

From Standard to Excellence: The Pillars of a Centre of Clinical Excellence in Stroke Recovery and Rehabilitation

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ABSTRACT

Stroke rehabilitation centres could play a vital role in promoting recovery and improving the quality of life of stroke survivors and their families. Many facets contribute to effective rehabilitation, including coordinated specialised multi-disciplinary teams, ongoing access to rehabilitation, early discharge planning and a goal-oriented approach to care. The concept of a Centre of Clinical Excellence represents an aspirational benchmark in stroke rehabilitation, characterised by exceptional patient care, innovative processes and optimising outcomes. However, there are no clear ways to determine which stroke rehabilitation centres are Centres of Clinical Excellence.

The International Stroke Recovery and Rehabilitation Alliance, in a collaborative effort between researchers and consumers, identified seven defining criteria of Centres of Clinical Excellence (CoCE) in Stroke Recovery and Rehabilitation. This PhD research, which was conducted with the active participation of international stroke rehabilitation centres, was designed to trial and evaluate the seven defining criteria and their underpinning indicators.

This research employed a pragmatic concurrent embedded mixed-method approach to explore the evidence on CoCE and to trial and evaluate the measurable indicators in centres that provided stroke rehabilitation. This method allowed the research questions to be answered from quantitative and qualitative perspectives, allowing for a more complete analysis. Initially, a scoping review was undertaken to explore how CoCE have been identified, developed or described in the international literature. Then, the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation were trialled and evaluated using a survey and semi-structured interview tools that were developed, guided by the Consolidated Framework for Implementation Research (CFIR) as the theoretical framework. Centres were asked whether they were able to demonstrate the performance of each criterion and indicator, and data were collected about participants'

perceptions of the indicators and experiences when gathering information on these. The responses regarding what data were collected at each site were descriptively analysed. Responses regarding perceptions, facilitators and barriers were thematically analysed using the Framework Analysis method and mapped to the constructs from the CFIR.

In total, 12 centres providing stroke rehabilitation services from low, middle and high-income countries participated in this research. Centres were able to demonstrate evidence for most of the indicators from Criterion 1 (Optimising Outcome and Delivering Rehabilitation), 3 (Interprofessional Working and Person-Centred Rehabilitation) and 6 (Receiving and Delivering Education). The least demonstrated indicators were from Criterion 2 (Research Culture), 5 (Leadership) and 7 (Advocacy). Within Criterion 4 (Knowledge Exchange and Mentorship), most centres were able to demonstrate nearly all the indicators in the Knowledge Exchange category but not the Mentorship category.

Overall, the participants from the centres acknowledged that the criteria and indicators set useful benchmarks for aspirational CoCE in Stroke Recovery and Rehabilitation. However, this research found that there were elements that influenced the usability of the indicators at the centres. These elements included the design of the indicators, the existing systems (Meso and Micro level) within and beyond the healthcare centres (Macro level), and the process used to gather and assess information to demonstrate performance on the criteria and indicators. It was noted that the trialling of the indicators highlighted several gaps in service and service delivery, prompting consideration for future service improvement initiatives at the centres involved. Additionally, the results highlighted the priority of different healthcare centres based on socioeconomic status, geographical location and healthcare funding model.

Ultimately, the centres reported that the overarching criteria were relevant and crucial to their stroke service. They emphasised the need for further refinement of the underpinning indicators to

improve the usability, which will be a key focus of future research. This research offers original insights into the field of stroke rehabilitation. It provides valuable feedback on the criteria and indicators, paving the way towards establishing a framework for Centres of Clinical Excellence in Stroke Recovery and Rehabilitation. The outcomes from this research will guide the development of a standardised framework for delivering excellent stroke care and outcomes for stroke survivors to establish the aspirational Centres of Clinical Excellence in Stroke Recovery and Rehabilitation at a global level.

DECLARATION

I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university
2. and the research within will not be submitted for any other future degree or diploma without the permission of Flinders University; and
3. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

Signed: *Thoshenthri Kandasamy*

Date: 21/01/2025

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PUBLICATIONS

Publication arising directly from this research

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Registered Protocol

Kandasamy T, Hendriks J, Stockley R, Lynch E. Conceptualising Centres of Clinical Excellence: A scoping review protocol. 2023. Available from <https://osf.io/rv7ad/>

Additional publications related to this research (Co-authored)

Stockley RC, Walker MF, Alt Murphy M, et al. Criteria and indicators for centers of clinical excellence in stroke recovery and rehabilitation: A global consensus facilitated by ISRR. *Neurorehabilitation and neural repair* 2024; 38 (2): 87-98. 20240111. DOI: 10.1177/15459683231222026.

Conference abstracts accepted for oral presentations

August 2024 – Smart Stroke Conference – Abstract accepted for a plenary session

Kandasamy T, Stockley R, Hendriks J, Lynch E. Evaluating Criteria and Indicators of Centres of Clinical Excellence in Stroke Recovery and Rehabilitation at Australian and International Centres [abstract] In Proceedings of the Smart Strokes: 29 – 30 August 2024; Gold Coast, Australia

October 2024 – World Stroke Congress – Abstract accepted for an oral presentation (11 minutes Free communication sessions)

Kandasamy T, Stockley R, Hendriks J, Lynch E. Evaluating the criteria and indicators of centres of clinical excellence in stroke rehabilitation centres globally [abstract] In Proceeding of the 16th World Stroke Congress, 23-26 October 2024, Abu Dhabi, United Arabs Emirates. *International Journal of Stroke*: 2024;19(2 suppl):3-498. doi:10.1177/17474930241274956

May 2025 – World Physiotherapy Congress, Tokyo, Japan – Abstract accepted for a focused symposium

World Physiotherapy Congress, Tokyo, Japan, May 2025. Titled Focused symposium: Exploring excellence in global stroke rehabilitation.

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September 2024 – Asia Pacific Stroke Conference – Abstract accepted for a poster presentation.

Kandasamy T, Stockley R, Hendriks J, Lynch E. International Stroke Recovery and Rehabilitation Alliance Centres of Clinical Excellence: evaluating the criteria and indicators at 13 centres [abstract] In Proceeding of the 2024 Combined Australian and New Zealand Stroke Organisation Conference: Transcending Borders, 25 – 28 September, Adelaide, Australia. Cerebrovascular Disease. 2024;53 Suppl 1:5-297. doi: 10.1159/000541320. Epub 2024 Sep 24. PMID: 39471793.

Other presentations during the candidature

- 3-Minute Thesis. Title: Conceptualising Centres of Clinical Excellence.
- Invited Speaker – To present PhD research and interim findings at an interviewed centre
- Invited speaker – South Australia Neuro Rehabilitation Exercise Physiology and Physiotherapy symposium

Prizes

2023: Smart Strokes Nursing and Allied Health Scholarship

2024: Flinders University Student Association Development Grant

2024: New Presenter Award – Smart Strokes Conference

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GLOSSARY

The terminologies used throughout the thesis have been explained below.

Accreditation	A formal process used to evaluate healthcare centres using pre-defined standards to ensure compliance with quality and safety benchmarks.
Applicability	Considers the indicators and how relevant they are to the stroke rehabilitation centres.
Centres	Healthcare centres /stroke rehabilitation units.
Centres of Clinical Excellence	A healthcare institution recognised for consistently delivering high-quality care, exceeding standard benchmarks.
Consolidated Framework for Implementation Research	A theoretical framework used to evaluate and guide the implementation of interventions using multiple domains and constructs.
Criteria and Indicators	Aspirational Centres of Clinical Excellence are measurable elements used to assess a stroke rehabilitation centre. In the survey and semi-structured interviews, indicators were also referred to as KPI (Key Performance Indicator).
Data	Evidence or information collected for indicators.
Dietitian	Dietitian or Nutritionist
Interdisciplinary Team	A group of clinicians from various disciplines work and collaborate to provide services.
Multidisciplinary Team	A group of clinicians working in parallel to each other to provide services.
Participants	Healthcare workers participating in the research. This was

predominately clinicians.

Patient-centred care	An approach that prioritises patient needs and preferences in all aspects of care delivery.
Physiotherapist	Physiotherapist or Physical Therapist
Quality improvement program	Ongoing processes within healthcare centres to improve service quality, patient safety and operational efficiency through systematic and regular evaluation.
Speech Pathologist	Speech Pathologist or Speech-Language Therapist
Stroke Recovery and Rehabilitation	A multidisciplinary process aimed at restoring functional abilities, improving quality of life and facilitating recovery after a stroke event.
Trialability	Evaluate the ease of testing the criteria and indicators.
Usability	Considers how well the design and function of the criteria and indicators align with the needs of the centre and participants, including ease of use.

LIST OF ABBREVIATIONS

ACHC	Australian Council on Health Care Standards International
AHA	Allied Health Assistant
ALO	Aboriginal liaison Officer (specific to Australian health services)
ANCC	American Nurses Credentialing Centre
AROC	Australasian Rehabilitation Outcomes Centre
CARF	Commission on Accreditation of Rehabilitation Facilities
CFIR	Consolidated Framework for Implementation Research
CINAHL	Cumulative Index of Nursing and Allied Health Literature
CoCE	Centres of Clinical Excellence
CoE	Centres of Excellence
DT	Dietitian
EQ-5D	EuroQol 5 Dimension (a quality-of-life measure)
FA	Framework Analysis
FIM	Functional Independence Measure
GOC	Global Oversight Committee
ISRRRA	International Stroke Recovery and Rehabilitation Alliance
JCI	Joint Commission International

KPI	Key Performance Indicators
LMIC	Low to Middle Income Country
MDT	Multi-disciplinary Team
MEDLINE	Medical Literature Analysis and Retrieval System Online
NA	Not Applicable
NICE	National Institute for Health and Clinical Excellence
OT	Occupational Therapist
PARIHS	Promoting Action on Research Implementation in Health Services
PRISMA-Scr	Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Review
PT	Physiotherapist
QI	Quality Improvement
REDCaps	Research Electronic Data Capture
Riksstroke	Swedish Stroke Register
SAC-HREC	Southern Adelaide Clinical Human Research Ethics Committee
SALHN	Southern Adelaide Local Health Network
SF-36	36 Item Short Form Survey (a quality-of-life measure)
SMART	Specific, Measurable, Achievable, Relevant and Time-bound (goal-setting tool)
SP	Speech Pathologist

SweReh	Sweden Rehabilitation
SW	Social Worker
TDF	Theoretical Domains Framework
TL	Team Leader
UK	United Kingdom
USA	United States of America
WSO	World Stroke Organisation

CHAPTER 1: INTRODUCTION

Stroke is a leading cause of disability in adults, and with advancing healthcare, the survival after a stroke is increasing.² With the increasing prevalence of survival post-stroke events, there are growing demands for stroke rehabilitation services.³ Stroke rehabilitation centres are continually improving their care, and recently, the concepts of clinical excellence and Centres of Clinical Excellence (CoCE) have emerged. Recognising this, a group of international stroke rehabilitation researchers have developed a set of aspirational criteria and indicators that could be used to identify and inform the development of a CoCE in Stroke Recovery and Rehabilitation.

This PhD research aimed to explore the concept of CoCE and to trial the criteria and indicators at global stroke rehabilitation centres. This introductory chapter sets the framework of this thesis by presenting the background context of CoCE and justification for this research. Additionally, it outlines the justification of research aims, objectives and questions and the significance of this research. The remainder of this chapter provides an overview of each chapter that will guide the reader towards a nuanced understanding.

1.1 Research Background

Stroke rehabilitation is an important stage in the stroke continuum of care.¹ While extensive research has been undertaken over the last 50 years on acute stroke care and preventative medicine, it was in more recent years that research on stroke rehabilitation has become more frequent.⁴ Aligned with advances in research, clinical services also have been advancing how healthcare is delivered. For example, many jurisdictions have healthcare accreditation processes to support clinical services in delivering high-quality care. Since the early 2000s, some healthcare centres that continually deliver care in line with clinical standards have started aiming higher, and the concept of 'clinical excellence' has been appearing in the literature, describing care that is

above and beyond standard care.⁵ Further, the concept of ‘centre of excellence’ or ‘centres of clinical excellence’ wherein an entire department of facility delivers excellent care has also been explored and these terms have been increasingly used in the literature in the last 10 years.⁶

1.2 Justification for the Research

Centres of Clinical Excellence (CoCE) has been widely used to describe centres outside and within the healthcare systems. While some healthcare centres are calling themselves CoCE, there is limited evidence on what defines a CoCE, and the processes involved in identifying as one.⁷ Further, the concept of a CoCE has not been described in stroke rehabilitation. As a result, further research is needed to define a CoCE in stroke rehabilitation and identify the elements that contribute to recognising a stroke rehabilitation centres as a CoCE. This research aims to bridge the gap by trialling the published criteria and indicators⁸ of CoCE in stroke rehabilitation published by the International Stroke Recovery and Rehabilitation Alliance at stroke rehabilitation centres globally. By trialling the indicators, this research will assess their relevance and adaptability to stroke rehabilitation centres globally, identifying the participants’ perception of the indicators, and explore the facilitators and barriers.

1.3 Research Aims

- **Aim 1:** To systematically explore, synthesise and summarise available evidence on CoCE.
- **Aim 2:** To map the defining criteria, selection and monitoring processes and evaluation protocols used in the literature when describing/identifying or establishing a CoCE.
- **Aim 3:** To trial the published criteria and measurable indicators of CoCE in Stroke Recovery and Rehabilitation at international stroke rehabilitation centres.
- **Aim 4:** To identify data collected for the CoCE criteria and indicators by the international rehabilitation centres.
- **Aim 5:** To analyse the facilitators and barriers to identifying and/or documenting evidence

regarding the criteria and indicators at international stroke rehabilitation centres.

- **Aim 6:** To evaluate the practices that align with the criteria and indicators at stroke rehabilitation centres based in diverse geographical regions and employing varying healthcare funding models.

1.4 Research Objectives

The objectives of this research project were:

- **Objective 1:** Describe the defining criteria, selection processes, and monitoring and evaluation protocols of CoCE that have been described in the published literature (Chapter 3: Scoping Review).
- **Objective 2:** Develop methods to trial the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation developed by the International Stroke Recovery and Rehabilitation Alliance at international stroke rehabilitation centres (Chapter 4: Methods and Methodology).
- **Objective 3:** Trial the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation at international stroke rehabilitation centres (Chapter 5: Descriptive Results).
- **Objective 4:** Compare and describe the data collected across the centres from different socioeconomic and geographical contexts, as well as healthcare funding models (Chapter 5: Descriptive Results).
- **Objective 5:** Identify, explore and evaluate the facilitators and barriers encountered while trialling the criteria and indicators in stroke rehabilitation centres (Chapter 6: Thematic Analysis).
- **Objective 6:** Examine and discuss the elements that influenced the trialling and evaluating

process, along with limitations and recommendations (Chapter 7: Discussion).

- **Objective 7:** Explore the influence and impact of using the criteria and indicators of CoCE in stroke rehabilitation centres (Chapter 7: Discussion).
- **Objective 8:** Evaluate the implication of trialling the criteria and indicators at stroke rehabilitation centres (Chapter 8: Conclusion).

1.5 Research Questions

The research questions were formulated to align with the research aims and objectives. The primary research question was

- What were the stroke rehabilitation centres' perceptions of the criteria and indicators of the Centres of Clinical Excellence in Stroke Recovery and Rehabilitation?

The secondary research questions were

- What CoCE have been described in the literature?
- What are the defining characteristics of CoCE?
- How are CoCE selected or nominated?
- What monitoring processes are employed to remain as CoCE?
- How can the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation be trialled at international stroke rehabilitation centres?
- What evidence do the centres collect against the criteria and indicators?
- How do the stroke rehabilitation centres view the criteria and indicators of the CoCE in Stroke Recovery and Rehabilitation?
- What were the facilitators and barriers identified by stroke rehabilitation centres when trialling the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation?

- What elements influenced the data collection against the indicators at the stroke rehabilitation centres?
- What drives healthcare centres to seek recognition as CoCE in stroke rehabilitation?
- How did the trial of the criteria and indicators of CoCE in stroke rehabilitation impact health service provision?

1.6 Significance of the Study

The findings from this research will contribute to understanding the mechanisms required to improve stroke rehabilitation services globally, recognising stroke rehabilitation centres that provide exceptional services and will set the stage for future research. This research will also explore the outcomes of trialling the criteria and indicators at the international centres while highlighting the pathways to achieving excellence in service delivery, research and patient outcomes. Ultimately, this research aims to contribute to advancing the field of stroke rehabilitation, highlighting pathways to excellence and inspiring future research and innovation, regardless of geographic or socioeconomic factors.

1.7 Structure of the Thesis

The structure of this thesis is organised into eight chapters, as outlined below:

Chapter 1: Introduction—Current chapter. It provides a brief outline of how this research was conceptualised and outlines the research aims, objectives, and questions. It also focuses on the significance of this research and its original contribution to the field of stroke rehabilitation, how this ties in with the research aims, and justification of the importance of this research.

Chapter 2: Background – This chapter provides an overview of the research, situating it within the existing literature. It describes where stroke rehabilitation is positioned within the context of the stroke continuum of care. It outlines the existing challenges in stroke rehabilitation from the

perspectives of healthcare funding and socioeconomics. This chapter also summarises the current processes used to collect clinical and service outcomes to maintain the rehabilitation services and the quality and safety processes utilised by healthcare centres. Finally, it explores the concept of excellence, the current gaps in the field of stroke rehabilitation and the aspirational criteria and indicators of CoCE in Stroke Recovery and Rehabilitation.

Chapter 3: Scoping Review – This scoping review chapter presents findings from the scientific and grey literature about existing CoCE from a broad array of clinical settings. The chapter synthesises and presents the results of the defining characteristics of CoCE and the selection and monitoring processes currently conceptualised or used at these centres. This chapter contributes to the current research on existing CoCE and how this can be adapted to guide CoCE in the field of stroke rehabilitation. This scoping review highlighted that there were no established frameworks that could be applied in this research, therefore a novel methodology had to be developed to trial the criteria and indicators.

Chapter 4: Methods and Methodology – This chapter details the research design, methodology viewed from the ontological and epistemological stances, and data collection and analysis techniques used to answer the research questions. It includes the stance of the PhD candidate, the justification for method selection, and how this aligns with research aims and objectives. This chapter outlines the methods used to trial the criteria and indicators, and ethics considerations for the participating centres.

Chapter 5: Descriptive Results—This chapter summarises the outcomes from the descriptive data collected from the survey and semi-structured interviews. The responses are structured using the criteria and indicators as subheadings. The responses are collated in tables with descriptions and comparisons provided in narrative forms.

Chapter 6: Thematic Analysis—This chapter presents the thematic findings from the semi-structured interviews. The themes were derived using the Framework Analysis method and coded to the Consolidated Framework for Implementation Research. This chapter explores emerging patterns and commonly identified themes, as well as participants' perceptions of the criteria and indicators and how they influenced current practice.

Chapter 7: Discussion – This chapter triangulates, interprets and discusses the results from Chapters 5 (Descriptive Results) and 6 (Thematic Analysis) and contextualising these with the findings from Chapter 3 (Scoping Review). The discussions are centred on the usability, applicability, and relevancy of the criteria and indicators and how the different levels of the healthcare structure influence this. Additionally, the strengths and limitations of this research were explored.

Chapter 8: Conclusion – This final chapter summarises the key contribution of this research to advancing the aspirational CoCE in Stroke Recovery and Rehabilitation. It emphasises the implications for practice, the significance of the findings, the recommendation and the impact of future directions to advance this work. Additionally, it outlines the revised criteria and indicators of the CoCE based on the findings from this research.

CHAPTER 2: BACKGROUND

2.1 Chapter Overview

This chapter provides a comprehensive introduction to stroke rehabilitation and its key challenges. It examines the current global stroke guidelines and accreditation processes used by stroke rehabilitation centres, providing a context of how they shape the current care standards, and influence patient and service outcomes. Additionally, this chapter explores the concept of excellence by reviewing the existing literature on 'clinical excellence' and 'centres of clinical excellence', highlighting key concepts and trends. Finally, this chapter discusses the established criteria and indicators of Centres of Clinical Excellence (CoCE) in Stroke Recovery and Rehabilitation and identifies the gaps in knowledge that inform the research aim. Some parts of this chapter have been submitted for publication.

Publication: Kandasamy T, Stockley RC, Hendriks JM, Fini NA, Bulto LN, Lynch EA. Conceptualising Centres of Clinical Excellence: A Scoping Review. *BMJ Open*. 2024 Dec 1;14(12):e082704.

2.2 Stroke Rehabilitation in the Continuum of Care

Stroke is the second leading cause of death globally⁹ and third leading cause of disability in adults.^{10, 11} One in four people will experience a stroke event in their lifetime.¹² Stroke and stroke-related disability are more prevalent in lower to middle-income countries, with stroke burden (stroke-related deaths and disability-adjusted life years) increasing rapidly.^{13, 14} In Australia, it was estimated that one stroke occurs every 19 minutes, with increased prevalence among regional Australians.¹⁵

The World Stroke Organization (WSO) established the Global Stroke Guidelines and Quality Committee in 2014 to improve evidence-based stroke care and, after further consultation, founded the Global Stroke Services Action Plan.¹ This action plan led to the Global Stroke

Services Framework, which focused on the continuum of care after a stroke. The continuum of care or stages of recovery (Figure 2.1) can be delineated as hyperacute, acute, and rehabilitation (early subacute, late subacute, and chronic).^{1, 16} Stroke service models or guidelines are tailored to specific healthcare systems and differ between countries. However, resource availability, infrastructure, and access to services can still influence care at any stage of the continuum even within the same countries.¹² With the aim of reducing the risk of stroke and stroke-related deaths and disability, stroke research tends to focus on primary and secondary stroke prevention, the hyperacute and acute stages post-stroke. These developments include increasing education on stroke risks and prevention, progressive and innovative treatment ideas, and optimising acute care pathways and guidelines.

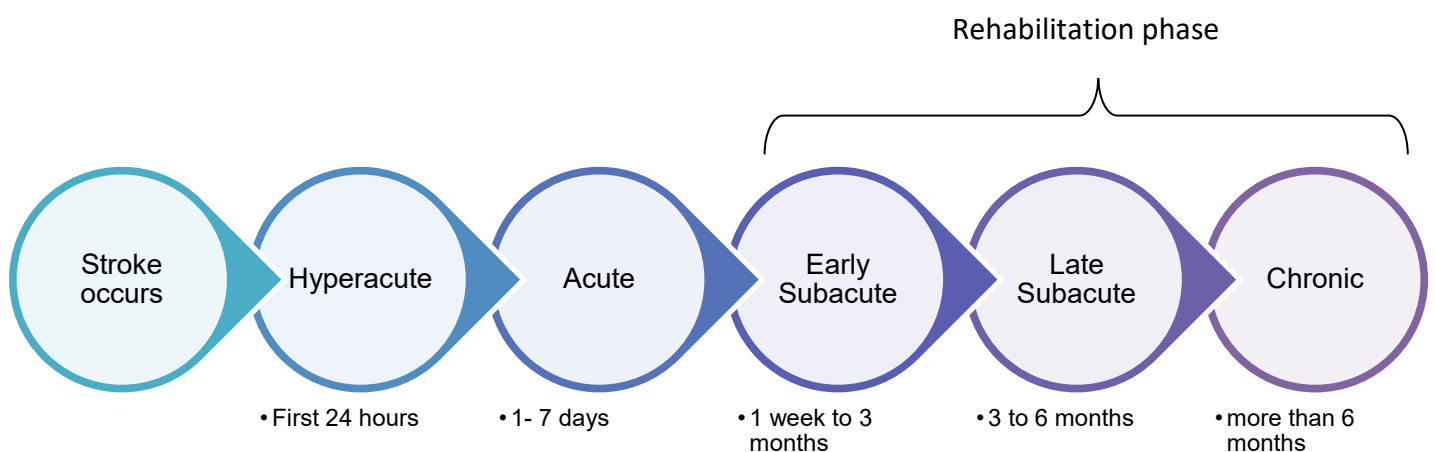


Figure 2.1 Continuum of Care showing stages of recovery after a stroke event. Adapted from WSO guidelines.¹

With advancing healthcare, ongoing work in stroke prevention and the continual effort to reduce stroke mortality (e.g. revascularisation with tissue-type plasminogen activator or mechanical thrombectomy), both in developing and developed countries, the prevalence of survival after a stroke event is increasing, thereby increasing stroke morbidity.¹⁶ This increase has been associated with an increased burden of disability caused by stroke on stroke survivors and their families,

therefore highlighting the importance of increasing the focus in the stroke rehabilitation and recovery phase.^{2, 16}

2.2.1 Within a Systems Perspective

Stroke rehabilitation exists within a complex health ecosystem, influenced by interconnected factors operating at the macro, meso and micro levels. These levels are dynamically interacting, creating a complex and adaptive system that can shape the uptake and receptivity of new innovations.¹⁷ Therefore, when trialling an innovation, the broader healthcare system elements should be analysed to understand the dynamics within this complex adaptive system and the interplay of these elements.¹⁸ This ensures that the dynamic of the macro-level policies (funding and frameworks), meso-level resource allocations (organisational structures and processes), and micro-level individual behaviours and experiences are accounted for to provide a holistic understanding of how innovations are received and integrated within the health system.¹⁷

2.3 Challenges in Stroke Rehabilitation: A Global Perspective

Stroke recovery and rehabilitation is an important phase in the stroke journey to regain independence in physical, cognitive and communication functions and is key to reducing and improving the level of disability.¹⁴ The rehabilitation process is dynamic, progressive, and goal-oriented to improve the quality of life of stroke survivors.¹⁹ Stroke rehabilitation commences once the patient is medically stable and has identifiable goals for rehabilitation. The demand for rehabilitation is increasing with increasing rates of disease, and timely access to rehabilitation is important to promote early recovery of function.²⁰ Effective rehabilitation often includes having a coordinated specialised multidisciplinary team, early and ongoing access to rehabilitation, early discharge planning, and a goal-oriented approach.² Stroke survivors from low- to middle-income countries experience a lesser functional gains compared to those from high-income countries, which can be associated with the quality of rehabilitation services.¹⁴

2.3.1 Stroke Rehabilitation in the Context of Healthcare Models

Internationally, rehabilitation after a stroke event varies due to healthcare funding models, access to services, length of stay and local guidelines.²¹ Healthcare systems are often loosely based on four healthcare funding models (Figure 2.2).

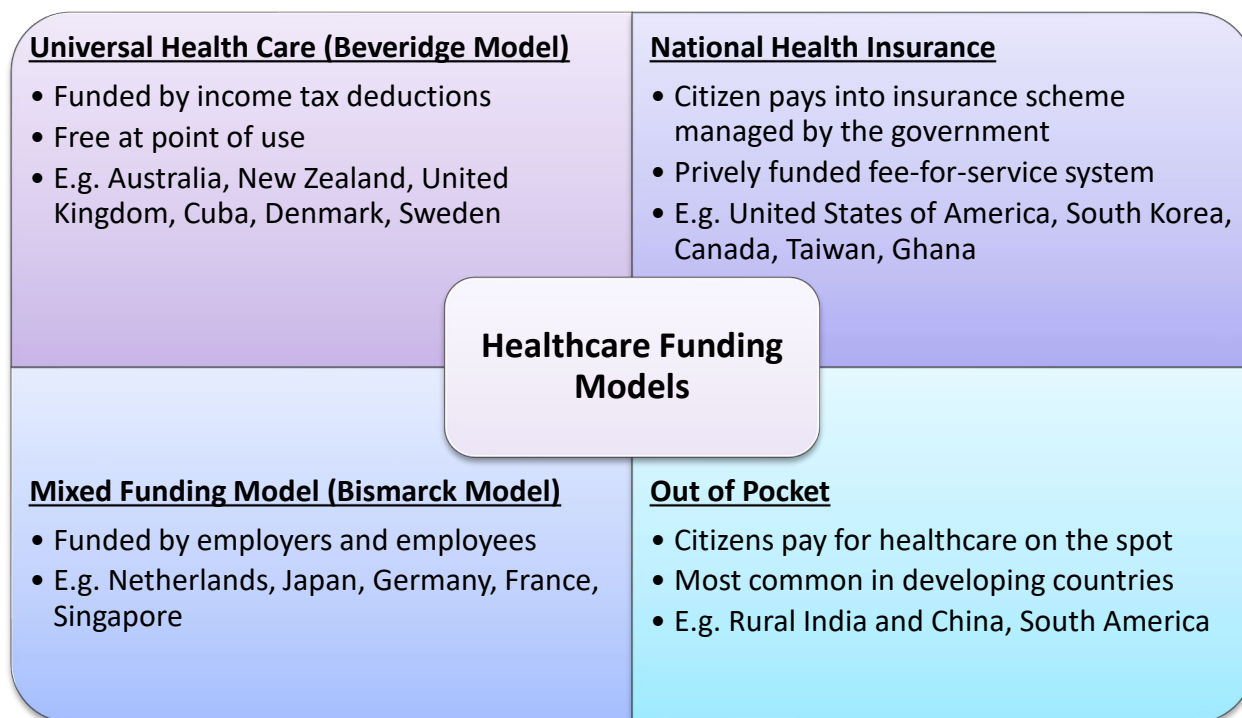


Figure 2.2 The four types of healthcare funding model.

The Beveridge Model, also known as Universal Health Care (used in countries including the United Kingdom, Spain, Australia, and Cuba), is based on a structure when the government acts as a single-payer and provides the public with free healthcare.^{22, 23} Comparatively, the United States of America and Taiwan do not have a universal health system and use the National Health Insurance model, a privately funded fee-for-service system.²² Countries such as Germany, Japan, Singapore, and the Netherlands have based their healthcare services on the Bismarck Model, which uses a mixed system that funds healthcare through employer deduction.²² The final type of funding is used in rural areas of India, South America, China, and Africa. It is known as the ‘out-of-pocket’ model, in which individuals pay for their care.²³

The healthcare models influence stroke rehabilitation differently in different phases of stroke rehabilitation and funding availability. The variability in healthcare models can impact on the standardisation of stroke care, thereby adding to the complexity of establishing the standard uniform of care globally. For example, in the United States of America, those who experience mild or severe strokes are managed in outpatient and skilled nursing facilities, respectively.²⁴ Patients with moderate-severe strokes are admitted into rehabilitation centres and treated aggressively with a shorter length of stay and promotion of early discharge.²⁴ Comparatively, countries with Universal Health Care (based on the Beveridge Model) tend to accept patients later in their journey into a rehabilitation program (sub-acute phase) with limited choices for inpatient rehabilitation. They also stay longer within the program and are discharged with higher functional independence measure (FIM) scores compared to rehabilitation centre based on other healthcare funding.²⁴ These differences in rehabilitation service delivery could be driven by the financial accountability that different healthcare models impose.²⁴

2.3.2 Stroke Rehabilitation from Socioeconomics Perspectives

Stroke rehabilitation faces disparities in access, outcomes and quality of care, especially between high and low to middle-income countries.²⁵ The disparities are caused by socioeconomic constraints, funding availability, resource limitations, workforce challenges and sub-optimal rehabilitation services.²⁶ These disparities are between high and low to middle-income countries and among the marginalised and remote communities in high-income countries. Additionally, the differences in access to rehabilitation are further amplified between lower and higher-income countries, resulting in international rehabilitation experts raising “a call for action” to reduce disparities and improve stroke rehabilitation delivery services in lower-income countries.²⁷ This highlights the need for a globally applicable framework that could encourage stroke rehabilitation centres to strive for excellence in care. The call for action also highlighted the need to establish a

framework or benchmark with global engagement to bridge the gap between countries with different healthcare models and socioeconomic levels.²⁷

2.4 Stroke Guidelines

In 2016, the World Stroke Organisation (WSO) developed a roadmap to deliver quality stroke care to support healthcare administrators and clinical groups in implementing, monitoring, and evaluating high-quality stroke rehabilitation services.^{1, 9} The roadmap included core evidence-based recommendations that should be delivered by all stroke rehabilitation services, including a set of recommendations to be implemented at minimum (i.e. poorly resourced) services and a further suite of recommendations that should be implemented in advanced stroke services.¹

Stroke guidelines are developed by individual countries and reflect their unique healthcare priorities. The guidelines primarily focus on outcome-based clinical care. Stroke guidelines often describe the features across the stroke continuum of care, with some countries embedding the elements of rehabilitation section within the guidelines and other countries developing separate stroke rehabilitation guidelines. A study²⁸ mapping the stroke guidelines globally concluded that health professionals from high-income countries are more aware of the stroke guidelines compared to low-to-middle-income countries (LMIC). Stroke experts from high-income countries develop the guidelines for their specific healthcare systems, which, on occasion, are adopted by other stroke services, especially those from LMIC.²⁹ However, the guidelines may not be adaptable to LMIC because of the different healthcare funding, resource availability, and infrastructure that are available to high-income countries. The guidelines developed by LMIC can be of lesser quality.³⁰ While implementing best practice guidelines and evidence-based recommendations does not encompass all aspects of achieving clinical excellence, it provides the foundation to address global disparities in stroke rehabilitation and ensure stroke survivors receive optimum care. Table 2.1 below lists examples of stroke guidelines and whether stroke rehabilitation has been included

within the guidelines or had its guidelines.

Table 2.1 Examples of stroke rehabilitation-specific guidelines and stroke guidelines with rehabilitation components.

Country	Stroke Guidelines	Rehabilitation component
United Kingdom and Ireland	National Clinical Guideline for Stroke for UK and Ireland. ^{31, 32}	Embedded within stroke guidelines
Australia and New Zealand	Living Clinical Guidelines for Stroke Management. ³³	Embedded within stroke guidelines
United States of America	Guidelines for Adult Stroke Rehabilitation and Recovery: A Guideline for Healthcare Professionals from the American Heart Association/ American Stroke Association. ³⁴	Specific stroke rehabilitation guidelines
Canada	Rehabilitation and Recovery Following Stroke. ³⁵	Specific stroke rehabilitation guidelines

2.5 Certification

While stroke guidelines are developed to help clinicians understand what clinical care should be delivered to which patient cohort, certification programs are a means of monitoring clinical care delivery at an organisational level. Participation in certification programs means to be recognised as a clinical unit or organisation that provides quality, equitable care.³⁶ Based on the Roadmap for Quality Stroke Care, the WSO developed a stroke certification³⁷ initiative to improve access to quality acute stroke care globally. Adopting this, various countries or regions have developed acute stroke certification programs (Figure 2.3) to increase the quality of acute stroke care (i.e. in the first 24 to 48 hours post stroke) and improve patient outcomes. Some regions work in

collaboration with WSO to deliver stroke certification programs specific to that region, and others have sought national or external certification programs as portrayed in Figure 2.3 below. While stroke certification for acute stroke has been developed, there are limited work in the rehabilitation phase, therefore highlighting the importance of exploring certification within stroke rehabilitation.

Region-specific (in collaboration with WSO)	National-specific (based on WSO certification program)	External program
<ul style="list-style-type: none"> • WSO/MENA-SINO (Middle East North Africa Stroke and Interventional Neuro-Organisation) • WSO/NABH (National Accreditation Board of Hospitals and Healthcare providers) • WSO/SIECV (Latin America) • ESO (European Stroke Organisation) stroke units and centre certification 	<ul style="list-style-type: none"> • Australian Stroke Unit Certification Program 	<ul style="list-style-type: none"> • Joint Commission International Stroke Certification (e.g China, United States of America, Singapore, India) • DNV (Det Norske Veritas) - Acute Stroke Ready Certification (e.g. United States of America, Norway)

Figure 2.3 Stroke certification programs that are used by different countries/regions.

2.6 Accreditation

Delving briefly into the quality and safety aspects of healthcare delivery, the goal is to ensure healthcare centres participate in ongoing quality and safety improvement using stringent standards and indicators, many of which incorporate evidence-based recommendations.³⁸ Most healthcare organisations internationally have to meet national accreditation standards, which focus on quality and safety standards by addressing clinical practices, organisational performance,

staff efficiency and high-quality care.³⁹ These accreditation standards are often enforced and regulated by governing bodies (i.e. funding bodies) to ensure the healthcare centres meet the required health and safety standards. Accreditation processes also monitor consistent care delivery and patient safety. Some of the accreditation bodies that are used by healthcare centres, are the Joint Commission International (JCI), the Commission on Accreditation of Rehabilitation Facilities (CARF) and the Australian Council on Health Care Standards International (ACHC). For example, all public and private healthcare centres in Australia must meet the National Safety and Quality Health Service Standards regulated by the Australian Commission on Safety and Quality Healthcare. The accreditation processes typically assess healthcare centres against pre-defined benchmarks using a mixture of documentation reviews, audits and site visits to ensure centres meet the minimum health and safety expectations to maintain the standard of care. If a healthcare centre fails to comply with accreditation standards, it may face sanctions, fines or penalties.³⁹

Accreditation is important to ensure a consistent standard of care through focussing on clinical processes. However, limited data tend to be collected on patient-centred outcomes such as patient-reported outcomes and experience measures. Other limitations of accreditation processes are that they tend to lack adaptability, and results cannot be benchmarked or compared between different socioeconomic and cultural contexts and between countries if different accreditation bodies are used. Accreditation does not typically focus on innovative healthcare which can hamper healthcare centres from aiming for care beyond standard. Therefore, to strive for above the standard care, healthcare centres may need to adopt different frameworks that encourages innovation and excellence in care.

Recognising this gap, healthcare organisations are increasingly voluntarily initiating self-development to deliver excellence in evidence-based, patient-oriented clinical care to improve

patient outcomes.³⁹⁻⁴¹ This is in line with healthcare shifting from traditional medical models, which are centred on morbidity and mortality, to wellness models, which focus on patient satisfaction, patient-perceived health status, and quality of life.^{42, 43} Excellence in clinical care encompasses elements such as healthcare access, equity of service provision, and services that improve patient outcomes, patient experience, and health service efficiency. Healthcare centres worldwide use various methodologies to measure and monitor service delivery to provide the best care to their communities within their resource constraints.⁴²

2.7 The Concept of ‘Excellence’

Recognising the need for excellence in holistic clinical care, the concept of ‘clinical excellence’,⁴⁴ along with similar terms such as ‘research excellence’,⁴⁵ ‘service excellence’⁴⁶ and ‘operational excellence’,⁴⁷ are increasingly being used in the international literature to describe different aspects of excellence in healthcare.

Focusing specifically on clinical excellence, the concept has been used to describe policy development, engagement with the clinical workforce, health research, and the promotion of excellence in specific areas of healthcare.^{6, 48} Some authors have defined the domains of clinical excellence in different areas of medicine from the perspectives of clinicians.^{44, 49, 50} For example, three qualitative studies (Table 2.2 below) sought to identify elements that are important in achieving clinical excellence. These differences in factors underpinning excellence highlight the importance of making sense of the different terms and gaining an understanding of clinical excellence, that encompasses the views of both the clinicians and the people who receive healthcare.

Aiming for clinical excellence is important in healthcare. It inspires healthcare professionals to pursue the best clinical care for their patients and encourages the healthcare facility to aspire for

the latest evidence-based care for their community. Clinical excellence encourages healthcare centres to strive to provide patients with up-to-date, evidence-based, high-quality healthcare and a platform to promote interdisciplinary collaboration.⁵¹ For the purpose of this research, clinical excellence will be defined as:

“Providing patients with an exceptionally high level of effective and efficient evidence-based care while maintaining the highest quality and safety standards and promoting excellent clinician engagement.”^{49, 50, 52-61}

Table 2.2 Elements required to achieve clinical excellence, described by three studies: Christmas et. al., Kotwal et. al. and Kapur.

Christmas et.al⁴⁹ (Described eight domains of excellence)	Kotwal et. al⁵³ (Described seven domains related to clinical excellence)	Kapur⁵² (Described 15 Pillars of Excellence)
Communication and Interpersonal Skills	Communicating Effectively	Evidence Based Thinking and Practice ^a
Professionalism and Humanism	Appreciating Partnership and Collaboration	Professional and Peer Accreditation ^a
Diagnostic Acumen	Having Superior Clinical Judgment	Decision Support Systems ^a
Skilful Negotiation of the Healthcare System	Being Organised and Efficient	Effectiveness and Efficiency ^a
Knowledge	Connecting with Patients	Learning and Risk Management ^a
Scholarly Approach to Clinical Practice	Understanding Need for Professional Growth and Development	Interpersonal Skills ^b
Passion for Clinical Medicine	Being Professional and Humanistic	Collaboration and Leadership ^b
Reputation for Clinical Excellence		Resilience and Stress Management ^b
		User Involvement ^b
		Moral Principles ^b
		Policy and Succession Planning ^c
		Teaching and Training ^c
		Innovation ^c

		Research and Publications ^c
		Income Resource Generation ^c

^aTechnical Pillars; ^bPersonal Pillars; ^cFuture Pillars

Beyond defining different facets of excellence, a recent development has been to label healthcare centres as Centres of Clinical Excellence (CoCE).^{6, 7, 52} While clinical excellence includes disease-specific criteria, CoCE is inclusive of all aspects of care, from macro- to micro-systems and often refers to a healthcare centre. CoCE is typically defined as an outstanding centre that undergoes rigorous standards to provide care above and beyond the standard. CoCE ranges in scope from entire healthcare organisations to single areas of medicine (e.g. departments/wards/clinics). Elrod and Fortenberry (2017) defined CoCE as:

“A program within a healthcare institution which is assembled to supply an exceptionally high concentration of expertise and related resources centred on a particular area of medicine, delivering associated care in a comprehensive interdisciplinary fashion to afford the best patient outcome possible.”^{6(p16)}

CoCE has been described in clinical areas, including cardiology, infectious disease, and oncology, with variations in the usage of this term.^{44, 50, 62, 63} Despite the emerging research in these areas, no work has been identified reporting on CoCE in the field of stroke rehabilitation.

2.8 Criteria and Indicators of Centres of Clinical Excellence in Stroke Rehabilitation

The International Stroke Recovery and Rehabilitation Alliance (ISRRA) is a group of stroke rehabilitation experts with clinical and scientific backgrounds collaborating together to improve lives of stroke survivors. ISRRA highlighted a key theme for future research: the ‘development of a network of Clinical Centres of Excellence in Stroke Recovery’.⁶⁴ From the brief literature search that was completed, it was found that published literature was available on research excellence in the field of stroke, but very limited evidence exists on clinical excellence in stroke rehabilitation.

In 2020, ISRRA assembled an expert working group to collaborate and develop globally relevant

criteria and measurable indicators to define CoCE in Stroke Recovery and Rehabilitation. The criteria and measurable indicators were developed over two stages through multiple consultations with stakeholders (researchers, clinicians, stroke survivors, and families) from different countries. Stage one involved developing the criteria which was completed in 2020, and stage two was completed in 2022 and involved developing and finalising the measurable indicators. This resulted in seven criteria (Figure 2.4), which included 46 indicators and 25 sub-indicators.⁸

Centers of Clinical Excellence

Criteria		Indicators
OPTIMAL OUTCOME		Optimal outcome Outstanding rehabilitation
RESEARCH CULTURE		Organizational processes and systems Links with external agencies Staff expertise and culture
INTERPROFESSIONAL WORKING		Support patient and family involvement Interdisciplinary teamwork
KNOWLEDGE EXCHANGE		Knowledge exchange Mentorship
LEADERSHIP		Leadership development Leaders engage with stakeholders National/international Leadership
EDUCATION		Receiving education Delivering education
ADVOCACY		Communication Equitable access Advocacy

Figure 2.4 Criteria and Categories (Indicators) of Centres of Clinical Excellence in Stroke Recovery and Rehabilitation. Adapted and modified from Stockley et. al.⁸

2.8.1 Summary of Criteria and Indicators

A full description of the criteria and the list of indicators have been published in the article that the PhD candidate co-authored.⁸ A complete list of indicators and sub-indicators is included in Chapter 5 (Descriptive Results). A brief description of the criteria is as follows:

Criterion 1 (Optimal Outcome)	A CoCE in Stroke Recovery and Rehabilitation delivers outstanding rehabilitation (evidence-based practice within the recommended time) by ensuring optimal outcomes for stroke survivors, carers, and services.
Criterion 2 (Research Culture)	A CoCE in Stroke Recovery and Rehabilitation has a positive research culture, research collaboration, and recognition with national and international organisations. Additionally, it demonstrates the translation of research into best clinical practice.
Criterion 3 (Interprofessional Working)	A CoCE in Stroke Recovery and Rehabilitation demonstrated person-centred rehabilitation through interprofessional working relationships in which clinicians, stakeholders, stroke survivors, and families work together to achieve a common goal.
Criterion 4 (Knowledge Exchange)	A CoCE in Stroke Recovery and Rehabilitation encourages best practices through knowledge exchange and mentorship between centres, stakeholders and clinicians.
Criterion 5 (Leadership)	A CoCE in Stroke Recovery and Rehabilitation demonstrates value-based leadership to support workforce development and collaboration between stakeholders and leaders.

Criterion 6 (Education)	A CoCE in Stroke Recovery and Rehabilitation promotes the delivery of high-quality education to clinicians, stroke survivors, and families, as well as opportunities for staff to engage in education for skill development.
Criterion 7 (Advocacy)	A CoCE in Stroke Recovery and Rehabilitation should actively advocate for equitable access to stroke services and rehabilitation and promote innovative service delivery through funding and research.

With the issues raised and the gaps identified above, this PhD research seeks to map and synthesise evidence on CoCE. Then, this research aims to trial and evaluate the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation at international stroke rehabilitation centres.

2.9 Chapter Summary

This chapter highlighted the current knowledge gap in acknowledging that the concept of ‘clinical excellence’ or ‘centres of clinical excellence’ has been used in the field of stroke rehabilitation. This chapter also outlined stroke rehabilitation within the stroke continuum of care and the influence of socioeconomic status, healthcare funding, geographical areas, and resources on service delivery and patient outcomes. Additionally, it highlighted the function of accreditation, certification and stroke guidelines with regards to stroke rehabilitation. This underscored the importance of this PhD research to explore how the pre-established criteria and indicators of CoCE will change how the rehabilitation centres measure their performance, which might shift how stroke rehabilitation is delivered. The next chapter in this thesis will explore the current evidence on CoCE in the wider literature and how they are defined, developed, monitored and evaluated.

CHAPTER 3: SCOPING REVIEW

3.1 Chapter overview

This chapter presents a review of the literature on the concept of Centres of Clinical Excellence (CoCE). A scoping review methodology was used to map the defining characteristics of CoCE, the criteria and processes used to select these centres, and the monitoring and evaluation protocols used. A version of this scoping review has been published in BMJ Open (see Appendix B for the formatted version of the publication). The scoping review protocol was prospectively registered with Open Science Framework (see Appendix A). This chapter has been formatted to align with the rest of the chapters in this thesis, with sections from the scoping review background included in the previous chapter (Chapter 2: Background).

The publication was co-authored with Associate Professor Elizabeth Lynch, Associate Professor Rachel Stockley, Professor Jeroen Hendriks, Dr. Lemma Bulto, and Dr. Natalie Fini. The PhD candidate contributed approximately 80% of the completed work and was responsible for writing up the protocol for the scoping review and the initial draft of the scoping review manuscript. The PhD candidate also revised the manuscript with the suggested edits provided by the other authors and was responsible for the submission process in accordance with publication guidelines. A co-authorship form (signed by three main authors excluding the PhD candidate) was completed and submitted along with the thesis.

The overall aims of the scoping review were:

- **Aim 1:** To systematically explore, synthesise and summarise available evidence on CoCE.
- **Aim 2:** To map the defining criteria, selection and monitoring processes and evaluation protocols used in the literature when describing/identifying or establishing a CoCE.

This chapter review answered the following questions:

- What CoCE have been described in the literature?
- What are the defining characteristics of CoCE?
- How are CoCE selected or nominated?
- What monitoring processes are employed to remain as CoCE?

The following documents are included in the appendix

Appendix A: Kandasamy T, Hendriks J, Stockley R, Lynch E. Conceptualising Centres of Clinical Excellence: A scoping review protocol. 2023 Available from <https://osf.io/rv7ad/>

Appendix B: Publication: Kandasamy T, Stockley RC, Hendriks JM, Fini NA, Bulto LN, Lynch EA. Conceptualising Centres of Clinical Excellence: A Scoping Review. BMJ Open. 2024 Dec 1;14(12):e082704.

Appendix C: Scoping review extraction - Data extraction Part 1 (Data extraction Part 2 has been included within this chapter as Table 3.4)

3.2 Abstract

Background: Centres of Clinical Excellence (CoCE) are nominally healthcare centres that provide excellent, patient-centred, evidence-based care. However, despite the increasing prevalence of CoCE internationally, there is a lack of clarity on how these centres are identified, described and monitored. This scoping review aimed to explore and map how CoCE has been described in the literature. Additionally, it will investigate the defining characteristics, the selection criteria and processes, and the monitoring and evaluation protocols used to establish the CoCE described in

the literature.

Methods: A refined scoping review methodology using Arksey and O'Malley's framework with enhancement from Levac was applied. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews were also used. A comprehensive search using MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus to identify relevant published studies between January 2010 and June 2022. Additionally, grey literature was searched using Google and Google Scholar. A bespoke data charting form was developed to collate data on the features of each CoCE.

Results: In total, 5318 records were screened for relevance, and 50 records describing 45 CoCE were included in this review. With the exception of one CoCE, all CoCE focussed on one clinical condition/population, and most were published in the USA (n=25, 56%). These clinical conditions were mostly cardiac disease (n=8, 17%), spinal surgeries (n=4, 9%), and pituitary tumours (n=4, 9%). More than half of the CoCE (n=30, 67%) described a structured process to establish CoCE. The definitions of CoCE were not uniform. Common defining features included the volume of patients treated, a concentration of medical expertise, a highly skilled multi-disciplinary team, delivery of high-quality care, and achievement of excellent patient outcomes. The selection process as a CoCE varied from self-identification with no explicit criteria or assessment process, to application and assessment by an approval panel.

Discussion and Conclusion: Despite a growing prevalence of CoCE, there are inconsistencies in how these centres are established, identified, monitored and evaluated. Common (but not uniform) features of CoCE are highly skilled staff, high-quality care delivery and optimal patient outcomes. No literature has been identified on CoCE in Stroke Rehabilitation.

3.3 Background

Healthcare centres worldwide have a shared goal to continually improve healthcare delivery, often using stringent standards and indicators.^{38, 39} Improvements in healthcare delivery can take the form of defining best clinical practice or effectively demonstrating important aspects of care, such as safety, access, affordability, equity, effectiveness and efficiency.

Most healthcare organisations must meet national quality and safety standards to address clinical practice and organisational performance.³⁹ Accreditation is instrumental in achieving a baseline standard of care, but it has inherent limitations when it comes to achieving care that strives to be excellent or seeks to optimise patient-reported outcomes and experience. Recognising this gap between care that meets accreditation standards and “excellent” care, some healthcare centres are taking proactive steps to engage in self-improvement and seek recognition for delivering exceptional care.

This aspiration for excellence within healthcare is often labelled as ‘clinical excellence’,⁴⁴ with organisations that deliver exceptional patient care being termed ‘Centres of Excellence’ or ‘Centres of Clinical Excellence’.^{6, 7, 52} A recently published review⁷ summarised evidence pertaining to Centres of Excellence in healthcare, education, research, industry and information technology. The authors of this review concluded that there are inconsistencies in how healthcare centres are designated as Centres of Excellence and ambiguity between Centres of Excellence and regular healthcare centres, with limited information on how these Centres were evaluated.

Attaining recognition as a CoCE could be a source of inspiration, as it encourages healthcare centres and health professionals to pursue the best clinical care for their patients as well as being recognised as the leader in healthcare provision.⁵¹ This motivates healthcare centres to aspire to promote high-quality, up-to-date, evidence-based care to their community.⁵¹ Despite the

increasing use of the term CoCE, there is a lack of clarity about how this term is defined, how sites are nominated and selected as a CoCE and how a CoCE is evaluated and monitored.

The primary aim of this scoping review was to map evidence on CoCE in healthcare. The scoping review sought to explore and answer the following questions systematically:

- What CoCE have been described in the literature?
- What are the defining characteristics of CoCE?
- How are CoCE selected or nominated?
- What monitoring processes are employed to remain as CoCE?

3.4 Method

3.4.1 Protocol and Registration

A scoping review was selected for this research as it allows for an inductive approach and answers broad research questions. The scoping review protocol was developed to define the objectives and methods of the scoping review based on the research question above. The scoping review protocol was registered on the Open Science Framework in April 2022.⁶⁵ The scoping review framework proposed by Arksey and O'Malley⁶⁶ with the refinement outlined by Levac, Colquhoun and O'Brien⁶⁷ to evaluate the evidence on CoCE were used. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) were followed.⁶⁸

3.4.2 Information Sources and Searches

A search strategy was developed with the support of a research librarian. The keywords used were:

“centre of clinical excellence” OR “networks of excellence” OR “best practice” OR

“clinical exemplars” OR “integrated healthcare delivery” OR “excellence” OR

“clinical protocols” OR “clinical competence” as search terms, subject headings, concepts or keywords.

The searched databases included MEDLINE Ovid, PubMed, Web of Science, CINAHL, and Scopus, to identify recently published records between January 2010 and June 2022.

Example of literature search

- MEDLINE Ovid:** (((centre* or network* or best practice or institute*) adj3 clinical excellence) or center of excellence or centre of excellence).ti,ab,kf.
- CINAHL:** TI ((((centre* or network* or best practice or institute*) adj3 clinical excellence) or center of excellence or centre of excellence)) OR AB ((((centre* or network* or best practice or institute*) adj3 clinical excellence) or center of excellence or centre of excellence))
- Web of Science:** ((TI = (((centre* or network* or best practice or institute*) NEAR3 clinical excellence) or center of excellence or centre of excellence)) OR AB=(((centre* or network* or best practice or institute*) NEAR3 clinical excellence) or center of excellence or centre of excellence))) OR AK=(((centre* or network* or best practice or institute*) NEAR3 clinical excellence) or center of excellence or centre of excellence))

Grey literature (government reports, policies, protocols, conference proceedings, unpublished studies) and relevant websites using Google and Google Scholar were also searched. Reference lists of included records were searched to check for further relevant records.

Inclusion and exclusion criteria are presented in Table 3.1. The records included were those that discussed CoCE, which provided clinical care for people with any health condition in any setting

(primary care, inpatient, outpatient, or community). Records had to describe how a CoCE was defined, established, monitored, or evaluated to be included in the scoping review. Records that used the term “CoCE” without outlining any criteria were excluded. Centres of Excellence that were not designed to provide clinical care (such as Centres of Research Excellence) were excluded. Given the exploratory nature of the research questions, there was no limitation to study populations or interventions.

Table 3.1 Inclusion and exclusion criteria for the scoping review.⁶³

<p>Inclusion criteria</p> <ul style="list-style-type: none"> ➤ Records were available in the English language ➤ It included information on CoCE ➤ Healthcare organisations or services providing clinical care to people with any healthcare condition ➤ Records are published from January 2010 ➤ CoCE could be based in any geographical location ➤ Studies describing the development/defining/monitoring/evaluation/frameworks of CoCE
<p>Exclusion criteria</p> <ul style="list-style-type: none"> ➤ Records that describe a study conducted at a CoCE (e.g. using participants from CoCE) but not discussing or describing the CoCE ➤ Centres that do not provide clinical care (e.g. Centres of Research Excellence or Centres of Leadership Excellence) ➤ Conference abstracts/papers, letters, NICE guidelines, JBI guidelines ➤ Only looking at costs associated within one CoCE (no comparator) ➤ Only looking at clinical outcomes for people receiving care at a CoCE (no comparator) ➤ Using the term “CoCE” without outlining the criteria

Abbreviation: CoCE-Centres of Clinical Excellence; NICE-National Institute for Health and Care Excellence; JBI-Joanna Briggs Institute

3.4.3 Selection of Records

The search results were imported into Covidence, and duplicates were removed. As recommended by Levac,⁶⁷ two reviewers independently screened titles and abstracts (the PhD candidate completed all reviews and second reviewer was shared between the other authors - EL, JH, RS, NF, and LB). Any disagreements were discussed between the two involved authors. Full-text documents were reviewed by two reviewers (as for abstract and title screening) using the inclusion criteria (Table 3.1).

One reviewer (PhD Candidate – TK) conducted the online search for relevant websites (first 20 pages on Google search), and two reviewers (TK and LB) independently completed the screening and review of the grey literature. The inclusion and exclusion criteria were reviewed periodically throughout the title and abstract screening process to ensure the criteria facilitated the identification and inclusion of relevant studies.

3.4.4 Data Charting Process

A data extraction form was developed for the study. The following information were extracted: author, country/region, the aim of publication, type of publication, name of CoCE, clinical focus area, year CoCE established, the framework used (created or developed), function of CoCE, resources (personnel, infrastructure, equipment), and processes used or established for CoCE (to create, monitor and evaluate) The extraction process using the form was pilot tested with the first 15 eligible records to ensure consistent data collection. Two independent reviewers (TK and EL) independently extracted data on all included studies using the extraction form on Covidence. Then, the extracted data from each reviewer were compared to ensure similar information was extracted and any discrepancies were discussed and resolved. Once the extractions were completed, the data were downloaded to a Microsoft Word document to begin analysis. The quality of individual records was not assessed due to the descriptive nature of the review aims.

The extracted data included the type of CoCE, the clinical focus areas, the reported resources required for CoCE, processes used or suggested for a CoCE, and delineating between theoretical and physical centres. A theoretical centre was defined as a centre that describes aspirational criteria/framework to develop a CoCE, and a physical centre was defined as a centre that has documented criteria/framework/description used to establish a CoCE. Additionally, it was noted whether CoCE used a published framework or described their own framework to define a CoCE or guide the process of developing a CoCE.

3.4.5 Synthesis of Results

The research findings were synthesised according to the research questions, and data from all included studies were presented in tabular form. Study characteristics were presented descriptively, and the research questions were presented narratively.

3.4.6 Patient and Public Involvement

Patients were not involved in the design or completion of this study.

3.5 Results

3.5.1 Selection of Sources of Evidence

Overall, 9077 records were identified from a database search, and 36 were identified through a grey literature search. A further three records were identified by reviewing reference lists of included records. Fifty records describing 45 CoCE were included in the analysis (Figure 3.1).

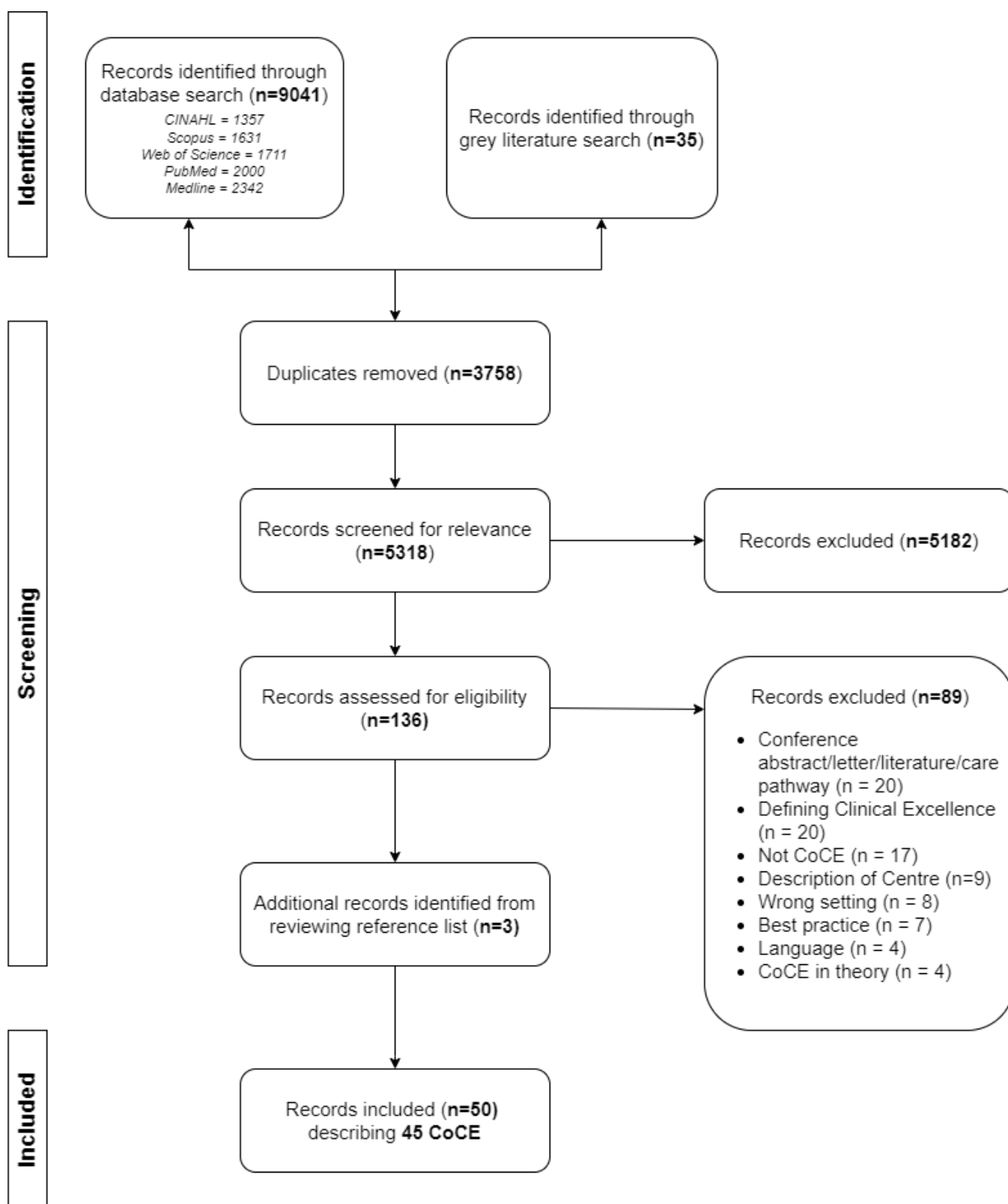


Figure 3.1 PRISMA-ScR flow diagram.⁶³

Abbreviation: CoCE - Centres of Clinical Excellence; CoE - Centres of Excellence.

3.5.2 Characteristics of Sources of Evidence

Most records (n=43, 86%) were published in or after 2015. Nearly all of the included records (n=44, 88%) were published in peer-reviewed journals, but only 15 (30%) were research articles. The remaining 28 (56%) records were other article types, such as editorials or case reports. The literature search identified two websites as additional records. Table 3.2 describes the characteristics of the sources of evidence (e.g. research articles, book chapters, etc), and Table 3.3 provides an overview of the characteristics of the CoCE, the description of a CoCE, the processes used to monitor and evaluate the CoCE, and the resources used.

Table 3.2 Characteristics of sources of evidence, countries and clinical conditions.⁶³

Types of literature from included records (n=50)	N (%)
Research articles	15 (30%)
Others (Editorial, reports, case reports) from peer reviewed journals	28 (56%)
Book chapters	3 (6%)
Websites	2 (4%)
Systematic review	1 (2%)
Government report	1 (2%)
Country of Centre described (n=45)	
United States of America	25 (56%)
Others	20 (44%)
Clinical Conditions from CoCE Described (n=45)	
Cardiovascular disease	8 (18%)
Spinal surgery	4 (9%)
Pituitary tumours	4 (9%)
Diabetes	3 (7%)
Pregnancy related	2 (4%)
Others	24 (53%)

3.5.3 Synthesis of Results

Less than half (n=20, 47%) of the centres identified were physical CoCE. With the exception of one CoCE, which provided care for people with diabetes and cardiovascular disease,⁶⁹ all identified CoCE treated a single clinical condition or population. The commonly described conditions were cardiac disease⁷⁰⁻⁷⁷ (n=8, 17%), spinal surgeries⁷⁸⁻⁸¹ (n=4, 9%), pituitary tumours⁸²⁻⁸⁵ (n=4, 9%), diabetes^{69, 86, 87} (n=3, 6%), and obstetrics^{88, 89} (n=2, 4%).

Six CoCE (13%)^{71, 75, 79, 82, 90, 91} were located across several countries. The majority were described as stand-alone clinical centres, such as wards, surgical centres, or clinics. Eight CoCE (18%)^{74, 86, 92-97} were located in low- and middle-income countries. More than half of the CoCE were in the USA (n=25, 53%). CoCE established in high-income countries were typically described in terms of high-quality care delivery, such as standardised care and optimal outcome (n=12, 27%),^{73, 75-77, 79, 87, 89, 92, 93, 98-100} comprehensive multi-disciplinary care (n=8, 18%)^{70, 82, 85, 86, 94, 101-103} or accessible patient-centred care (n=7, 16%).^{6, 48, 69, 83, 90, 96, 104, 105}

More than half of the CoCE (n=30, 67%) described a structured process that was used or could be used to establish the CoCE. While many CoCE reported that the centres were established using a framework or series of developmental stages, details regarding the developmental stages were rarely available. Five CoCE reported using published frameworks (developed by Elrod and Fortenberry,^{83, 91, 99} Christmas¹⁰⁶ and National Cancer Institute⁷⁷) to guide their process of establishing the CoCE. Table 3.4 outlines a detailed description of the results from the scoping review, including the description of the CoCE criteria and the processes used to establish and monitor CoCE, which will be explored throughout this chapter.

Table 3.3 Summary of characteristics of Centres of Clinical Excellence, including resources and processes used. (Adapted from Kandasamy et al.⁶³)

Author(s)	Country / Region	Clinical focus area of CoCE	Theoretical Centre (T) or Physical Centre (P)	Used or developed a framework	Reported resources required for CoCE				Processes used or suggested for CoCE		
					Personnel	Infrastructure	Equipment	Other	Criteria described	Processes to establish a CoCE	Processes to monitor a CoCE
Bitzer et al ¹⁰¹	Europe*	Sexual medicine	T	✓	✓	✓			✓		✓
Burkett et al ⁷⁸	Not reported	Spinal surgeries	T		✓				✓		✓
Campbell et al ⁹²	India#	Cleft palate	P	✓	✓	✓			✓	✓	
Carvalho and Jill ⁸⁸	USA*	Obstetric – Anaesthesia and Perinatology	T	✓	✓		✓		✓	✓	✓
Casanueva et al ⁸² & Tritos ⁸⁵	International	Pituitary tumours	T	✓	✓				✓		
Chang et al ¹⁰² & Lymphatic Education & Research Network ¹⁰⁷	USA*	Lymphatic disease	P	✓	✓			✓	✓	✓	✓
Choque-Velasquez et al ⁹³	Peru^	Specialty neurosurgical centre	P	✓	✓		✓	✓			✓
Coon et al ¹⁰⁸	USA*	Multiple System Atrophy	P	✓	✓				✓		
Creehan et al ¹⁰⁹	USA*	Pressure ulcer	T	✓	✓				✓		
Daming et al ⁷³	USA*	Maternal cardiac health	P	✓	✓	✓			✓	✓	✓
Deshmukh et al ⁹⁴	India#	Oral healthcare	P	✓	✓				✓		✓
Dietz et al ⁹⁸	USA*	Periprosthetic joint infection	T	✓	✓		✓	✓	✓		
Distiller and Brown ⁸⁶	South Africa^	Diabetes	P		✓			✓	✓		✓

Author(s)	Country / Region	Clinical focus area of CoCE	Theoretical Centre (T) or Physical Centre (P)	Used or developed a framework	Reported resources required for CoCE				Processes used or suggested for CoCE		
					Personnel	Infrastructure	Equipment	Other	Criteria described	Processes to establish a CoCE	Processes to monitor a CoCE
Draznin et al ⁸⁷	USA*	Diabetes	T	✓	✓	✓			✓		
El-Eshmawi et al ⁷⁰	USA*	Mitral Valve disease	P	✓	✓	✓			✓	✓	✓
Elrod and Fortenberry ⁶	USA*	11 clinical areas	P	✓	✓	✓			✓	✓	
Ferguson and Froehlich ¹⁰⁴	USA*	Joint replacement	P		✓					✓	✓
Frara et al ⁸³	Authorship team from Spain	Pituitary tumours	T	✓	✓	✓			✓	✓	✓
Geetha et al ¹⁰⁶	USA*	Nephrology	P	✓					✓		
Haider et al ⁹¹	LMIC	Urology surgery	T	✓	✓				✓		✓
King, Jamieson and Berg ⁹⁹	USA*	Hepatology	P	✓					✓	✓	✓
Kullar et al ¹¹⁰	USA*	Infectious disease	P	✓	✓				✓	✓	✓
Lancellotti, Dulgheru and Sakalihasan ⁷¹ & Chambers et al ⁷²	Multiple European countries	Heart Valve surgery	T		✓	✓			✓		✓
Li et al ¹¹¹	USA*	Multiple clinical areas	T						✓	✓	
Marinoff and Heiberger ⁹⁵	China^	Low vision and vision rehabilitation	P		✓	✓				✓	
Martin et al ⁷⁹	Various countries	Spine	T	✓					✓		
McLaughlin et al ⁸⁴	USA*	Pituitary	T		✓		✓	✓	✓		✓
Nakov et al ⁷⁴	Bulgaria^	Transthyretin	P		✓				✓		

Author(s)	Country / Region	Clinical focus area of CoCE	Theoretical Centre (T) or Physical Centre (P)	Used or developed a framework	Reported resources required for CoCE				Processes used or suggested for CoCE		
					Personnel	Infrastructure	Equipment	Other	Criteria described	Processes to establish a CoCE	Processes to monitor a CoCE
		Amyloidosis									
Piccini et al ⁷⁵	Not specifically identified	Atrial Fibrillation	T	✓	✓	✓		✓	✓		
Pronovost et al ¹⁰³	USA*	NA	T	✓					✓		✓
Safer Care Victoria ⁴⁸	Australia*	Multiple clinical areas	T	✓					✓		
Sandhu et al ⁷⁶	USA*	Atrial Fibrillation	T	✓	✓						
Santos-Moreno et al ^{90, 112, 113}	South America	Rheumatoid Arthritis	P	✓	✓	✓	✓		✓	✓	✓
Sheha and Iyer ⁸⁰	USA*	Ambulatory Spinal surgery	T		✓				✓		✓
Shikora, Delegge and Van Way III ¹¹⁴	USA*	Nutritional Support	P	✓	✓	✓	✓		✓	✓	✓
Shommu et al ¹¹⁵	Canada*	Inflammatory Bowel Disease	T						✓		
Silver et al ⁸⁹	USA*	Placenta Accreta Intensive Care Unit	T		✓	✓			✓		
Steiner et al ¹¹⁶	USA*	Headaches	T		✓				✓	✓	
Tapela et al ⁹⁶	Rwanda%	Cancer	P		✓	✓	✓	✓	✓		
Thomas et al ⁶⁹	USA*	Diabetes and Cardiovascular Disease	P		✓					✓	✓
Vivian et al ¹⁰⁰	USA*	Pancreatic	P	✓	✓	✓	✓	✓	✓	✓	

Author(s)	Country / Region	Clinical focus area of CoCE	Theoretical Centre (T) or Physical Centre (P)	Used or developed a framework	Reported resources required for CoCE				Processes used or suggested for CoCE		
					Personnel	Infrastructure	Equipment	Other	Criteria described	Processes to establish a CoCE	Processes to monitor a CoCE
		disease									
Williams ⁷⁷	USA*	Hypertrophic Cardiomyopathy	T	✓	✓		✓		✓	✓	
Wirth et al ¹⁰⁵	Europe (Barcelona)*	Prostate Cancer	T	✓	✓				✓	✓	✓
Wu et al ⁸¹	USA*	Inpatient Spinal Surgery	T	✓					✓		✓
Yao and Zhou ⁹⁷	China^	Peritoneal dialysis	P	✓	✓			✓		✓	✓
Total	Country / Region		21 (P) 24 (T)	30	37	15	9	9	39	20	24

*High-income country; ^Upper-middle income country; #Lower-middle income country; %Low-income country

3.5.4 Defining Characteristics of Centre of Clinical Excellence

Less than half (n=19, 42%) of the CoCE explicitly defined the characteristics of the CoCE. Seven (16%) CoCE^{74, 78, 80, 83, 91, 99, 110} used the definition from Elrod and Fortenberry:

“a program within a healthcare institution which is assembled to supply an exceptionally high concentration of expertise and related resource centred on a particular area of medicine, delivering associated care in a comprehensive, interdisciplinary fashion to afford the best patient outcomes possible”.^{6(p16)}

The most commonly described defining features of CoCE were high volumes of patients treated/procedures performed, staffing and infrastructure resources and above-average quality of care and patient outcomes. Key components that were reported regarding staffing were medical expertise, highly skilled multi-disciplinary teams and staff: patient ratios. Other resources that were described as part of the CoCE were infrastructure (n=15, 33%), such as building space and examination rooms, and specialised equipment (n=9, 20%). High quality of care delivery was described in terms of standardised care and optimal outcome (n=12, 27%),^{73, 75-77, 79, 87, 89, 92, 93, 98-100} comprehensive multi-disciplinary care (n=8, 18%)^{70, 82, 85, 86, 94, 101-103} or accessible patient-centred care (n=7, 16%).^{6, 48, 69, 83, 90, 96, 104} Seven CoCE (15%) described the availability of treatment protocols as an important feature. See Table 3.3 for details on the types of resources.

There were differences noted in the defining characteristics of CoCE in low- and middle-income countries compared to CoCE in high-income countries. While most CoCE had common features regarding staff expertise, equipment and patient outcomes, CoCE in low- and middle-income countries tended to be established by collaborating with larger local or international healthcare centres and to provide a healthcare service that otherwise was not available in the region, for instance, neurosurgery in Peru and comprehensive dental care in Guwahati, India.

Table 3.4 Summary of findings on description of criteria, processes used to establish CoCE and processes to monitor a CoCE. (Adapted from Kandasamy et al.⁶³)

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
Bitzer et al ¹⁰¹	<ul style="list-style-type: none"> • Staffing and infrastructure recommendations • Training and professional development opportunities • Formal links with academic institution 	Not reported	To audit outcomes, number of patients, gender, diagnoses, and interventions would be tracked, with patient follow-up and satisfaction. Complete a cost analysis.
Burkett et al ⁷⁸	<ul style="list-style-type: none"> • High patient satisfaction • Lower utilisation of medical services and medications • Low overall cost of care • Provide a quicker return to work or regular activity for patients. • Superior medical care with seamless coordination between disciplines • High volume of patients treated. 	Not reported	Report that centres of excellence are held to specific quality metrics to maintain “centre of excellence” designation, specific quality metrics not reported.
Campbell et al ⁹²	<ul style="list-style-type: none"> • High level of patient need • Good working relationships between organisations • Receptiveness and capacity of local government, hospitals, and medical societies • Political and economic environment consistent with the ability to provide care 	Local government approached Operation Smile for assistance with treating its cleft backlog. Site visit to determine site suitability.	Not reported
Carvalho and Jill ⁸⁸	<ul style="list-style-type: none"> • Must demonstrate adherence to all criteria below (each clearly described in source documents): • Personnel and staffing • Equipment, protocols, and policies • Simulation and team training • Obstetric emergency management • Caesarean delivery and labour analgesia care • Recommendations and guidelines for implementation • Quality assurance and patient follow-up systems 	Apply to the Society of Obstetric Anaesthesia and Perinatology applications reviewed and graded by the CoCE Subcommittee. If successful, granted CoCE designation	Recertify every 4 years using the same process

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
Casanueva et al ⁸² & Tritos ⁸⁵	<ul style="list-style-type: none"> • Provide the best standard of care to patients with pituitary tumours and disorders • Organise MDT clinical management • Liaison between experienced neurosurgeons and expert neuroendocrinology • Specialised staff training • Provision of educational courses • Comprehensive patient information and data management • Sharing information with scientific bodies and administrators • Support endocrine units outside Pituitary tumours CoCE • Advise health administrators and authorities on specific problems • Advance the science and scholarship of pituitary tumours • Include tumour data on national registries 	Not reported	Currently, no formal accreditation for Pituitary tumours CoCE exists. The external body may or may not perform the final step of validation of the centre
Chang et al ¹⁰² & Lymphatic Education & Research Network ¹⁰⁷	<ul style="list-style-type: none"> • Minimum criteria for comprehensive centres of excellence: • Mandatory list of staffing, including surgeons and therapist • Demonstrated proficiency in diagnosis, imaging, conservative management, assessment tools, interventional therapies, surgery 	<p>The Lymphatic Education and Research Network Global Oversight Committee will review applications. All applications will be scored, using the following three individual criteria:</p> <ol style="list-style-type: none"> a. The quality of the overall application/services. b. Unique offerings or particular characteristics that add to the Lymphatic disease clinic. c. Miscellaneous (e.g., lymphatic disease community citizenship, research). 	The designation is valid for 3 years
Choque-Velasquez et al ⁹³	Not reported	Not reported	Evaluated using volume of neurosurgery

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
Coon et al ¹⁰⁸	Comprised of: <ul style="list-style-type: none"> • Core clinical team • Additional subspecialty care • Longitudinal data collection • Support group involvement • Research opportunities • Additional support 	Not reported	Not reported
Creehan et al ¹⁰⁹	Domains of American Nursing Credentialing Center model for the Magnet Recognition Program <ul style="list-style-type: none"> - transformational leadership - structural empowerment - exemplary professional practice - new knowledge, innovation and improvement 	Not reported	Not reported
Daming et al ⁷³	<ul style="list-style-type: none"> • Established in tertiary care hospital. • Created inpatient and outpatient protocol. • Has a set of criteria specific to maternal cardiac CoE and cardiac CoE and cardiovascular intensive care unit 	Self-nominated as Centre of Excellence	<ul style="list-style-type: none"> • Monitoring productivity and streamlining communication between hospital • Management and stakeholders are the role of a program director.
Deshmukh et al ⁹⁴	CoE is an organisational environment that strives for and succeeds in developing high standards of conduct in a field of research, innovation and learning. <ul style="list-style-type: none"> • Capacity building for staff • Patient awareness • Increase in number of patients visiting the units and opting for treatment. • Research initiatives • Collaborations and networking 	Not reported	Evaluation based on public health program evaluation criteria - assessing and documenting program implementation, outcomes, efficiency and cost-effectiveness of activities.
Dietz et al ⁹⁸	Suggestion of CoCE criteria but did not expand <ul style="list-style-type: none"> • Multi-disciplinary care pathways and teams and 	Not reported	Not reported

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
	evaluation of surgeon's credentials, <ul style="list-style-type: none"> • Electronic medical records • Patient data management and or tracking • Process metric 		
Distiller and Brown ⁸⁶	<ul style="list-style-type: none"> • Integrated information technology systems • Aligned finances and responsibility • Care planning • Clinical engagement and leadership • Robust clinical governance • Multi-disciplinary team 	Not reported	Outcome-based monitoring protocol <ul style="list-style-type: none"> • Glycaemic control • Hospital admission • Microvascular disease outcomes
Draznin et al ⁸⁷	<ul style="list-style-type: none"> • Focus on high-risk individuals and an open-door policy • Clear communication to guide care • Provision of comprehensive care • Ongoing focus on quality improvement • Ongoing monitoring of patient outcomes • Education and dissemination 	Not reported	Not reported
El-Eshmawi et al ⁷⁰	<ul style="list-style-type: none"> • Centres with surgeons that can achieve a very high likelihood of a durable valve repair • Dedicated multidisciplinary team (see staffing resources) • Transparent data management and quality assessment 	Self-nominated -The centre was formed, and the criteria used in this study were discussed.	Monitoring of proportion of patients with successful valve repair; durability of valve repair
Elrod and Fortenberry ⁶	<ul style="list-style-type: none"> • Supplies an exceptionally high concentration of expertise and related resources centred on a particular area of medicine • Delivers care in a comprehensive, interdisciplinary fashion • Leads to best possible patient outcomes. 	Overseen by organisation – an interdisciplinary committee vets the proposed Centre of excellence (assesses financial resources, culture and leadership support)	Not reported
Ferguson and Froehlich ¹⁰⁴	Not reported.	Self-nominated	<ul style="list-style-type: none"> • Length of stay

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
			<ul style="list-style-type: none"> • Increased patient volume • Monthly snapshot of - financial (includes caseload, cost and labour/case) <ul style="list-style-type: none"> - operational (includes length of stay, discharge to rehabilitation) - patient experience - quality (includes process measures, infections, falls, readmissions)
Frara et al ⁸³	<ul style="list-style-type: none"> • “Explicit and practical definitions for a degree of excellence have not yet been defined” • Require an integrated multidisciplinary group in a single location 	Most are self-appointed without any formal acknowledgement	Discuss measuring effect via patient outcomes, cost of treatment, research outputs, and contribution to scientific efforts (e.g. scientific meetings, health registries)
Geetha et al ¹⁰⁶	<ul style="list-style-type: none"> • Achieving a level of mastery related to • Patient care • Explicitly modelling this mastery to medical trainees • Collaborating with investigators to advance science and discovery 	Not reported	Not reported
Haider et al ⁹¹	<ul style="list-style-type: none"> • Patient care: must provide safe, effective and accessible care to the highest possible standards depending on geography, resources, infrastructure, patient population and local culture with site-specific management guidelines • Training: provides leadership in best practices, research, support and training for focus area • Dissemination of knowledge is essential function of the centre 	Not reported	Recommend data collection to quantify impact and identify areas for change
King, Jamieson	Reviewed criteria of designated Centres of Excellence	Formally designated by insurers and employers	Need to monitor quality of care:

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
and Berg ⁹⁹	<p>within Solid organ Transplant Networks– common features include</p> <ul style="list-style-type: none"> • Number of patients treated • Good patient and graft outcomes compared to national average on Scientific Registry of Transplant Recipients • Centres of Medicare and Medicaid Services certified • +/- cost-effective care 		<ul style="list-style-type: none"> • Patient factors • Facility and program structure • Transplant centre processes • Waiting list management • Post transplant care • Clinical and patient centred outcomes • Cost effectiveness • Team experience • Organ donation environment
Kullar et al ¹¹⁰	<ul style="list-style-type: none"> • Sustained institutional leadership commitment and accountability (e.g. mission statement, letter of attestation from management, documentation of physician leadership) Drug expertise (evidence of infectious disease and pharmacy expertise) • Action (e.g. action plan, disease specific protocol) • Tracking (e.g. monitoring antibiotic use, demonstration of use of electronic health record as part of antimicrobial stewardship program) • Reporting (e.g. demonstrated participation in national reporting program) • Education (documented professional development program) 	Infectious Diseases Society of America solicited applications. Centres required to submit documentation of core criteria. A committee of 6 Infectious Diseases pharmacists and physicians with extensive antimicrobial stewardship experience reviewed applications.	The CoCE designation is valid for 2 years, after which the institution must re-apply
Lancellotti, Dulgheru and Sakalihasan ⁷¹ & Chambers et al ⁷²	<ul style="list-style-type: none"> • Specialist valve clinic acts as a hub between community, other hospitals and extracardiac departments, and between non-invasive cardiologists and surgeons and interventional cardiologists • Nominated cardiac experts with speciality skills • Regular case discussions • Systematic approach to reducing medical and surgical 	Not reported	Have a high-volume operation rate on valvular heart disease, which is believed to be associated with better repair results and potentially improved outcome. This partly explains why there is no obligation to refer patients eligible for surgical repair in centres of excellence

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
	<ul style="list-style-type: none"> risks Data review: Robust internal audit processes including repair rates, rates of residual regurgitation, complications, durability of repair and reoperation rate Results available for review internally and externally Involvement in national databases 		
Li et al ¹¹¹	<ul style="list-style-type: none"> Variable - can be selected and overseen by insurance companies, medical professional societies, government organisations, employer professional associations, individual employers or hospitals themselves Insurers (different criteria used between different companies) tend to use data and identify centres that perform well on structural outcomes such as use of protocols and outcome measures such as hospital readmissions, complication rates, and volume. Cost sometimes considered 	Some insurers use of a panel of experts from national organizations who understand the insurer's objectives and help select hospitals to be part of the CoCE network.	Not reported
Marinoff and Heiberger ⁹⁵	Not reported	Self-nominated following partnership between USA College and Chinese University	Not reported
Martin et al ⁷⁹	<ul style="list-style-type: none"> Standardization of protocols for the workup of suspected spinal cord compression across the regional hospital system to improve time to diagnosis, transport, and intervention. Unified and standardized vendors and equipment across surgeons and the two departments to improve cost savings and resource utilisation. 	Not reported	Not reported
McLaughlin et al ⁸⁴	<p>Propose that centres fulfil the following</p> <ul style="list-style-type: none"> Provide multidisciplinary optimal clinical care to patients with pituitary tumours and related disorders Provide residency, fellowship training and/or continuing medical education and patient support 	Not reported	Need to develop - suggested recognition or verification process be an ongoing process that is updated biannually

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
	<ul style="list-style-type: none"> • Contribute to research in the field of pituitary disorders. 		
Nakov ⁷⁴	<p>Elements that should be considered:</p> <ul style="list-style-type: none"> • Establish a dedicated team of multidisciplinary experts • Engage with patient advocacy group • Initiate a specific training regime to continue education for new and existing members of the team • Source appropriate funding to ensure sustainability • Schedule regular team meetings to ensure an individual plan for patient diagnosis, treatment and follow up 	Not reported	Not reported
Piccini et al ⁷⁵	<ul style="list-style-type: none"> • Identification and referral of patients • Appropriate staffing and dedicated clinics that focus on atrial fibrillation patients • Developing a comprehensive care team • Specific treatment goals • Evaluating and improving symptoms • Rate and rhythm control • Stroke prevention • Treatment of risk factors • Development of team based care pathways • Quality improvement 	Not reported	Not reported
Pronovost et al ¹⁰³	<ul style="list-style-type: none"> • Provide frictionless access • Ensure coordinated compassionate navigation • Apply rigorous appropriateness criteria for all the expensive diagnostic studies and procedures • Engage the entire team around the purpose of providing high-value care • Ensure the site of service and surgeon optimal • Reduce variation and complications by using evidence-based protocols • Provide personalized care 	Not reported	Outcome-based evaluation process

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
	<ul style="list-style-type: none"> Continually monitor, transparent report and improve performance 		
Safer Care Victoria ⁴⁸	<ul style="list-style-type: none"> Centres based on population health (e.g., acute, chronic and prevention, older people, women and children and funded program. Have 3 core functions: advocate and inform, guidance and advice and improvement. Has a list of key groups that the centres partner with to plan and deliver work 	Not reported	Not reported
Sandhu et al ⁷⁶	<p>Focus area</p> <ul style="list-style-type: none"> Access to care Stroke prevention Education Atrial Fibrillation quality improvement Atrial Fibrillation barrier 	Not reported	Not reported
Santos-Moreno et al ^{90, 112, 113}	<ul style="list-style-type: none"> 3 types of CoCE were defined based on structure, process and outcomes indicators <ul style="list-style-type: none"> structure indicators - Evaluate the institutional capacity to deliver the expected results, adequate infrastructure, suitable personnel, including rheumatologists and other professionals, to ensure comprehensive attention and the existence of complementary resources process indicators (Adherence to management recommendations based on treatment strategy by objectives outcome indicators (The achievement of the objectives proposed along the care or comprehensive patient must be evaluated. The progression of the disease, functional disability, and the achievement of remission goals must 	<p>Steps to implement CoE for RA</p> <p>Step 1: implementing an attention model for the patients diagnosed with rheumatoid arthritis, in accordance with the requirements of each type of centre of excellence</p> <p>Step 2: filling the self-assessment form of each type of centre of excellence and implementing improvement actions</p> <p>Step 3: requesting and preparing for a verification visit</p> <p>Step 4: receiving a verification visit</p> <p>Step 5: official notice of the results of the assistance and verification visit</p>	<ul style="list-style-type: none"> The follow-up should take place according to the following 6 characteristics: <ol style="list-style-type: none"> Clinimetrics Decision-making factors based on the results of the clinimetrics Opportunities to access treatment or follow-up Patient education Clinical care guidelines Evaluation system Must be assessed and accredited cyclically based on standards, evaluators and evaluation and qualification process.

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
	<p>be quantified using clinimetric scales.</p> <ul style="list-style-type: none"> • Different quality standards requirements for each CoCE model and centres need to apply to get CoCE. • 3 types of centres (must meet accreditation and meet minimum criteria for each type) <ul style="list-style-type: none"> - Standard - Optimum - Model 		
Sheha and Iyer ⁸⁰	<p>Suggested to use Joint Commission certification that requires healthcare facility to comply with national standards, use of evidence-based practice and collect performance measures. Also, to partner with American Academy of Orthopaedic Surgeons to provide certifications to standardised CoCE.</p> <p><u>Key tenets for CoCE</u></p> <ul style="list-style-type: none"> • Creating value - highest quality care at lowest cost is the overarching goal of CoCE in ambulatory spinal care (is the confluence of safety, institutional processes, patient satisfaction and outcome measures, overall cost to patient, payer and society) • Centralization of organization - "one-stop shop" (integration of a variety of specialists under the umbrella of one hospital system gives CoE the ability to treat conditions that may complicate or arise from patient's episode of care) • Multidisciplinary team building and protocol creation (utilisation of multidisciplinary meetings geared at creating value and improving outcomes by carefully scrutinizing patient treatment plans) 	Not reported	Accreditation Association for Ambulatory Health Care have provided a set of criteria for certification as an ambulatory orthopaedic surgery CoCE
Shikora, Delegee and	Criteria that were described were used for Bariatric CoCE and to be adapted by Nutritional Support CoCE	<p>Based on Bariatric CoCE</p> <ul style="list-style-type: none"> • Online application completed by surgeon or 	Recertification is required every 3 years and includes an online

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
Van Way III ¹¹⁴	<ul style="list-style-type: none"> • Surgeon Specific Criteria to ensure surgeons have obtained the experience and training necessary to perform the appropriate surgical procedure • Institute Specific Criteria to ensure that the facility is committed to the program 	facility <ul style="list-style-type: none"> • Successful application results in provisional status • Within 2 years must seek full approval, pass on-site inspection, and indicates has excellent outcome • Mandatory submission of all patient data to a database 	application followed by a site visit.
Shommu et al ¹¹⁵	Essential criteria of CoCE that were divided into short (1-3 years) and long terms (>5 years) goals/ activities specific to Irritable Bowel Disease <ul style="list-style-type: none"> • Excellence in Clinical Care • Novel Discovery and Research • Knowledge translation 	Not reported	Not reported
Silver et al ⁸⁹	Suggested Criteria <ul style="list-style-type: none"> • Multidisciplinary team • Intensive care unit and facilities • Blood services – blood bank with 24/7 service 	Not reported	Not reported
Steiner et al ¹¹⁶	Suggested standards <ul style="list-style-type: none"> • Competence of staff - staffed by headache specialists • Provision of care – management of headache • Quality and evolution and assurance - monitors quality of care • Networks and collaborations - maintains quality of endeavour through networking, collaboration and the sharing of experience with other international and/or national centres. • Teaching - principal resource for national postgraduate training • Research - useful research output in the field of 	Agencies with appropriate competence and authority might use these standards as a basis for centre accreditation.	Not reported

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
	<p>headache</p> <ul style="list-style-type: none"> • Empirical support of existence 		
Tapela et al ⁹⁶	<p>Key attributes that made it possible</p> <ul style="list-style-type: none"> • Meaning full partnership emphasising health systems strengthening • Innovative task and infrastructure shifting • Strong Rwandan Ministry of Health leadership coordinating efforts to embed services with the public sector • An equity-driven agenda to serve those most in need 	Not reported	Not reported
Thomas et al ⁶⁹	Not reported	Appears self-nominated	Outcome-based & site-specific patient outcomes (not benchmarked to other services)
Vivian et al ¹⁰⁰	<p>Objectives</p> <ul style="list-style-type: none"> • Provide the highest standard of care, services and support to each patient • Communicate process improvements and data to key stakeholders in the pancreas domain • Analyse barriers and data to create better clinical pathways and care maps • Identify best practice guidelines and use them in our pancreas population • Identify quality and utilisation metrics used to analyse physician practices 	<p>Process outlined.</p> <ul style="list-style-type: none"> • Establishing the foundation (leadership structure and purpose) • Formalising the program (clinical education training, MDT involvement) • Solidifying the CoE status (certification/accreditation by external institute) 	Not reported
Williams ⁷⁷	<p>Key components of an Hypertrophic Cardiomyopathy (HCM) centre include.</p> <ul style="list-style-type: none"> • HCM multi-disciplinary team and an administrative HCM coordinator. • Administrative support for marketing and programmatic 	A centre must meet various criteria set forth by the NCI both in terms of clinical expertise and research capabilities	Not reported

Author(s)	Criteria described	Processes used to establish a CoCE	Processes to monitor a CoCE
	development.		
Wirth et al ¹⁰⁵	<p>Criteria with specific requirements are outlined in the study</p> <ul style="list-style-type: none"> • Core team • Associated services • Multi-disciplinary team • Diagnostic pathway • Therapeutic pathway 	When an institution successfully achieves all the steps, it will be certified as a European Prostate CoCE.	The certification will be reviewed every 3 years, The accreditation team will be prespecified, and it will be composed of seven members of the European Prostate CoCE.
Wu et al ⁸¹	<p>The Blue Distinction Plus Centre program encompasses quality criteria on structure, process, and outcomes and cost criteria</p> <p>A cost threshold was set at 1.05 times the national average cost of surgery.</p> <p>Facilities that met predetermined clinical requirements and had spine surgery costs below the threshold received the value designated Blue Distinction Plus Centre designation.</p>	Not reported	Facilities receiving a value designation were associated with lower costs (16-19% lower) and equal or better quality outcomes, compared with all other facilities.
Yao and Zhou ⁹⁷	Not reported	<p>Mentee sites were selected based on</p> <ul style="list-style-type: none"> • Using drop-out rate and time on therapy • Willingness to improve Peritoneal Dialysis outcomes. • Mentor sites were selected based on • Peritoneal Dialysis clinical outcome • Willingness to participate in the program 	Continuous quality improvement in managing Peritoneal Dialysis centre. Volume of patients.

Abbreviation: CoCE – Centres of Clinical Excellence; CoE – Centres of Excellence, MDT – Multidisciplinary Team

3.5.5 Selection or Nomination Process of Centres of Clinical Excellence

In half (n=24, 53%) of the included CoCE, there were no details available about how centres were selected as a CoCE (Table 3.4). While 21 CoCE reported that there was a selection or nomination process to be recognised as a CoCE, the details of the selection/nomination process were inconsistently reported. Processes used to select centres as CoCE were varied and included application and assessment by an approval panel (n=9, 45%),^{6, 46, 77, 88, 97, 99, 110, 111, 116} self-identification as a CoCE with no explicit criteria or external assessment (n=6, 30%)^{69, 70, 73, 83, 95, 104} and site visit by funding body to assess suitability (n=1, 5%).⁷² Only four (20%)^{90, 100, 102, 114} CoCE presented the process used to select a CoCE in its entirety, as presented in Table 3.4. The bodies providing oversight of the nomination or selection of the CoCE were professional bodies,^{77, 80, 88, 90, 102, 110} insurers,^{99, 111} and organisations.^{6, 92, 100}

Table 3.5 Outline the selection or nomination process of a CoCE. (Adapted from Kandasamy et al, 2024⁶³

Author(s)	Steps outlined
Chang et al¹⁰² & Lymphatic Education & Research Network¹⁰⁷	<ol style="list-style-type: none"> 1. Applications will be reviewed by the Lymphatic Education & Research Network Global Oversight Committee. All applications will be scored, using the following three individual criteria: <ol style="list-style-type: none"> a. The quality of the overall application/services. b. Unique offerings or particular characteristics that add to the Lymphatic disease clinic. c. Miscellaneous (e.g., lymphatic disease community citizenship, research).
Santos-Moreno et al⁹⁰	<ol style="list-style-type: none"> 1. Implementing an attention model for the patients diagnosed with rheumatoid arthritis, in accordance with the requirements of each type of centre of excellence. 2. Filling the self-assessment form of each type of centre of excellence and implementing improvement actions. 3. Requesting and preparing for a verification visit. 4. Receiving a verification visit from REAL-PANLAR. 5. Official notice of the results of the assistance and verification visit.
Shikora, Delegge and Van Way III¹¹⁴	<ol style="list-style-type: none"> 1. Online application completed by surgeon or facility. 2. Successful application results in provisional status. 3. Within 2 years must seek full approval and pass on-site inspection and indicates has excellent outcome. 4. Mandatory submission of all patient data to a database.
Vivian et al¹⁰⁰	<ol style="list-style-type: none"> 1. Establishing the foundation (leadership structure and purpose).

	<ol style="list-style-type: none"> 2. Formalising the Centre of Excellence program (clinical education training, multi-disciplinary team involvement). 3. Solidifying the Centre of Excellence status (certification/accreditation by external institute).
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3.5.6 Monitoring Protocols to Remain as a Designated Centre of Clinical Excellence

Only 24 (53%) of the included CoCE reported a monitoring process (Table 3.4 and 3.5). Monitoring was mandatory for six (25%)^{88, 90, 102, 105, 110, 114} CoCE through a recertification process. Other CoCE reported the importance of monitoring outcomes such as productivity (n=5, 21%),^{71, 73, 93, 97, 104} patient outcomes (n=9, 36%),^{69, 70, 81, 83, 86, 99, 101, 103} quality metrics (n=3, 13%)^{78, 80, 91} and efficiency and cost-effectiveness of the program (n=1, 4%),⁹⁴ but there was no evidence that this monitoring process was routinely performed or overseen by any parties.

3.6 Discussion

This is the first scoping review completed on CoCE in healthcare. It provides in-depth insight into CoCE, as reported in the literature. Despite the identification of numerous CoCE described as a CoCE, the processes used to select more than half of the CoCE could not be identified. When selection processes were documented, there was an inconsistent relationship between CoCE. Further, there were inconsistencies in monitoring CoCE performance. Without consensus on what defines a CoCE and without a recognised body to monitor the performance within each CoCE, there is no guarantee that care being delivered by sites claiming to be CoCE is actually delivering excellent (or even better-than-usual) healthcare.

The most common defining feature of CoCE included in this review was resource availability, specifically personnel, infrastructure and equipment. It is well established that there are associations between staffing levels, skill mix infrastructure and patient outcomes¹¹⁷⁻¹²¹ Further, infrastructure and specialised expertise are key factors in establishing Centres of Excellence in

Healthcare and other industries.⁴⁶ Therefore these findings regarding features of CoCE are not at all surprising, but reinforce that CoCE described in the literature have been designed to align with what is known about healthcare delivery that leads to improved patient outcomes.

While frameworks and processes used to establish or describe a CoCE serve as valuable guides to others in the field, they may have limitations when they have been developed for a specific healthcare facility or disease group. For example, the Willis-Knighton Health System is a not-for-profit healthcare network in Louisiana, USA, that operates eleven self-nominated centres of excellence. The framework used to establish these centres of excellence was described by Elrod and Fortenberry⁶ and cited by authors of eight published CoCE in this review to describe or establish their centres. While this framework was used as guidance, consideration should be given as to whether this framework is fit for purpose beyond the state of Louisiana and in countries with different healthcare models to the USA. Additionally, it is unclear whether this framework meets a universally agreed definition of excellence in healthcare. Empirical research to define “excellent care” from patients’, healthcare centres’ or funders’ perspectives could increase the validity of the frameworks and, subsequently, the CoCE.

Selection procedures for CoCE were inconsistently reported and unavailable for nearly half the included CoCE. The description of excellent care provided by the CoCE varied, seemingly associated with which agency was responsible for creating the definition. Descriptions of excellence encompassed patient-centric outcomes (e.g. optimising clinical outcomes and quality of life), service-centric outcomes (e.g. staff skill development, resource availability and meeting quality and safety accreditation) and economic outcomes (e.g. cost of treatment, length of stay). The concept of excellence was sometimes conflated with a high volume of patients who received care at the centre. Excellence for some centres from low- and middle-income countries was defined (either by self-nomination or by the government or collaborating international

institutions) to provide a particular healthcare service when none was previously available in the region. Many of these aspects of excellence reflect commonly measured quality indicators of healthcare in high-income countries, namely effectiveness, access, safety and efficiency.¹²² However, cost is not included as a quality metric in countries such as Australia, Canada or the UK but is included as a measure of quality in the US Commonwealth Fund framework.¹²² The inclusion of cost as a feature of some CoCE could be reflective of the different funding models (e.g. fee-for-service versus universal healthcare) or healthcare priorities within the centres or by the bodies determining a site's excellence. The centres that reported economic outcomes as a measure of clinical excellence were predominantly located in the USA and were nominated by healthcare funders.^{123, 124}

Benchmarking is a well-recognised process that identifies the best-performing healthcare centres in terms of patient outcomes and system performance.¹²⁵ However, while there is an implicit assumption that a CoCE will deliver care that is superior to another (non-excellent) centre, most of the included CoCE in this review did not benchmark with other services using transparent criteria. While a minority of the CoCE reported a certification process, there was no evidence that this process included healthcare centres being benchmarked against other centres. Benchmarking allows for the tracking of performance over time while comparing performance against other centres, thereby demonstrating what is feasible to achieve in terms of quality of care.¹²⁵ For the CoCE reviewed in this scoping review, the lack of comparison with other healthcare centres, and without a standardised set of explicit, evidence-based measurable criteria, creates disparities and challenges in determining how these centres can be recognised as legitimate CoCE.

It is recognised that healthcare performance can be variable,¹²⁵ so healthcare centres should monitor and evaluate their programs to ensure continued excellence. This process needs to be feasible within the time and resource constraints. Just over half the CoCE included in this review

reported monitoring their service and described various processes, including measuring patient outcomes, service productivity and quality metrics to maintain the designation of CoCE. Only six CoCE reported a structured process, where their ongoing performance was reviewed and assessed by an overseeing body to maintain their status as CoCE. Clearly, more attention should be paid to demonstrating the sustainability of excellence centres.

3.7 Conclusion

Although CoCE are increasingly reported in the literature, there are inconsistencies in how these CoCE are established, monitored and evaluated. Processes used range from self-designation or adapting criteria from other centres to using external evaluation and periodic recertifications. Features of CoCE centred around skilled medical and multi-disciplinary teams and other resources such as infrastructure and equipment. More work is required to develop transparent systems and processes to ensure that centres claiming to be “excellent” can demonstrate that they are delivering the highest quality care. There were no CoCE identified in the field of stroke recovery and rehabilitation.

3.7.1 Implication for Practice and Future Research

This review highlights the need for clear criteria that healthcare centres use to identify or establish a CoCE. The processes used also need to be transparent, so they are easily available for certification or auditing purposes. The concept of a healthcare centre promoting “excellence” can also vary depending on different perspectives: patient, systems or funding. There needs to be clear guidelines that highlight the impact of “excellence” from these perspectives to ensure transparency, why a centre was nominated as a CoCE, and the monitoring processes used. The findings from this review will contribute to international efforts to establish CoCE using robust, transparent criteria and indicators.

3.7.2 Strengths And Limitations of the Scoping Review

The strengths of the scoping review include the inclusive search strategies (peer-reviewed journals and grey literature) and stringent review process using two independent reviewers throughout the process. There is a potential that there may be established CoCE that have not published any studies or reports, which were not identified in this review. Whilst assistance was sought from an academic librarian to ensure the search strategies were clear and comprehensive, centres that describe excellence using different terms and relevant information published in non-indexed sources may have been missed. This is a particular challenge of this focus of work which straddles healthcare organisation, clinical practice and academic research.

3.8 Chapter Summary

This chapter summarised how Centres of Clinical Excellence were described in the current literature, and reported the defining characteristics, selection criteria and processes, and monitoring and evaluation protocols of a CoCE. The results from the scoping review highlighted a marked variety in positions for establishing a Centre of Clinical Excellence. Ultimately, there was no literature that described a Centre of Clinical Excellence in Stroke Recovery and Rehabilitation that was identified by this scoping review. These findings align with the theme ‘development of a network of Clinical Centres of Excellence in Stroke Recovery’ highlighted by the International Stroke Recovery and Rehabilitation Alliance.⁶⁴ This leads to the current work completed by this expert group on defining the aspirational criteria and indicators that could be used to conceptualise a CoCE in Stroke Recovery and Rehabilitation. The use of these criteria and indicators at stroke rehabilitation centres will be explored in this research. The next chapter will describe the methods and methodology that will be used to trial these indicators at international stroke rehabilitation centres.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Chapter Overview

High-quality research stems from a well-defined theoretical foundation and research methodology. The theoretical framework underpins the philosophical assumptions and sets the foundation for the research methods. Following on from the gap in the understanding of the CoCE identified in the previous two chapters (Chapters 2: Background and 3: Scoping Review), this chapter comprehensively describes the research position, the underlying paradigm that shaped the methodological framework, and the methods used, all of which were selected to address the aims of the research.

This chapter will explore

- The PhD candidate's research position by considering the ontological and epistemological stance that serves as the guiding principle for this research.
- The thematic framework that underpins the research questions, the development of the data collection instruments, the mapping of the data analysis, and the organisation of the results analysis.
- The methods used to identify, recruit, and the processes to complete the semi-structured interviews or disseminate the survey (Research Aim 2).
- The ethical considerations involved in the research process, both locally and internationally, for the participating stroke rehabilitation centres.

Appendix D: Consolidated Framework for Implementation Research Domains and Constructs

Appendix E: Publication co-authored by PhD Candidate: Stockley RC, Walker MF, Alt Murphy M, et al. Criteria and indicators for centers of clinical excellence in stroke recovery and rehabilitation:

A global consensus facilitated by ISRRRA. Neurorehabilitation and neural repair 2024; 38: 87-98.

Appendix F: Survey Questions (Distributed using Qualtrics)

Appendix G: Ethics Approval Letter

Appendix H: Participant Information Sheet and Consent Form

4.2 Summary of Research Aims, Objectives and Questions

The first part of the thesis was designed to identify, map and synthesise evidence on Centres of Clinical Excellence using a scoping review (Chapter 3). The second part of the thesis was designed to trial the criteria and measurable indicators at national and international healthcare centres that provide stroke rehabilitation services.

The primary research question for this PhD is:

- What were the stroke rehabilitation centres' perceptions of the criteria and indicators of the Centres of Clinical Excellence (CoCE) in Stroke Recovery and Rehabilitation?

Table 4.1 below outlines the research aims, research objectives, research questions and the relevant chapters.

Table 4.1 Summary of research aims, research objectives, research questions and relevant chapters.

Research Aims	Research Objectives	Research Questions	Chapter
<p>Aim 1: To systematically explore, synthesise and summarise available evidence on CoCE.</p> <p>Aim 2: To map the defining criteria, selection and monitoring processes and evaluation protocols used in the literature when describing/identifying or establishing a CoCE.</p>	<p>Objective 1: Describe the defining criteria, selection processes, and monitoring and evaluation protocols of CoCE that have been described in the published literature.</p>	<p>What CoCE have been described in the literature?</p> <p>What are the defining characteristics of CoCE?</p> <p>How are CoCE selected or nominated?</p> <p>What monitoring processes are employed to remain as CoCE?</p>	Chapter 3: Scoping Review
<p>Aim 3: To trial the published criteria and measurable indicators of CoCE in Stroke Recovery and Rehabilitation at international stroke rehabilitation centres.</p>	<p>Objective 2: Develop methods to trial the criteria and indicators of CoCE in stroke rehabilitation developed by the International Stroke Recovery and Rehabilitation Alliance at international stroke rehabilitation centres.</p>	<p>How can the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation be trialled at international stroke rehabilitation centres?</p>	Chapter 4: Methods and Methodology
<p>Aim 4: To identify data collected for the CoCE criteria and indicators by the international rehabilitation centres.</p>	<p>Objective 3: Trial the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation at international stroke rehabilitation centres</p> <p>Objective 4: Compare and describe the data collected across centres from</p>	<p>What evidence do the centres collect against the criteria and indicators?</p>	Chapter 5: Descriptive Results

	different socioeconomic and geographical contexts, as well as healthcare models.		
Aim 5: To analyse the facilitators and barriers to identifying and/or documenting evidence regarding the criteria and indicators at international stroke rehabilitation centres.	Objective 5: Identify and evaluate the facilitators and barriers encountered while trialling the criteria and indicators in stroke rehabilitation centres.	How do the stroke rehabilitation centres view the criteria and indicators of the CoCE in Stroke Recovery and Rehabilitation? What were the facilitators and barriers identified by stroke rehabilitation centres when trialling the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation?	Chapter 6: Thematic Analysis
Aim 6: To evaluate the practices that align with the criteria and indicators at stroke rehabilitation centres based in diverse geographical regions and employing varying healthcare funding models.	Objective 6: Examine and discuss the elements that influenced the trialling and evaluating process, along with limitations and recommendations	What elements influenced the data collection against the indicators at the stroke rehabilitation centres?	Chapter 7: Discussion
	Objective 7: Explore the influence and impact of using the criteria and indicators of CoCE in stroke rehabilitation	What drives healthcare centres to seek recognition as CoCE in stroke rehabilitation?	Chapter 7: Discussion
	Objective 8: Evaluate the implication of trialling the criteria and indicators at stroke rehabilitation centres.	How did the trial of the CoCE in stroke rehabilitation criteria and indicators impact health service provision?	Chapter 8: Conclusion

4.3 Methodology

The research framework acts as a philosophical position when designing a study. The study is described in terms of ontology, epistemology, and axiology, which informs the theoretical framework.¹²⁶ This underpins the research methodology and, finally, the research methods used in this study. Figure 4.1 below outlines the ontology, epistemology, axiology, methodology, and methods used in this research within a pragmatic worldview.

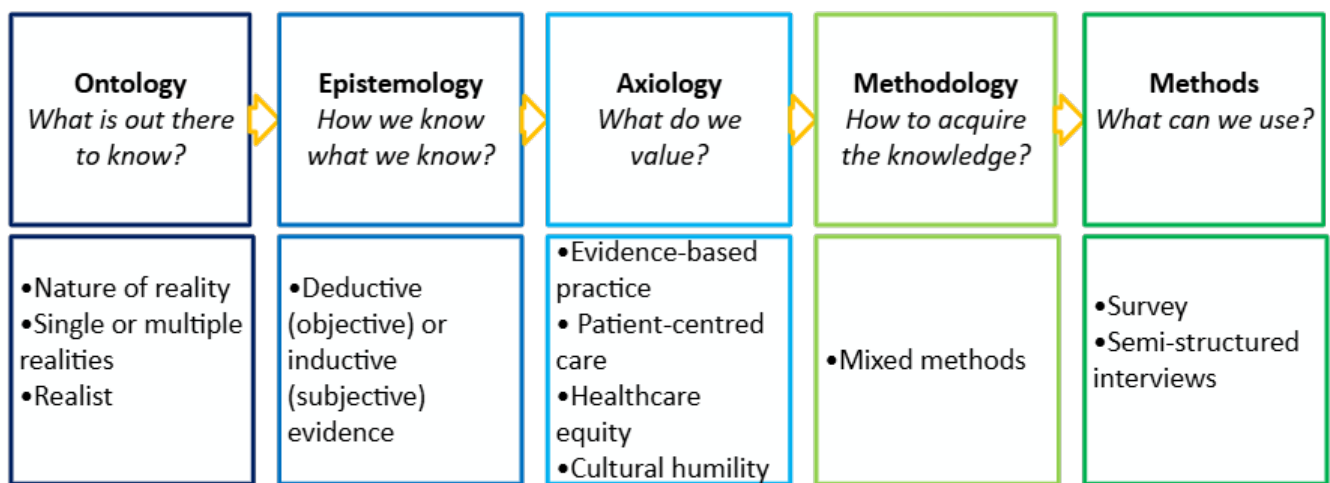


Figure 4.1 The research framework used in this research, depicting the Ontology, Epistemology, Axiology, Methodology and Methods.

4.3.1 Pragmatism Worldview

Among the four worldviews (Post-positivism, Constructivism, Participatory, and Pragmatism) that could be applied to this research, the problem-centred, pluralistic pragmatic worldview, oriented towards real-world practices and consequences of actions, was selected.^{126, 127} This worldview facilitates inductive and deductive thinking, enabling the use of qualitative and quantitative methods in a single study guided by a practical and applied research philosophy.¹²⁸

Pragmatism can be described as “a theory of the nature of ideas and truth.”^{129(pp85)} Pragmatists believe that the realities are dynamic and constantly changing and can be viewed from multiple perspectives, which allows freedom to choose the data collection and analysis methods specific to

the research questions. Pragmatism can be used to describe the view of research designs, methods and theoretical models.¹³⁰ From the program evaluation perspectives, pragmatic designs can be used to investigate whether the program works or to examine the perspectives of important stakeholders, which can be conducted in multiple heterogeneous settings and are very likely to look at the standard of care.¹³⁰

The pragmatic worldview aligns well with the objectives of this research. The scoping review in Chapter 3 highlighted knowledge gaps on how Centres of Clinical Excellence (CoCE) are identified, defined and monitored. Further, Chapter 3 identified the current absence of published literature regarding CoCE focused on stroke recovery and rehabilitation service delivery. The pragmatic worldview allowed the PhD candidate to view the problem and solution pluralistically from the individual, organisation and systems perspectives. Therefore, instead of achieving excellence from one perspective (i.e., only patient outcomes), the focus was also on the team, research, and resources perspectives and how this impacted excellence. The pluralist view of multiple realities informed the research questions, allowing for the analysis of indicators from various perspectives.

4.3.2 Ontological Foundation

Ontology is the study of being or reality with the aim of understanding the types of entities and their interrelations.¹²⁶ The ontological position emphasises the importance of examining the practical consequences and implications of different philosophical concepts. The philosophical position of the research influences the researchers' ontological position. Two extreme stances that were considered are realism (only one truth exists and does not change) and relativism (multiple realities exist and are dynamic).^{131, 132}

Within the pragmatic worldview, ontology acknowledges the existence of single and multiple realities; however, it is often overlooked, thereby only considering the research position from epistemological and methodological stances.¹³³ In a healthcare setting, the researcher's

ontological position shapes the nature of health and practices, in addition to the researcher's experience and viewpoint, which can influence the research findings.

In this research, the quantifiable data and participants' perceptions, which are shaped by their beliefs and experiences, were recognised as valuable information to achieve an in-depth understanding of the criteria and indicators. Aligning this to relativism as the chosen ontological stance, enabled the PhD candidate to understand centres' varied perspectives and experiences when trialling these criteria and indicators.¹²⁶

4.3.3 Epistemological Stance

Epistemology examines the process of knowledge acquisition through iterative, independent and subjective interpretation.¹³¹ Additionally, it considers how knowledge is built through interactions with the environment by exploring various theories of knowledge either through a deductive or inductive approach.¹³⁴ In this research, the epistemological stance reflects the pluralist pragmatic worldview, integrating subjective experience and objective data to address the research questions effectively, where knowledge is influenced by interactions between people and environments, shaped by their experience.¹²⁹ This research acknowledges the dynamic interplay between individual experiences and systemic factors. Therefore, the pragmatic approach ensures that knowledge generation is guided by practice outcomes. It allows for flexibility in methodology and the inclusion of different perspectives, thereby drawing ideas from both worlds and abandoning the forced dichotomy between post-positivism and constructivism.¹²⁶

4.3.4 Axiological Stance

Axiology, the study of the nature of value, encompasses both biased and unbiased perspectives within the pragmatist worldview.^{128, 135} These values underpinned the development of the research questions and methodology used in the research. Axiological stance questions researchers' and participants' personal values and the values embedded in the community or

culture. Additionally, axiology enforces transparency in the value and acknowledges the role of ethics.^{126, 136}

In this research, the axiology was rooted in the principles of patient-centred care, healthcare equity, cultural humility and evidence-based practice. These were incorporated through the questions in the semi-structured interviews where the participants' perception and views of the criteria and indicators, and relevancy, adaptability and applicability to their stroke rehabilitation service were explored.

4.4 Theoretical Framework

While the research framework acted as a philosophical position when developing the study design, the theoretical frameworks provided a basis for guiding, understanding, and analysing the processes and rationale underpinning the research.^{137, 138} As this research was designed to trial the criteria and indicators at international stroke rehabilitation centres, the implementation frameworks were considered as the theoretical framework suitable for this research. The frameworks for implementation science could be categorised into determinant frameworks, process models, implementation theories, classic theories and evaluation frameworks.¹³⁹

In line with the research aim, the determinant frameworks were best suited to identify, understand, and explain what influences implementation outcomes (for example, the participants' perceptions, facilitators, and barriers).¹³⁹ The three commonly used determinant frameworks in health sciences were considered for this research: the Theoretical Domains Framework (TDF), Promoting Action on Research Implementation in Health Services (PARiHS), and Consolidated Framework for Implementation Research (CFIR).

The TDF is an integrative framework developed by Cane, O'Connor and Michie¹⁴⁰ based on the behaviour change theory, which is influenced by cognitive, emotional, and social aspects of

behaviour and readiness for change. While this framework is beneficial when assessing behaviour change, it encompasses many domains and constructs (the revised version included 84 constructs in 14 domains).¹⁴⁰ A limitation of this framework for the current research project is that the TDF does not consider the external factors that impact the implementation process (for example, systems and processes).¹⁴¹ Comparatively, the PARIHS, originally developed by Kitson, Harvey and McCormack¹⁴² was developed for a healthcare setting and has elements (evidence, context and facilitation) designed to capture the complexities around the implementation process. The aim of this framework is to promote action through research translation into practice. However, there is a limited focus on individual behaviour change (when compared to TDF).¹⁴¹ While the TDF explores behaviour change, the primary outcome for PARIHS was the success of the research implementation.

CFIR is a comprehensive framework developed by Damschroder et al.^{143, 144} using the common constructs from 19 published implementation theories. The CFIR can guide the implementation process across multiple settings, with the option of using some or all the domains or constructs. While CFIR considers the five domains that influence the implementation process, it does not provide guidance on how to implement the innovation.¹⁴¹ Nevertheless, this framework best fits this research as it is adaptable and explores the elements from individual, organisational, and systems perspectives. Within the healthcare system, CFIR is frequently used to explore various implementation processes in areas of patient-centred care, healthcare delivery, disease management, health-related topics, healthcare systems and quality improvement.¹⁴⁵ Studies have evaluated the applicability and usefulness of the CFIR as an implementation framework for clinical practice guidelines in nursing practice and concluded that the framework was helpful during the development of the data collection tool and the analysis of the qualitative data. However, it can be limited and could be supplemented with other tools.¹⁴⁶ Additionally, CFIR can be used to

distinguish the facilitators and barriers that influenced the implementation process.¹⁴⁷

While the TDF, PARIHS, or CFIR could be suitable, the PhD candidate considered that CFIR had the 'best fit' when the research aims and questions were considered, due to its capacity to explore the success of innovation.^{138, 139}

4.4.1 Consolidated Framework for Implementation Research

This research used the CFIR to develop the research questions and data collection tool (survey and semi-structured interview questions). The CFIR framework has five domains and 39 constructs that provide a pragmatic framework to map and seek information on the usability of the indicators.¹⁴⁴

Each domain has been presented in bold, along with a definition and description of how the domain applies to the research, as described below:

- ***Intervention Characteristics*** could impact implementation success and are evaluated using perceived internal or external origin, evidence quality and strength, relative advantages, adaptability, trialability, complexity, design quality, presentation, and cost.¹⁴³
 - In this research, intervention characteristics encompassed clinicians' perceptions of the evidence underpinning the criteria and measurable indicators, their views on the design, adaptability and suitability, and overall feedback on the criteria and indicators.
- ***Outer Setting*** refers to any external factors that influence implementation and are described using patient needs and resources, cosmopolitanism, peer pressure and external policies and incentives.¹⁴³
 - In this research, the external factors were the healthcare models and external health policies and guidelines relevant to using the indicators.

- **Inner Setting** comprises challenges or opportunities that arise from within the implementing organisation that impact the implementation. This can be evaluated using structural characteristics, networks and communications, culture and implementation climate.¹⁴³
 - In this research, the Inner Settings that impacted the trial process were the readiness of the clinicians/healthcare centre to gather evidence/data and resource availability.

- **Individual Characteristics** are the Individual beliefs and attributes that impact implementation. These can be appraised using knowledge and beliefs about the intervention, self-efficacy, individual stage of change, individual identification with the organisation and other personal attributes.¹⁴³
 - This research was designed to gather evidence from an organisational perspective rather than the perspectives of individuals, so this domain was not represented as strongly as other domains.

- **Process of Implementation (or innovation process)** is the appraisal of stages of implementation such as planning, engaging, executing, reflecting and evaluating.¹⁴³
 - In this research, the processes used to trial and evaluate the indicators and the strategies used to obtain the evidence for the criteria and indicators were evaluated.

The types of questions that were developed for the semi-structured interview, guided by CFIR, are listed below under each domain. These questions were used to initiate the interview, and based on the responses provided by participants, follow-up questions were asked:

Intervention Characteristic Domain

- What are your thoughts on these indicators?
- Would you like any clarification on any of the indicators?
- What does [indicator] mean to you?
- How well are these indicators integrated into practice?
- Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that should be included for your site/health services?
- Are there any indicators listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

Outer Setting Domain

- How are the criteria and indicators adaptable to your healthcare model?
- What is missing from the indicator that is relevant to health service/model/country?
- What are your thoughts on how well your centres have achieved the indicator compared to other centres/countries or areas?
- Would identifying as a CoCE change/impact service delivery?

Inner Setting Domain

- How does trialling the indicators impact your record-keeping?
- Was it difficult to collect evidence or meet the indicators?
- What are the systems/procedures used to consistently measure and retain the indicators?

Individual Characteristics Domain

- Did you have any issues with the trialling process?
- What types of evidence would you like to see be considered for each of the indicators?

Implementation Process Domain

- Do these indicators fit your rehabilitation service?
- What type of data is collected?
- How is the data collected?
- Are there any facilitators or barriers to collecting this information?
- Exploring barriers/rationale if the indicators are not met or partially met .

4.5 Mixed-Method Approach

Guided by the theoretical framework and based on the pluralistic pragmatism worldview mentioned above, the mixed-method approach is the most suitable method for this research. This worldview acknowledges that this research is multifaceted, with the focus on the consequences of the research, allowing the use of multiple methods of data collection.¹²⁸ The research questions were explored using quantitative and qualitative strands, allowing for a more complete analysis.¹⁴⁸

Creswell and Clark¹⁴⁹ described six major mixed-method research designs: embedded design, explanatory sequential design, convergent parallel design, exploratory sequential design, transformative design, and multiphase design. The mixed-method approaches are determined based on the level of interactions (independent or interactive), the priorities of the strands (quantitative, qualitative or equal), the timing of the strands (sequential, concurrent or multiphase combination) and the procedure to mix the strands (mixing at the level of design, data collection, data analysis or data interpretation).¹⁴⁹ The process used to select the most suitable mixed-method approach was determined using the following criteria below (Figure 4.2).¹²⁸

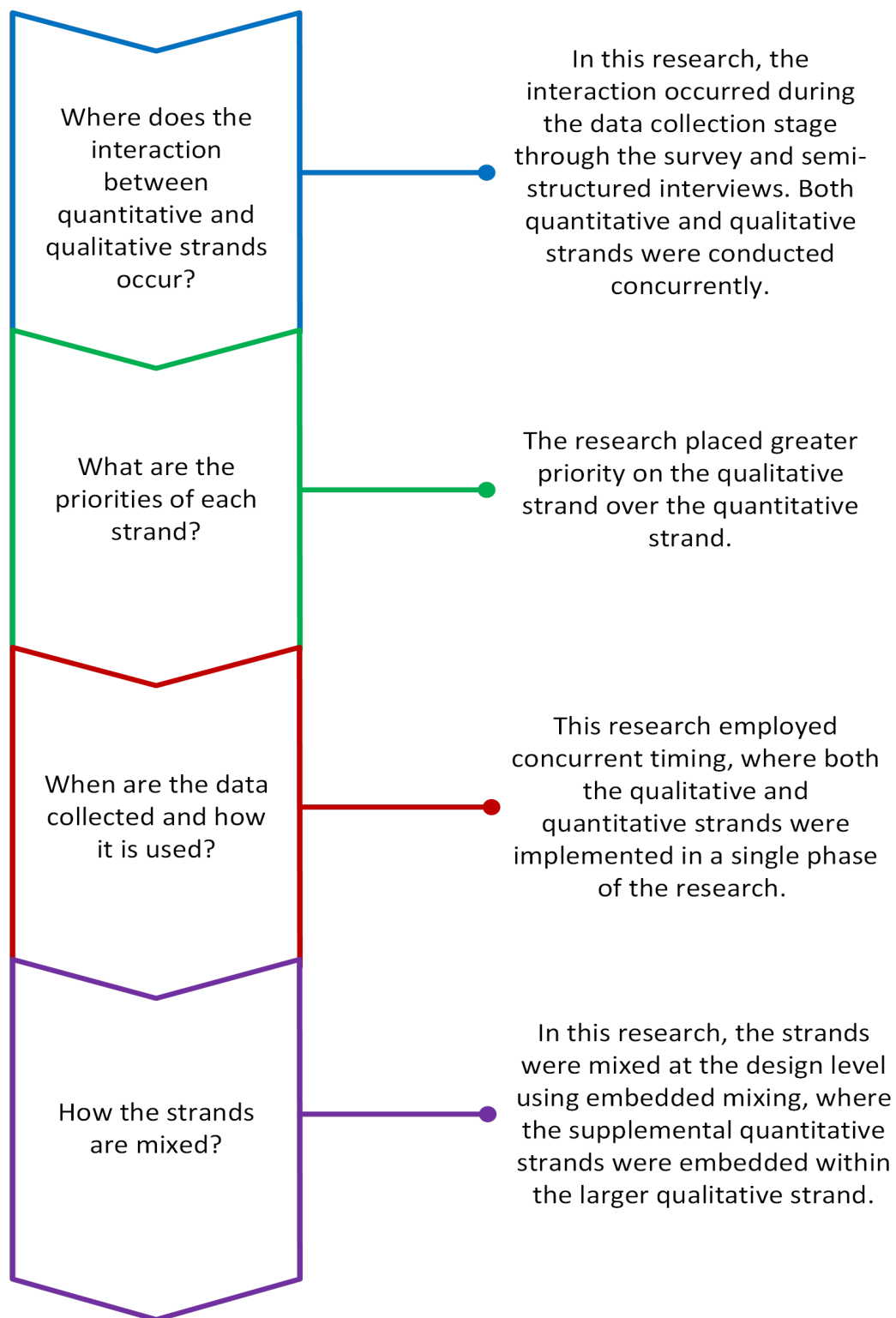


Figure 4.2 The process of selecting the most suitable method for this research.

Based on the selection process above, this research adopted a concurrent embedded mixed-method approach to trial and evaluate the indicators in centres that provided stroke

rehabilitation.¹²⁸ Both the qualitative and quantitative data were collected and analysed concurrently, with the qualitative strand adding more depth to the responses received. This approach aligns with a pragmatic worldview, allowing for a comprehensive understanding of indicators' fit within centre priorities, usability and relevance to healthcare models.

4.6 Methods

Research methodology and approaches determine the methods used in this research. This section outlines the centre and participant selection, data collection procedures and data analysis techniques. Figure 4.3 below outlines the method used in this research.

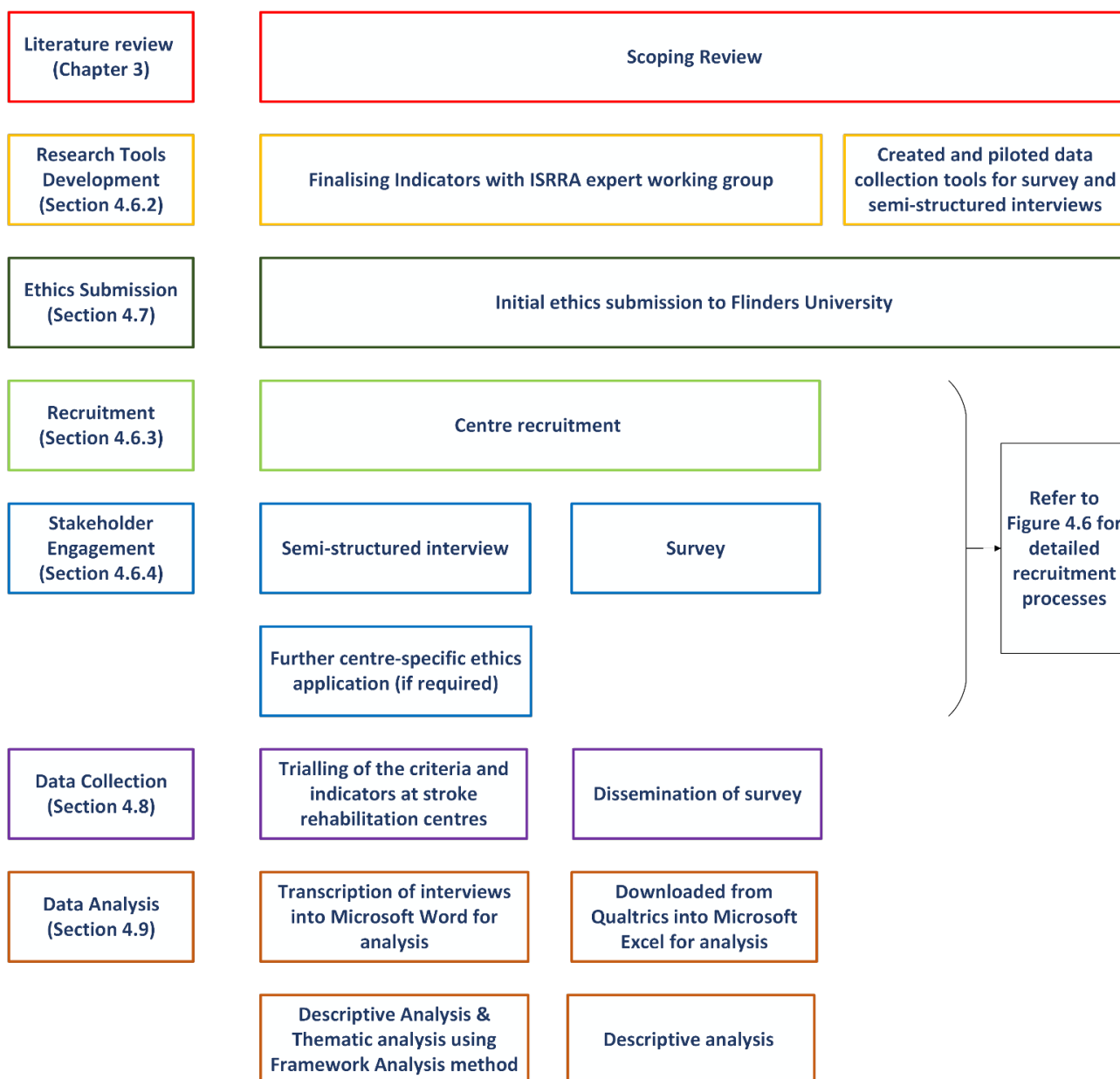


Figure 4.3 Overview of research methods.

4.6.1 Indicators

This section describes the PhD candidate's involvement in the development of the indicators, which was led by the PhD candidate's supervisors. The criteria and measurable indicators of CoCE in Stroke Recovery and Rehabilitation were developed by an international expert working group with consultation with consumer groups prior to centre recruitment. The PhD candidate joined the expert working group after the seven criteria were developed and had a key role in developing and refining the measurable indicators for each criterion (See publication co-authored by PhD

candidate, Appendix E). This publication discussed the finalised criteria and indicator development processes used in this research. The indicators are also listed and described in Chapter 5: Results.

The PhD candidate was involved in the design and dissemination of a survey led by her supervisors that was designed to collect information from the ISRRA expert group of researchers and clinicians, and a separate aphasia friendly survey for consumers. The purpose of these surveys was to identify the elements that defined each criterion. When responses were received, the PhD candidate and supervisors inductively analysed the responses to derive the common themes that were to be included as indicators under each criterion.⁸ Multiple iterations of coding, indicator generation and sorting indicators within criteria were completed to reduce duplication between indicators, and to maximise clarity. Once completed, the indicators were circulated to the wider ISRRA group for consultation and were finalised to be used in PhD candidate's research. A detailed method for developing the indicators has been published.⁸ Generation of the indicators for the criteria of CoCE in Stroke Recovery and Rehabilitation is the only component of the research presented in this thesis that the PhD candidate did not lead, but was actively involved throughout the process.

4.6.2 Research Instruments and Resources

This section describes the development of tools and resources used in this research to trial the indicators at international rehabilitation centres. Once the indicators were approved by the ISRRA expert group, the final version was translated into Chinese using approved and accredited translator service. This was to improve the usability of the indicators to ensure that appropriate data were collected. The language gap was identified during the initial recruitment process when the indicators were discussed with ISRRA researchers from China. The researchers from other countries with English as their secondary language favoured using the English version of the indicators.

The indicators were evaluated in two ways, with each consenting centre indicating whether they preferred to participate by completing a survey or a series of in-depth semi-structured interviews. While it was anticipated that the interviews would yield more detailed information, the PhD candidate considered that a survey might be more appealing to resource and time-poor centres because it was less time-consuming, thereby facilitating the inclusion of centres from different global regions.

4.6.2.1 Survey

A survey instrument was developed in Microsoft Word to systematically collect information on each criterion and the associated indicators. Questions were designed to capture detailed information for each indicator and were framed by the CFIR domains, namely features of the criteria and indicators (innovation), Inner Setting, Outer Setting, processes used to trial the criteria and indicators, and characteristics of the individuals (as described in Section 4.5: Theoretical Framework). The survey comprised closed- and open-ended questions to aid comprehensive responses to the questions. The closed responses required the participants to respond 'Yes' or 'No' regarding whether they collected information on the indicators. If the participants responded 'Yes', they were asked open-ended questions about what information was collected (Figure 4.4 below). The survey was uploaded into Qualtrics¹⁵⁰, and the skip logic option was used to ensure that relevant questions were asked for each centre (responses to previous questions were used to guide subsequent questions). This also reduced the burden on participants. Participants were also asked to indicate and explain if specific indicators were deemed relevant or not relevant for each criterion.

Optimal Outcomes

1. Do you routinely collect information on

Patient outcomes

Clinical/physiological measures
Patient-reported outcomes
Patient-reported experience
Self-management skills

- ☐ Yes
- ☐ No

If yes, what information do you routinely collect

- ☐ Clinical/physiological measures _____
- ☐ Patient reported outcomes _____
- ☐ Patient reported experience _____
- ☐ Self-management skills _____

Figure 4.4 Example from the survey instrument.

Five allied health professionals from Australia pilot-tested the survey tool to ensure the survey questions' clarity, comprehensibility, and appropriateness. Based on the feedback, minor edits were made, and the survey was deemed ready for distribution. Formal data on inter-rater agreement were not collected during the pilot phase, as the pilot phase aimed to refine language and format, rather than assess scoring consistency. Participants were emailed a survey link connected to a landing page that presented detailed information about the research. Participants needed to consent to participate for the survey questions to be presented. The survey took up to 45 minutes to complete. The full survey is included in Appendix F.

4.6.2.2 *Semi-structured interview questions for in-depth evaluation*

There are many forms of research interviews, and selecting the types of interviews to be used in a research project will depend on the amount of information required from the participant.¹⁵¹

Structured interviews can be used to ask all respondents the same questions to reduce bias.¹⁵¹ In contrast, unstructured interviews use an informal style of questioning, with the phrasing of questions varying for each respondent and more flexible follow-up questions from the interviewer.¹⁵¹ Semi-structured interviews are mid-way between these two styles and are commonly used in social sciences.^{151, 152} In semi-structured interviews, the interviewer usually has an interview guide comprising a list of open-ended questions to cover during the interview. The interviewer has the flexibility to explore specific topics in response to the interviewee's answers, for instance, by asking probing questions for more detail or seeking clarification.^{151, 153, 154 155}

Based on this research's objectives and research questions, semi-structured interviews were deemed suitable as they promoted flexibility for the PhD candidate to explore the participants' answers further and to vary the questioning style based on the centre's preference. This method of data collection was also used to explore and understand the participant's views and perceptions of the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation. The semi-structured interview questions were developed, guided by the CFIR domains explained above in Section 4.4.1. The questions were designed to explore the integration of indicators into the centre's practice and participants' perceptions and experiences of collecting evidence against the indicators. Figure 4.5 below illustrates the types of questions that were asked for each indicator, each criterion and at the end of the trial period, which was during the final scheduled interview session with the interviewed centres.

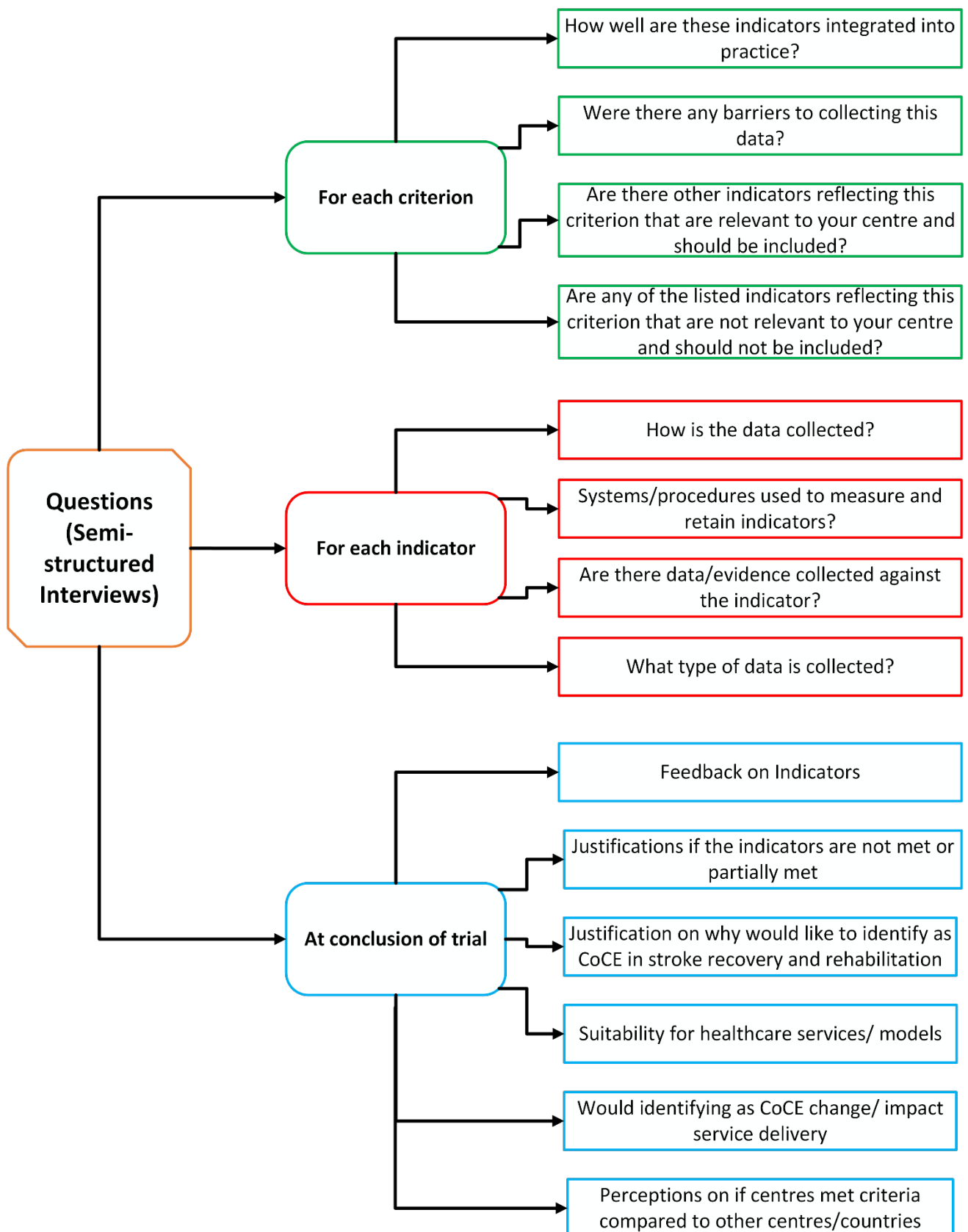


Figure 4.5 List of semi-structured interview questions for each criterion, each indicator, and at the conclusion of the trial.

4.6.3 Recruitment Process

Centres that provided stroke rehabilitation were recruited to participate in the survey or in-depth semi-structured interview evaluations. Following the recruitment of the centres, individuals working within the centres were recruited to participate in the research. The recruitment process is summarised in Figure 4.6 below.

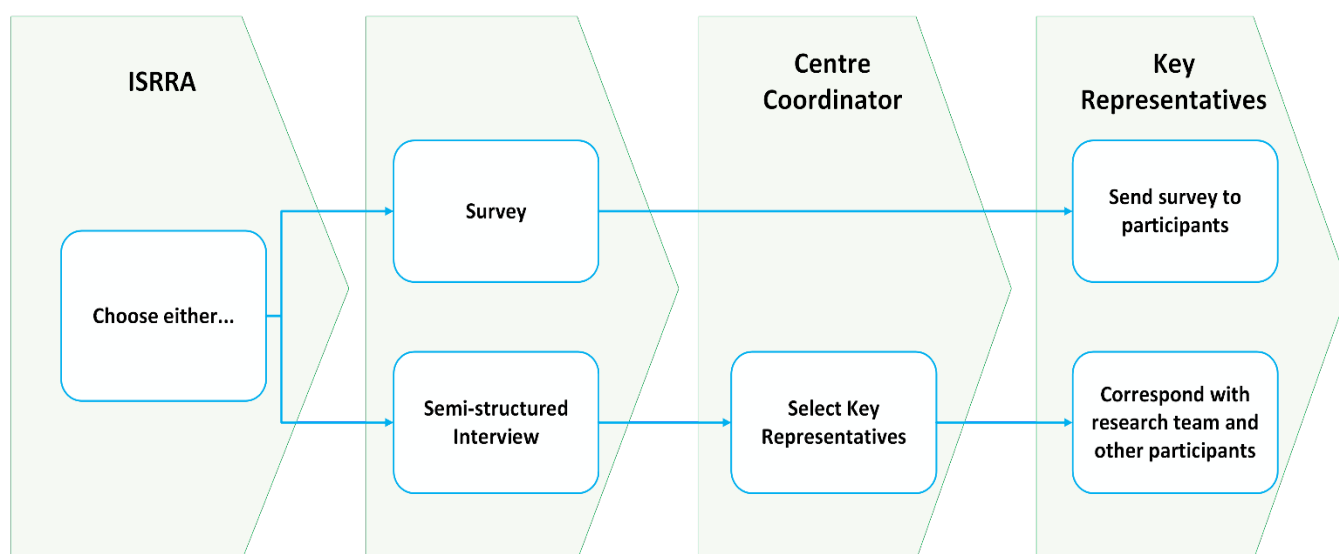


Figure 4.6 Centre recruitment process to participate in the survey or semi-structured interview.

4.6.3.1 Centre recruitment

While the indicators were being finalised, the PhD candidate designed the proposed research methods for trialling the indicators at stroke rehabilitation centres and presented these to the ISRRA expert group. This included information on the research aims, consent, processes involved in participating in the survey and interview, centre selection criteria, the anticipated time requirement, and the ethics process. The ISRRA expert group members were asked to nominate centres that would like to participate in the research, either in the survey or interview. A reminder email was sent out one month later.

The centre selection criteria included:

- Need to provide stroke rehabilitation services to stroke survivors.
- Centres can be stand-alone stroke rehabilitation centres or centres that include stroke rehabilitation in a rehabilitation unit.
- Representation from low, middle and high-income countries.
- Representation from metropolitan and regional/rural centres.
- Representation with centres using different healthcare funding models.

Expert working group members were asked to email the PhD candidate with details of potential stroke rehabilitation centres that were interested in participating and a nominated contact person within the specific centre. In some (but not all) cases, the contact person was the expert working group member. The PhD candidate collated responses from the expert working group and met with supervisors to finalise the centres based on the selection criteria. Twenty centres were nominated to participate in the research, and 16 centres met the criteria and agreed to participate (one centre did not provide stroke rehabilitation, and the other three did not consent). From the 16 centres, only 12 were included in this thesis as ethics were not approved until after the cut-off date for this thesis (this will be explored in the next chapter – Chapter 5: Results).

The centres were purposively selected to include those from low-, middle-, and high-income countries, from different geographical regions with different national languages, and healthcare funding models (fee-for-service vs. universal healthcare vs. mixed model). In addition, a Regional Australian centre providing healthcare to a large Indigenous population was strategically recruited to trial and evaluate the measurable indicators from cultural perspectives.

4.6.4 Stakeholder Engagement

4.6.4.1 *Semi-structured interview*

Following centre selection, an initial email was sent to the relevant contact person (Figure 4.6 above), who were either expert working group members or nominated by the expert working group. The email explained the research aims and included an invitation to set up the first meeting with the PhD candidate and her principal supervisor over Microsoft Teams. The agenda of the first meeting covered explaining the research, discussing ethics requirements for the centre (whether local ethic approvals were required), and nominating participants (multidisciplinary team healthcare professionals/team leaders/program managers) and the 'key representative' from the centre.

The role of the key representative was to liaise between the research team and the participants from the centre. The key representative was selected on the premise that they work in the stroke rehabilitation service, were interested in participating in the study and had the required resources (e.g., were able to participate in 1:1 training and support sessions for the duration of the study, had working internet, allocated project time within their role).

4.6.4.2 Survey

For the survey, the PhD candidate emailed the key representative nominated by the ISRRRA expert group member to advise that the stroke rehabilitation centre had been nominated to participate in the research. The key representatives were invited to discuss the study aims, ethics requirements, and anticipated time requirements over email. Then, the key representative was asked to consult their teams, and if the centre agreed to participate, the key representative was asked to contact the PhD candidate for further information on the processes to participate in the survey. A follow-up email was sent to the key representative one week later as a reminder. Once the participation was confirmed and the ethics requirements met (if needed), the PhD candidate emailed the survey link (and QR code) to the key representative with a request for the survey to be disseminated to the clinicians/program managers/team leaders in their cohort to be completed

and the anticipated survey close date.

4.7 Ethics approval

This research was classed as low risk, and ethics approval was received prior to the commencement of this research from:

- The Southern Adelaide Clinical Human Research Ethics Committee (SAC-HREC) via Flinders University (Project number: 5776)
- Southern Adelaide Local Health Network (Office for Research number: 112.23)

Additionally, the PhD Candidate assisted the interviewed centres that required further ethics approval and/or local research governance to uphold the centre's research requirement. The PhD candidate assisted with ethics applications for the centres in Singapore, Malaysia and Regional Australia. The centres in Singapore required the PhD candidate to complete courses to gain certification before submitting the ethics application. The Regional Australian centre required regional governance approval before applying for regional ethics. The centre in Malaysia required identity clearance from the PhD candidate and all the supervisors as part of the ethics application. The processes to gain ethics approval at these centres were extensive, which delayed data collection from all three countries. Therefore, only the data from Regional Australia (out of three that required ethics) was included in this thesis, as data collection was completed before the due date for the thesis write-up. Centres in Sweden, Metropolitan Australia, and China deemed the research to be a quality improvement project and did not require ethics approvals. Refer to Appendix G for the Ethics Approval letter from SAC-HREC.

4.8 Data Collection Process

4.8.1.1 Survey

The survey was formatted and disseminated using the Qualtrics platform and was open for four

weeks. Key representative(s) from the participating centres were sent a QR code or a link via email to complete the survey. The key representative(s) were asked to complete one survey per centre. However, some centres completed one survey per service (inpatient versus outpatient). Additionally, the key representative could also complete the survey on behalf of the stroke rehabilitation centre. There was no pre-specified number of participants per centre as the participants were asked to collaborate with their teams when completing the survey. An email reminder to complete the survey was sent in Weeks 2 and 3. To ensure the survey completion rate, a hard copy of the survey was also made available to centres that requested it. Survey response data were exported from Qualtrics into Microsoft Excel for analysis.

4.8.1.2 *Semi-structured interviews*

Semi-structured interviews were conducted to gather information from the centres. Each centre had a designated key representative responsible for liaising between the researcher and local participants (i.e. the rehabilitation clinicians, managers, and/or team leaders). The local participants were invited to participate in the interview sessions.

All interviews were completed remotely over Microsoft Teams with participants from each centre, and were audio recorded using the recording function in Microsoft Teams. The semi-structured interview data was transcribed into Microsoft Word using the Microsoft Teams recording and transcription option, and field notes were taken by the PhD candidate.

Information on the criteria and indicators was collected over four subsequent interviews. The structure of the interviews differed slightly between centres to accommodate local processes and preferences. For example, some centres sent through the completed information prior to the scheduled interview and discussed what they had documented during the interview, whereas other centres discussed the indicators at the interview, sometimes sending through the discussed information after the scheduled interview. Semi-structured interviews were conducted with either

individual participants or small groups, depending on site preferences and availability. Two centres opted for individual participants (however, participants collaborated with their teams and recorded the responses before the interview), while others participated in group interviews. When group interviews were conducted, the same participants attended the interviews each time. Table 4.2 outlines the timeline and interview aims for the centres. Refer to Figure 4.5 above for a summary of the semi-structured interview questions.

Table 4.2 Outlines the aims for each interview session for interviewed centres.

Interview	Anticipated time requirement	What is covered in each scheduled interview
Interview 1	~ 30 minutes	An initial interview was set up between the centre's key representatives and the PhD Candidate. The consent form was explained (see Appendix H) and signed, and preliminary data (background information) was collected. Then, the centre was orientated to the seven criteria and the indicators. The data collection and recording method and the type of data the PhD Candidate was seeking were also discussed. Criterion 1 was emailed to participants and asked to document any evidence of individual indicators for discussion at the next scheduled interview.
Interview 2	~ 60 minutes	Discussed indicators in Criterion 1. Additional questions on the views of the criterion were asked at the end. The participants were orientated to Criteria 2 and 3. Any feedback or queries from the previous interview were resolved.
Interview 3	~ 60 minutes	Discussed each indicator in Criteria 2 and 3. Additional questions on the views of each criterion were asked at the end. The participants were orientated to Criteria 4 to 7. Any feedback or queries from the previous interview were resolved.
Interview 4	~ 90 minutes	Discussed each indicator in Criteria 4 to 7. Additional questions on the views of each criterion were asked at the end. Any feedback or queries from the previous interview were resolved. Participants were asked the post-trial questions as illustrated in Figure 4.5.

The PhD candidate provided ongoing 1:1 support to the key representatives and participants over Microsoft Teams for the trial duration. Support entailed discussing the indicators and resolving any

issues or ambiguity in evidence-seeking, data collection, and/or recording. Additional Microsoft Teams meetings were scheduled if requested by the participating centre or if further information sessions were required. Field notes were recorded during and after each weekly interview session.

4.9 Data Analysis

The centres are not identified in the results to preserve anonymity. However, the results were reported by the country that participated.

4.9.1 Descriptive Data

The quantitative data collected for this research included centre demographics information and the dichotomous responses (yes/no) from both the survey and semi-structured interviews regarding whether data were collected on the indicators. The data were collated and descriptively analysed to summarise key findings. The demographic data offer insight into the centre's general characteristics. The dichotomous responses were summarised and presented under each relevant indicator and criterion, allowing for comparison between centres. The results are tabulated and reported in detail in Chapter 5: Descriptive Results.

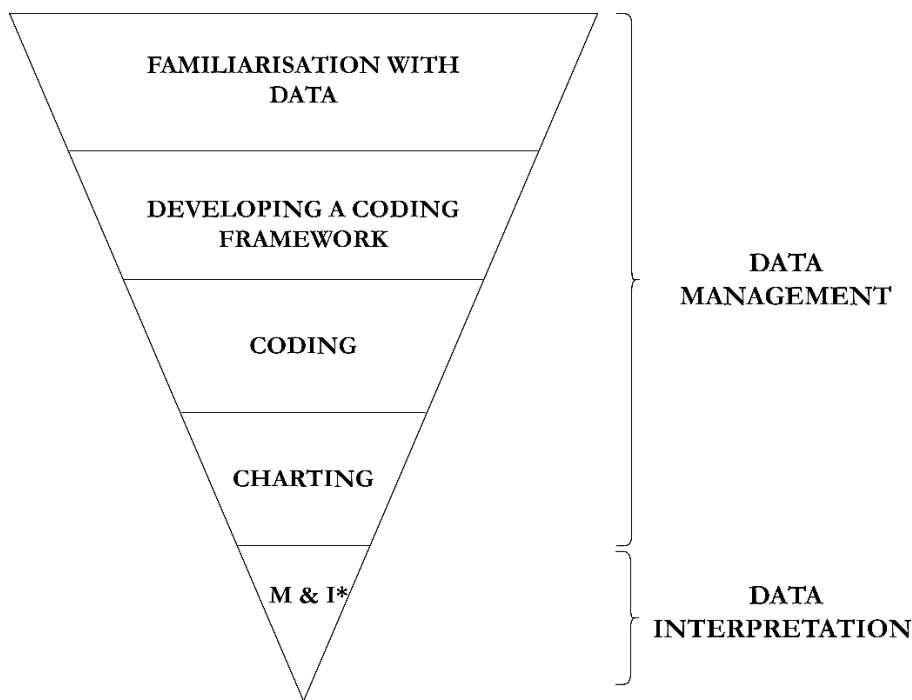
4.9.2 Thematic Analysis using Framework Analysis

The qualitative data from the semi-structured interviews were rigorously analysed to identify themes and patterns using Framework Analysis (explained in detail in the next section). This is a systematic and structured method for organising and interpreting qualitative data, involving several steps, each with a distinct function.

The Framework Analysis approach was initially developed in the social policy research domain to understand complex behaviours and systems.¹⁵⁶ Framework Analysis is a very flexible tool that is not aligned with a particular epistemological, philosophical or theoretical approach and is neither inductive nor deductive when used for thematic analysis, which is useful for this research that sits

along this continuum.¹⁵⁷ The 'framework' involves numerous interconnected stages (Figure 4.7 below), each with a distinct function. Data management comprises four stages: familiarisation with the data, developing a coding framework, coding and charting. These four stages frequently occur iteratively, with the coding system being refined as the researcher becomes more familiar with the data and codes more data to the framework. Data interpretation involves mapping and interpreting the data, subsequently developing the themes.

Framework Analysis was selected for use in this research as the commonalities and differences needed to be analysed before focusing on relationships between the data, therefore seeking to draw descriptive and/or explanatory conclusions clustered around themes.¹⁵⁷ Additionally, framework analysis allows for a more nuanced understanding of how participants interpreted and engaged with indicators without being overly constrained by existing categories, enabling themes to emerge organically from the data while still allowing for structured mapping to CFIR constructs. In this research, the findings of the qualitative analysis were presented in a comprehensive and structured manner. Each theme and sub-theme were described in detail, supported by quotes from the interview transcripts. The framework analysis process was tabulated and included in the results in Chapter 6: Thematic Analysis.



* Mapping and Interpretation

Figure 4.7 Summary of stages of the Framework Analysis method.

Familiarisation

Familiarisation involves listening to audio recordings, reading transcripts, and studying field notes to get to know the data.¹⁵⁷ This was completed by the PhD candidate who transcribed the semi-structured interview recordings by reviewing the audio recordings, the field notes, and other information sent by centres outside the interview schedule. As the PhD candidate assumed responsibility for facilitating all the interviews and taking all the notes, it was easier to familiarise with the data at this stage. Additionally, conceptualising the thematic framework was a flow-on progression.¹⁵⁶

When all the transcripts, field notes and additional information were collated for each centre, the PhD candidate reviewed the interview transcripts and audio recordings multiple times to become familiar with the data and gain an understanding of the content. The field notes were also included in the transcripts.

Developing a coding framework

During the familiarisation process, initial attempts were made to identify key issues, concepts, themes, and sub-themes. The themes were framed from three perspectives: pre-existing knowledge, participant responses, and patterns from the responses.¹⁵⁶

In this research, the PhD candidate analysed the responses from the transcripts and field notes to develop the initial theme or concept by grouping the facilitators, barriers, and perceptions of the indicators. Initial concepts were grouped into “a particular theme” while familiarising with the data. This was frequently updated as new concepts were established during this process. Each centre was analysed and tabulated independently until the final stage of mapping and interpretation.

Coding

The coding process involves the thematic framework or index being systematically applied to the data in its textual form.¹⁵⁶ In this research, once the framework was developed, the next step was to develop the codes by assigning the responses to further themes and sub-themes. Some responses were identified as requiring multiple codes as different concepts were discussed within a single interview response. The codes from Criterion 1 were cross-checked with the supervisors to ensure they were applicable and relatable to the theme.

Charting

The final step in the data management stage was charting. The charts were developed with headings and subheadings drawn from the thematic framework, from a priori research questions, or with considerations on how best to present and write up the study.¹⁵⁶

In this research, following the coding stage, responses were charted into different tables according to the research question, with the final version of the table shown below (Table 4.3). Each response was given a code mapped to the CFIR framework—categorised by the domains and

constructs. The principal supervisor cross-checked codes mapped to the CFIR domains and constructs to ensure there was agreement and consistency in mapping methods. Any differences were resolved with discussions. The table below portrays the table used in the charting stage.

Table 4.3 Example of the table in the Charting stage.

Participating centres for semi-structured interviews	Quote from participants to describe how the indicators were integrated into practice	Theme Codes	CFIR domains and constructs
------------------------------------------------------	--------------------------------------------------------------------------------------	-------------	-----------------------------

Mapping and Interpretation

Data interpretation was the final stage in the overall process. This stage involved mapping and interpreting the patterns and forming conclusions from the data. In this stage, similarities and differences between centres were identified. More codes are developed to aid the process.¹⁵⁶

Table 4.4 below shows the final version of the data mapping used to explain and discuss the developed themes. The themes were compared and contrasted between the centres to identify the common patterns and main themes. The themes were discussed in relation to the CFIR framework and its applicability to the research. These themes were developed from the responses of the perceptions, barriers and facilitators related to the indicators and criteria.

Table 4.4 Example of the final table used in the mapping stage.

How are the indicators integrated into practice?	What are the facilitators and barriers to achieving the indicators?
--------------------------------------------------	---------------------------------------------------------------------

The strength of using framework analysis was the dynamic process that allowed ideas to be reconsidered and reworked in the analytical process as the processes were documented.¹⁵⁶ The

results from the qualitative data are presented to answer the research questions in Chapter 6: Thematic Analysis.

4.9.3 Data Integration

This research used a concurrent embedded mixed method approach to analyse both qualitative and quantitative data concurrently and answer the research questions comprehensively.

Integrating qualitative and quantitative data allowed for a multifaceted examination of the indicators in stroke rehabilitation centres. Data from individual centres were analysed, compared, and contrasted to other centres. In Chapter 5: (Descriptive Results), data from both strands were visually presented to show the comparison between the centres. Following this, the data from the semi-structured qualitative strand were coded using the Framework Analysis (as described above) and mapped to the CFIR domains and constructs in Chapter 6 (Thematic Analysis). Both the strands were triangulated and discussed in Chapter 7: Discussion.

4.10 Limitations

There are limitations to the mixed method approach that can impact this research. While effective in collecting data for individual indicators, the quantitative strand with survey and semi-structured interview data lacked sufficient depth to provide a complete picture of how the indicators fit in the individual, organisation and system perspectives. However, this approach effectively collected data for individual indicators for analysis and comparison purposes. To complement this approach, the qualitative strand from semi-structured interviews provided in-depth data on participants' perceptions that can be used for thematic analysis. The downside of using a semi-structured interview is the impact on the rigour due to loss of naturalness in responses and lack of homogeneity with the questioning.

4.11 Chapter Summary

This chapter provides an overview of the research methodology that guided this research, drawing on different approaches to answer the research questions effectively. This research adopted the concurrent embedded mixed methods approach, integrating qualitative and quantitative strands to provide a holistic understanding of the research topic. Additionally, the rationale for using the chosen theoretical frameworks has been explored with a detailed description of how they informed the methods used in this research and will be used to code the themes during the data analysis process. The next two chapters will report on the findings of this research.

CHAPTER 5: DESCRIPTIVE RESULTS

5.1 Chapter Overview

The findings from this research are reported across two chapters: Chapters 5 and 6. The findings discussed in this chapter will outline and explore the descriptive responses from the survey and semi-structured interviews, including whether evidence against the indicators was collected.

Chapter 6 will focus on the outcomes from the thematic analysis of the semi-structured interviews. The findings in this chapter have been reported under each criterion of the Centres of Clinical Excellence (CoCE). The findings were reported within each criterion under the individual sub-indicators, indicators, or categories. This is to ensure the findings are presented cohesively and succinctly and to avoid repetition.

Chapter outline

- Summary of centres
- Criterion 1: Optimal Outcomes
- Criterion 2: Research Culture
- Criterion 3: Interprofessional Working
- Criterion 4: Knowledge Exchange
- Criterion 5: Leadership
- Criterion 6: Education
- Criterion 7: Advocacy
- Chapter Summary

The research question addressed in this chapter was

- What evidence do the centres collect against the criteria and indicators?

Appendix I: Transcribed interview responses from the semi-structured interviews

Recap from the previous chapter: Summary of data collection and data coding in the tables.

The surveyed and interviewed centres were asked if the data on the measurable indicators were routinely collected and the type and frequency of data collected. The survey responses were binary (yes or no). If the response was 'yes', further information on the type of data collected was ascertained using free text. The interviews consisted of open-ended questions to allow participants to elaborate on the indicators and provide feedback. The responses were coded as:

- ✓ Participants from the centres answered yes or responded that they collected data against the indicator and were able to describe the data collected.
- ✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.
- ✗ Participants from the centre responded no or that they do not collect data against the indicator.

'Partial' When participants from the centre did not collect data on all the sub-indicators.

The terms criterion, category, indicator, and sub-indicator throughout this chapter will be depicted as the example in Figure 5.1.

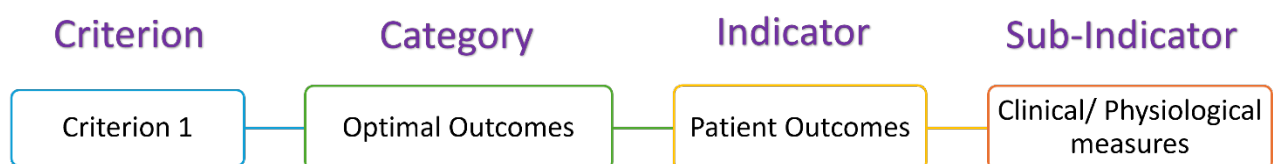


Figure 5.1 Example of Criterion, Category, Indicator and Sub-Indicator.

5.2 Summary of Each Centre

Surveys were completed by centres in Chile, Denmark, India (two centres), Ghana, the United Kingdom and Singapore (pending ethics approval for interview, however, was able to participate in survey). Interviews were completed with Australia (two centres), China (two centres) and Sweden. Table 5.1 presents an overview of the centres.

In total, 67% (n=8) of the centres were based in metropolitan areas (>100 000 people), 25% (n=3) were based in regional and rural areas (between 5000 to 100 000 people), and one centre was based in a remote area (<5000 people). It is worth noting that the terms regional and rural do differ between countries. Therefore, the participants were given an estimated population to refer to when responding to this question. The geographical area and population size were defined using the Rural, Remote and Metropolitan Area classifications.¹⁵⁸

All 12 centres provided inpatient rehabilitation services, and with the exception of the centre from Denmark, all centres also provided outpatient rehabilitation services. Only three (25%) centres provided rehabilitation services in the home. All centres had Physiotherapists and Registered Nurses involved in their service, with most centres (n=11, 92%) providing Occupational Therapy and Speech Therapy. Only five (39%) centres have a Social Worker involved in their services. All the centres had at least one medical professional (rehabilitation physician, neurologist and/or general practitioner) supporting their rehabilitation services. Seven (58%) centres had a psychologist's input, and some centres reported neuropsychologist care.

Table 5.1 Summary of Centre (Location), Types of rehabilitation services provided, Core team members and other disciplines involved.

Centre (Location)	Type of services				Core team members										
	Inpatient Rehabilitation	Outpatient Rehabilitation	Rehabilitation in the home	Telehealth	Rehabilitation Consultant	Neurologist	General Practitioner	Physiotherapist	Occupational Therapist	Speech Pathologist	Dietitian	Registered Nurse	Social Worker	Psychologist	Other disciplines
Survey															
Chile (Metropolitan)	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	Neuropsychologist
Denmark (Remote)	✓					✓		✓	✓	✓	✓	✓	✓	✓	Neuropsychologist
Ghana (Metropolitan)	✓	✓				✓	✓	✓				✓			
India (Metropolitan)	✓	✓		✓	✓	✓		✓	✓	✓		✓			
India (Regional)	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓	
Singapore (Metropolitan)	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	
United Kingdom	✓	✓	✓	✓	✓			✓	✓	✓		✓		✓	Trainee and Assistant Practitioners, Assistant Psychologist, Orthotics, Orthoptist, Dietitian, Stroke Specialist Nurse (Trust)
Interview															
Australia (Metropolitan)	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	Neuropsychologist, PT and OT AHA, Pharmacist and Geriatric Medicine.
Australia (Regional)	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓		
China (Metropolitan)	✓	✓			✓		✓	✓	✓	✓		✓			
China (Regional)	✓	✓			✓	✓	✓	✓	✓	✓		✓			
Sweden (Metropolitan)	✓	✓			✓			✓	✓	✓	✓	✓	✓	✓	Neuropsychologist, Nurse and PT Assistant, Physicians.

Table 5.2 summarises the funding model of each centre and the auditing/accreditation process for inpatient and outpatient rehabilitation services. Six (50%) centres reported a mixed funding model (combination of national health insurance and out-of-pocket funding), and five (39%) centres reported a Universal Health Care model. The centres from Denmark and Metropolitan India reported the National Health Insurance and Employer Funded model, respectively. Five (30%) centres reported stroke-specific audits or accreditation for inpatient rehabilitation services.

Table 5.2 Summary of Centre funding, Inpatient and outpatient auditing or accreditation processes.

Centre	Funding model	Inpatient auditing/accreditation process	Outpatient auditing/accreditation process
Survey			
Chile	Mixed funding (National Health Insurance and Out of Pocket Funding)	Chilean Accreditation of Quality in Health Care. Joint Commission International Accreditation for Hospitals. Stroke Center Certification on Latin America.	Chilean Accreditation of Quality in Health Care. Joint Commission International Accreditation for Hospitals.
Denmark	National Health Insurance	None	Not Applicable
Ghana	Mixed funding (National Health Insurance and Out of Pocket Funding)	None	None
India (Metropolitan)	Employer Funded	Questionnaire	Questionnaire
India (Regional)	Mixed Funding (National Health Insurance and Out-of-pocket funding)	National Accreditation Board for Hospital and Healthcare Providers.	National Accreditation Board for Hospital and Healthcare Providers.
Singapore	Mixed Funding (National Health Insurance and Out-of-pocket funding)	None	None
United Kingdom	Universal Health Care	Sentinel Stroke National Audit Programme.	In-house auditing tool.
Interview			
Australia (Metropolitan)	Universal Health Care	Hospital-specific accreditation. National Stroke Foundation – Audit Service level audit.	None

Centre	Funding model	Inpatient auditing/accreditation process	Outpatient auditing/accreditation process
		Discipline-specific document audit for allied health.	
Australia (Regional)	Universal Health Care	Hospital-specific accreditation. National Stroke Foundation – Audit Service level audit. Discipline-specific document audit for allied health.	Hospital-specific accreditation National Stroke Foundation – Audit Service level audit Discipline-specific document audit for allied health
China (Metropolitan)	Mixed Funding	Need to obtain and retain Joint Commission International accreditation. Certification for primary, secondary and tertiary hospital requirements.	None
China (Regional)	Mixed Funding	Need to obtain and retain Joint Commission International accreditation. Certification for primary, secondary and tertiary hospital requirements.	None
Sweden	Universal Health Care	Commission on Accreditation of Rehabilitation Facilities	Commission on Accreditation of Rehabilitation Facilities

5.3 Criterion 1: Optimal Outcomes

Criterion 1 is defined as ‘Centres of Clinical Excellence in Stroke Rehabilitation and Recovery deliver outstanding rehabilitation to ensure optimal outcomes (health, social and well-being) for people living with stroke.’⁸ Figure 5.2 below provides an overview of the categories, indicators and sub-indicators from this criterion.

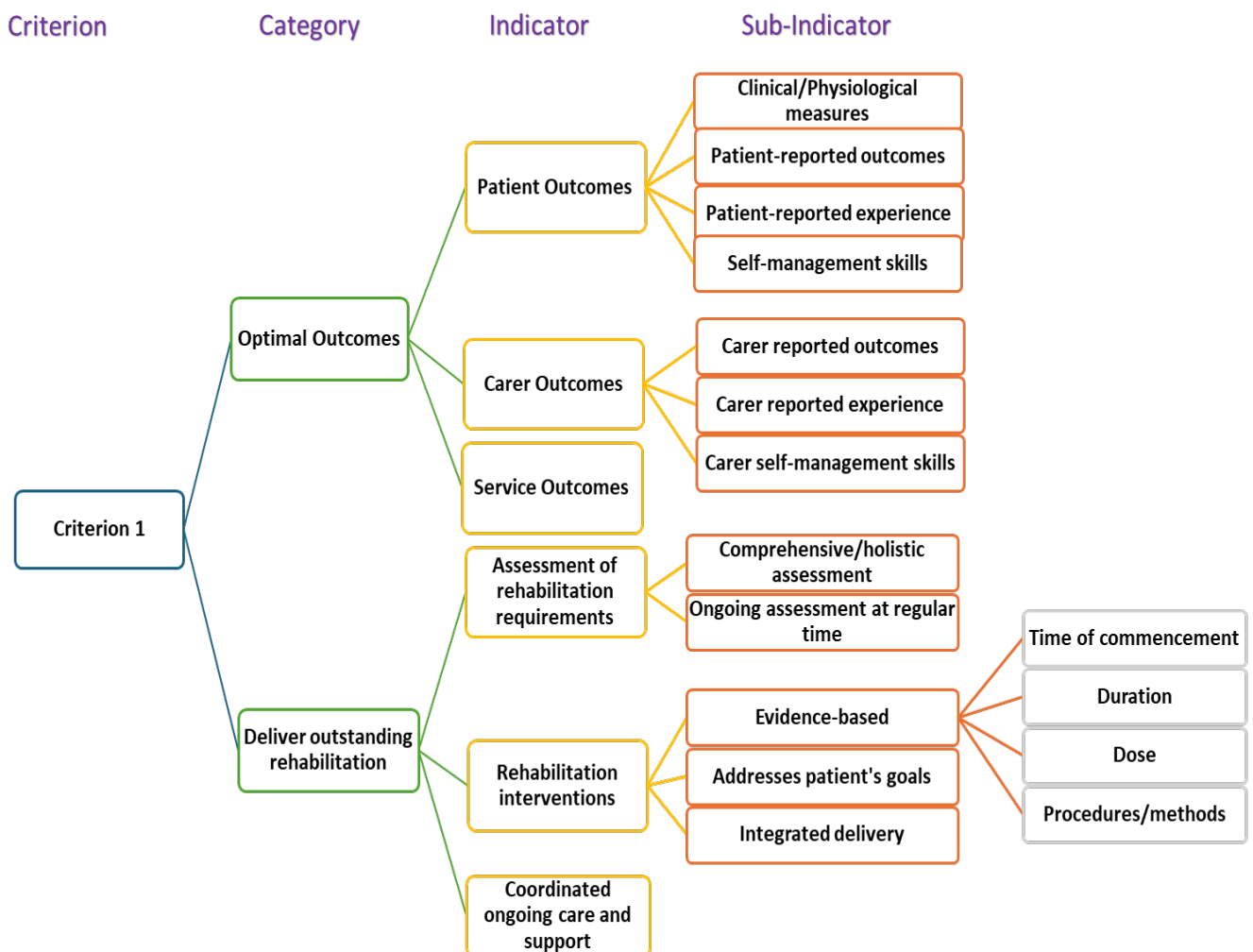


Figure 5.2 Overview of Categories, Indicators and Sub-Indicators of Criterion 1.

Criterion 1 is the most important criterion defining a Centre of Clinical Excellence.⁸ This criterion has 17 measurable indicators and sub-indicators for optimal outcomes, which were defined from the perspectives of the patient, carer, and service. Table 5.3 provides an overview of responses collected from the surveys and interviews.

Table 5.3 Routinely collected data on the indicators in the 'Optimal Outcomes' and 'Delivering Outstanding Rehabilitation' categories.

Centre	Criterion 1					
	Optimal Outcomes			Delivering Outstanding Rehabilitation		
	Patient outcomes	Carer outcomes	Service Outcomes	Rehabilitation requirements	Rehabilitation interventions	Coordinated ongoing care and support
Survey						
Chile	✓	✗	✓	✓	✓	✓
Denmark	✓	✗	✓	✓	✓	✓
Ghana	✗	✗	✗	✓	✗	✗
India (Metropolitan)	✓	✓	✓	✓	✓	✓
India (Regional)	✓	✗	✗	✓	✓	✗
Singapore	✓	✗	✓	✓	✓	✗
United Kingdom	✓	✓	✓	✓	✓	✗
Interview						
Australia (Metropolitan)	✓	✓	✓	✓	✓	✓
Australian (Regional)	✓	✗	✓	✓	✓	✗
China (Metropolitan)	Partial	✗	✗	✓	Partial	✗
China (Regional)	Partial	✗	✗	✓	✓	✓
Sweden	✓	✓	✓	✓	✓	✓

In the 'Optimal Outcome' category, most centres collected data on patient outcomes (n=9, 75%) and service outcomes (n=9, 75%), but only 4 (33%) collected data on carer outcomes. In the delivery of outstanding rehabilitation category, all centres (100%) collected data on the assessment of rehabilitation requirements, most centres (n=10, 83%) collected data on rehabilitation interventions, and half of the centres (n=6, 50%) collected data on coordinated ongoing care and support. The following sections have further described each indicator and sub-indicator in detail.

5.3.1 Optimal Outcomes

5.3.1.1 Patient Outcomes

'Patient Outcomes' include clinical/physiological measures, patient-reported outcomes, patient-reported experience, and self-management skills. Table 5.4 below outlines the responses for these

sub-indicators.

Table 5.4 Routinely collected data for the ‘Patient Outcomes’ sub-indicators.

Centre	Patient Outcomes			
	Clinical/ physiological measures	Patient-reported outcomes	Patient-reported experience	Self-management skills
Survey				
Chile	Discipline-specific measures	Activities specific balance confidence scale	Collected using Net Promotor Score Guide	✗
Denmark	Discipline-specific measures	✓*	Patient satisfaction questionnaire	✓*
Ghana	✗	✗	✗	✗
India (Metropolitan)	Physiological measures.	SF-36 [#]	✓*	✓*
India (Regional)	Physiological measures.	Barthel Index	✓*	✓*
Singapore	Discipline-specific measures.	EQ-5D [#]	Patient survey	✓*
United Kingdom	✓*	Patient-centred goal setting, EQ-5D-5L [#]	Verbal reports	Self-management program provided.
Interview				
Australia (Metropolitan)	Discipline-specific and Service-specific measures.	Goal review Task-based self-reported	Quality project evaluations, national surveys, and ward feedback forms.	Discipline-specific and Service-specific measures.
Australia (Regional)	Discipline-specific and Service-specific.	✗	Collecting for inpatients. Tools are available for outpatient services but not collected.	No formal processes.
China (Metropolitan)	Discipline-specific measures.	✗	✗	✗
China (Regional)	Discipline-specific and physiological measures.	Quality of Life – no formal documentation.	Informal – hospital administration will contact patients randomly for feedback.	✗
Sweden	Discipline-specific and Service-specific measures.	EQ-5D [#] , patient goal attainment - collected at admission, exit and follow-ups.	Rehabilitation satisfaction questionnaire.	Program to work at home in an outpatient setting.

[#] Quality of life questionnaires.

✓* Participants from the centres responded ‘Yes’ to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.3.1.1.1 Clinical/Physiological measures

Most centres reported collecting discipline-specific measures or rehabilitation service-specific measures. The centre from Metropolitan Australia, Regional Australia, Chile, Regional China, Denmark, Sweden and UK reported discipline-specific (or used by the discipline) Physiotherapy measures (e.g. Timed-up and Go, 10-Meter Walk Test, Fugl Meyer Assessment, Modified Ashworth Scale), Occupational Therapy measures (cognitive screens, Rivermead Behavioural Memory Test, Activity of Daily Living, sensory profile) and Speech Therapy measures (Water swallow test, Western Aphasia Battery, Fiberoptic Endoscopic Evaluation Swallowing). The centres from Metropolitan China, Regional India and Regional China reported physiological measures such as blood pressure, heart rate, and oxygen saturation. The centres in Australia, Denmark, Singapore, and Sweden reported rehabilitation service-specific measures such as the Functional Independence Measure (FIM) and Australian Therapy Outcome Measures.

5.3.1.1.2 Patient-reported outcomes

All centres other than centres from Regional Australia, Ghana, and Metropolitan China collected patient-reported outcome measures. The centres from Metropolitan Australia, the UK and Sweden reported that documentation of goal setting was considered as a patient-reported outcome. Patient-specific questionnaires (SF-36, EQ-5D, Barthel Index, Activity Specific Balance Confidence Scale and Quality of Life) were also reported as patient outcomes.

5.3.1.1.3 Patient-reported experience

Seven centres (58%), including centres from Metropolitan and Regional Australia, Chile, Regional China, Denmark, Singapore and Sweden, reported that patients completed questionnaires to rate their experiences during admission or post-discharge. The centre from Metropolitan Australia reported that patient-reported experience was more valuable than patient-reported outcomes, and Sweden similarly reported the importance of collecting these data.

“[Centres reported that] Not everyone knows that patient-reported outcomes and patient-reported experiences.”

5.3.1.1.4 Self-management skills

The centres from Regional Australia, Chile, Metropolitan China and Regional China were the only centres that did not collect data on ‘Self-management skills’. Seven centres (58%) reported collecting data on this indicator, but only three centres (Metropolitan Australia, Sweden and the UK) reported how self-management skills were demonstrated.

5.3.1.2 *Carer Outcomes*

‘Carer Outcomes’ included the carer-reported outcomes, carer-reported experience and carer self-management skills sub-indicators. Table 5.5 below outlines the responses for these indicators.

Table 5.5 Routinely collected data on the ‘Carer Outcomes’ sub-indicators.

Centre	Carer Outcomes		
	Carer-reported outcomes	Carer-reported experience	Carer self-management skills
Survey			
Chile		✗	
Denmark		✗	
Ghana		✗	
India (Metropolitan)		✓*	
India (Regional)		✗	
Singapore		✗	
United Kingdom	Part of a pilot study using CAT-S (Carer’s Alert Thermometer for Stroke Family)		
Interview			
Australia (Metropolitan)	Discipline-specific measures	Discipline-specific measures (Aishwarya care call and carer report on grief and loss)	Carer training (coping strategy, emotional regulation group)
Australia (Regional)	✗	✗	Carer training
China (Metropolitan)	✗	✗	✗
China (Regional)	✗	✗	✗
Sweden	✗	✗	✗

✓* Participants from the centres responded ‘Yes’ to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

Only three (25%) centres (Metropolitan India, the UK and Metropolitan Australia) reported that data were collected about carer outcomes. The UK reported that the data were collected as part of an ongoing research project (the Carer's Alert Thermometer for Stroke Family pilot study). While the centre from Metropolitan Australia reported that the data for the sub-indicators were collected, it was not formally documented, and there were no tools in place. One further centre (Regional Australia) collected data on carer self-management skills, which were rated during carer training sessions. The centre from Sweden welcomes carers to participate in meetings and plans to create a questionnaire for carers in the future.

5.3.1.3 Service Outcome

Table 5.6 summarises the 'Service Outcome' indicator. Data about the length of stay was commonly collected (n=7, 58%), followed by discharge destination (n=3, 25%) and hospital-acquired complications (n=3, 25%).

Table 5.6 Routinely collected data on the 'Service Outcomes' indicators.

Centre	Service outcomes
Survey	
Chile	Length of stay, in-hospital survival rate
Denmark	Length of stay, number of sessions, assessments
Ghana	✗
India (Metropolitan)	✗
India (Regional)	✓*
Singapore	Length of stay, number of treatment episodes, discharge destinations, service utilisation,
United Kingdom	Length of stay, discharge destinations
Interview	
Australia (Metropolitan)	Length of stay, number of episodes, FIM efficiency, discharge destinations, hospital-acquired complications rate, re-admission rate
Australia (Regional)	Length of stay, Separations, National Weighted Activity Unit, clinical benchmarks, occupied bed days, therapy hours, hospital-acquired complications rate
China (Metropolitan)	✗
China (Regional)	✗
Sweden	Length of stay, time to admission, hospital-related complications, unplanned transitions

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.3.2 Deliver Outstanding Rehabilitation

5.3.2.1 Assessment of rehabilitation requirements

This indicator included ‘comprehensive/holistic assessments’ and ‘ongoing assessments at regular time points’ sub-indicators (Table 5.7).

Table 5.7 Routinely collected data for the sub-indicators in the ‘Assessment of Rehabilitation Requirements’ indicator.

Centre	Assessment of rehabilitation requirements	
	Comprehensive/holistic assessment	Ongoing assessment at regular time points
Survey		
Chile	Use a complexity-based model to provide comprehensive patient assessment.	
Denmark	Ongoing assessment during hospital stay.	
Ghana	✓*	
India (Metropolitan)	Neurological assessment.	
India (Regional)	✓*	
Singapore	Discipline-specific assessment. Assessment completed on admission, discharge, and weekly during hospital stay.	
United Kingdom	Discipline-specific assessment, multi-disciplinary input from acute to 6 months post-discharge.	
Interview		
Australia (Metropolitan)	Multi-disciplinary team input (with access to additional services), links with discharge coordinator, palliative care, Aged Care Assessment Team, National Disability Insurance Scheme and State Health Injury Unit.	Regular discipline-specific assessment, patients assessed within the time requirement.
Australia (Regional)	Multi-disciplinary team input.	Regular and ongoing discipline-specific assessment.
China (Metropolitan)	✓*	Assessment on admission and discharge, specific assessment during the hospital stay.
China (Regional)	✓*	Once a month.
Sweden	Multi-disciplinary team input.	Assessment on admission and discharge, discipline-specific assessment during the stay.

✓* Participants from the centres responded ‘Yes’ to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.3.2.1.1 Comprehensive/holistic assessment

All centres reported collecting data on the comprehensive assessment of rehabilitation

requirements, although four centres (33% - Metropolitan and Regional China, Regional India and Ghana) did not describe the type of data collected. Assessments were conducted by separate disciplines (UK and Singapore) or multi-disciplinary teams (Metropolitan Australia, Regional Australia and Sweden). Details of who conducted the assessments were not provided in the survey responses by centres from Chile, Denmark or Metropolitan India.

5.3.2.1.2 Ongoing assessment at regular time points

The centres in Denmark, Singapore, Australia, China, and Sweden reported conducting regular, ongoing, discipline-specific assessments during hospital stays. Additionally, the centres from Singapore, Metropolitan China, and Sweden reported that assessments were completed upon admission, during the stay, and discharge.

5.3.2.2 *Rehabilitation interventions*

This indicator included ‘evidence-based intervention’ (exploring the time of commencement, duration, dose and rehabilitation procedures), ‘interventions that address a person’s goals’ and ‘integrated service delivery’ sub-indicators as outlined in Table 5.8 below. All centres apart from the centre from Ghana collected some data on delivering evidence-based rehabilitation interventions.

5.3.2.2.1 Evidence-based interventions

Time of commencement: The centres from Metropolitan Australia, Regional Australia, Metropolitan China, Sweden, and the UK (n=5, 42%) reported that the multi-disciplinary team assessed patients within a recommended timeframe. This timeframe varied between centres, with some centres reporting within 24 Hours.

Duration: When asked about the duration of therapy, the centres from Metropolitan Australia, Regional Australia, Chile, the UK, and Sweden reported daily therapy provided to patients with a duration ranging from 30 to 45 minutes per discipline per day. The centre from Sweden reported

that there were guidelines for the duration of therapy in the acute care stroke units, but there were no guidelines or recommendations for stroke rehabilitation. The centre from Regional China reported a total duration of 30 minutes per discipline per day for therapy, while the centre from Metropolitan China reported one year of therapy. The centre from Denmark reported that the number of sessions depended on the availability of funding.

Dose: Dose is defined as the amount of activity (e.g. three times a day) or repetition (30 times).

Only two centres of the five interview centres reported on the dose of rehabilitation (these data were not specifically sought in the survey). The centre from Metropolitan Australia reported that the dose was discipline-specific for therapy. The centre from Sweden reported that the dose is dependent on each patient's goal, and while there is a national recommendation for the duration, there is none for the dose.

Procedure/methods: The two Chinese centres reported that Chinese traditional medicine was offered to all stroke patients. The centres from Regional Australia and Sweden described the evidence-based practice for the types of procedures/methods offered. The common responses from all the interviewed centres were that the indicator was unclear and needed clarification.

5.3.2.2.2 Addresses person's goals

The centres from Australia, Regional India, the UK and Sweden reported addressing patients' goals either through individual discipline or as a team. The centre from Regional Australia reported:

“Yes, there are conversations about goals; are they patient or therapist-driven? Start [by] being patient-driven. The patient provided a copy of the goals; however, they were not reviewed weekly at a case conference. [Would be] Ideal [to] review weekly. We do reasonably well. Attempts to do patient-driven however sometimes impacted by their insight/expectations of return to functioning.”

The centre from Metropolitan China reported that there are no goal-setting processes and that therapy is based on the medical team's orders, while the centre from Regional China reported that

clinicians determined patients' goals and reflected that the centre needed to improve this measure.

5.3.2.2.3 Integrated delivery

The centres were asked to demonstrate the process of promoting the integrated delivery of stroke rehabilitation between disciplines and services. The centres from Metropolitan Australia, Regional Australia, Metropolitan China, Sweden, and the UK (n=5, 42%) reported evidence of pathways (including frequent team communication between staff within the service and between services) to minimise duplication and streamline the continuity of care delivery as patients transition from inpatient to community services. The centre from Regional China reported that clinicians provide individual care, so there will not be duplications.

Table 5.8 Routinely collected data on the sub-indicators in the 'Rehabilitation Intervention' indicator.

Centre	Rehabilitation Interventions					
	Evidence-based interventions				Addresses a person's goals	Integrated delivery
	Time of commencement	Duration	Dose	Procedure /methods		
Survey						
Chile	Daily multi-disciplinary rehabilitation sessions. Use of electronic clinical records.					
Denmark	A number of sessions depended on the Diagnostic Related Groups payment system.					
Ghana	✗					
India (Metropolitan)	✓*					
India (Regional)	Multi-disciplinary team and patient lead goals. New procedures are reviewed regularly.					
Singapore	✓* (Not collecting data on integrated delivery)					
United Kingdom	Patients are assessed within the timeframe. Daily therapy (individual and group) and regular goal reviews with patients and families. Integrated pathway and access to all patient records between inpatient and community. Trust shared records.					
Interview						
Australia (Metropolitan)	Discipline-specific input within 24 hours	45-minute sessions	Discipline-specific	✓*	Individual disciplines address discipline-specific goals, and team goals are addressed with the patient/carer. Documented.	Continuum of care with the overlapped workforce to minimise duplication. Weekly MDT and co-location of staff.
Australia (Regional)	Discipline-specific. Within 24 hours	2 to 3 hours a day	5-day service	Evidence-based therapy	Goals set as a team with patients.	Multi-disciplinary sessions.
China (Metropolitan)	Within 24 hours of patient admission	1 year or more, depending on the improvement	✓*	Discipline-specific procedures and Chinese traditional medicine	✗	Communication between medical, team, therapists and nurses with shift handovers. Daily progress is logged into online records.

Centre	Rehabilitation Interventions					
	Evidence-based interventions				Addresses a person's goals	Integrated delivery
	Time of commencement	Duration	Dose	Procedure /methods		
China (Regional)	Twice a day	30 minutes allocated per discipline	✓*	Discipline-specific procedures and Chinese traditional medicine	Clinicians determine goals.	Individual care from clinicians.
Sweden	On arrival	5 days a week	According to the patient's plan	Based on National and local stroke guidelines and pathways for each profession	Individual rehabilitation plan and planning meeting formulated with patient, team and carers. Client-centred care.	Weekly team conference

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.3.2.3 Coordinated ongoing care and support

Only seven centres (58%) collected data on coordinated ongoing care and support (see Table 5.9).

The centre from Chile described interdisciplinary rounds and goal-planning meetings between clinicians, patients, and families. The centre from Metropolitan Australia reported weekly multi-disciplinary meetings, and the centre from Sweden met with the patients and documented information on digital systems to communicate with facilities outside the hospital as part of coordinated ongoing care and support.

Table 5.9 Routinely collected data on the 'Coordinated Ongoing Care and Support' indicator.

Centre	Coordinated ongoing care and support
Survey	
Chile	Multi-disciplinary team rounds twice a week, a goal planning meeting for discharge between clinicians, patients and family.
Denmark	✓*
Ghana	✗
India (Metropolitan)	✓*
India (Regional)	✗
Singapore	✗
United Kingdom (Metropolitan)	✗
Interview	
Australia (Metropolitan)	Weekly multi-disciplinary team meeting to coordinate ongoing care and support
Australia (Regional)	No formal processes – Patients can transition from inpatient to ambulatory or supported care
China (Metropolitan)	✗
China (Regional)	✓*
Sweden	Meeting with patients, digital systems to communicate with facilities outside the hospital

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.4 Criterion 2: Research Culture

Criterion 2 is defined as ‘Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice’.⁸ Figure 5.3 below provides an overview of the indicators and sub-indicators from this criterion.

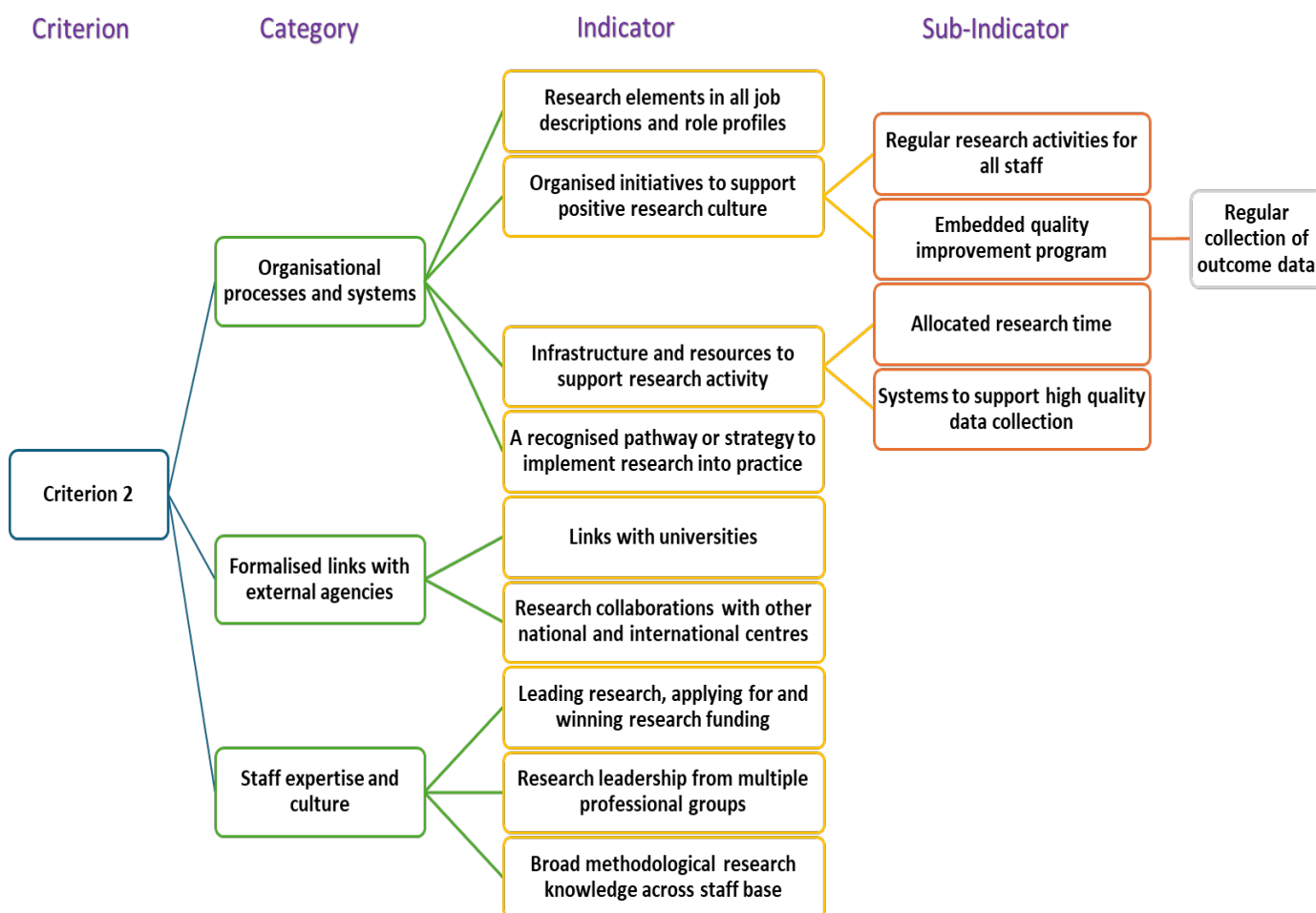


Figure 5.3 Overview of Categories, Indicators and Sub-Indicators of Criterion 2.

This criterion included 11 measurable indicators and sub-indicators focused on research culture, research collaboration, research activity and translation of research into practice. The responses have been summarised in Table 5.10 below.

Table 5.10 Overview of the responses from the Indicators in 'Organisation Processes and Systems', 'Formalised Links with External Agencies' and 'Staff Expertise and Culture' categories.

Centre	Criterion 2								
	Organisation Processes and Systems				Formalised Links with External Agencies		Staff Expertise and Culture		
	Research elements in all job descriptions and role profiles	Organised initiatives to support a positive research culture	Infrastructure and resources to support research activity	A recognised pathway or strategy to implement research into practice	Links with university	Research collaboration with other national and international centres	Leading research, applying for and winning research funding	Research leadership from multiple professional groups	Broad methodological research knowledge across staff base
Survey									
Chile	✓	✓	✓	✓	✓	✓	✓	✓	✓
Denmark	✗	✓	✓	✗	✓	✓	✓	✓	✓
Ghana	✓	✗	✗	✗	✗	✗	✗	✗	✗
India (Metropolitan)	✓	✓	✓	✓	✓	✓	✓	✓	✓
India (Regional)	✓	✓	✗	✓	✗	✗	✓	✗	✗
Singapore	✓	✓	✓	✓	✓	✓	✓	✓	✓
United Kingdom	✓	✓	✗	✗	✓	✓	✓	✗	✗
Interview									
Australia (Metropolitan)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Australian (Regional)	✗	✓	Partial	✗	✓	✓	✗	✗	✗
China (Metropolitan)	✗	✓	Partial	✓	✓	✓	✗	✓	✗
China (Regional)	✓	Partial	✗	✗	✓	✗	✓	✗	✗
Sweden	✓	✓	✓	✓	✓	✓	✓	✓	✓

5.4.1 Organisation Processes and Systems

Nine centres (75%) identified that there are research elements in all job descriptions and role profiles, ten centres (83%) have organised initiatives to support a positive research culture, six centres (50%) have the infrastructure and resources to support research activity and seven centres (58%) have a recognised pathway or strategy to implement research into practice. Table 5.11 summarises the responses for the indicators within organisation processes and systems.

5.4.1.1 Research elements in all job descriptions and role profiles

Nine centres (75%) responded that research elements were included in all the job descriptions and senior role profiles, but not routinely included in graduate or base-grade clinical roles. The centre from Metropolitan Australia discussed the research component for each professional group and how it was built into each role profile. Comparatively, the centre from Regional Australia reported that quality improvement was built into the role description but that quality improvement activities do not necessarily have to be research-based. Similarly, the centre from Sweden stated that all staff are expected to complete research activity as it is “integrated into career pathways and salary.”

The centre from Metropolitan China stated that the research elements were not included in the job description and role profiles; however, all staff, especially those in senior positions, were required to have input in the research.

5.4.1.2 Organised initiatives to support a positive research culture

Ten centres (80%) reported having organised initiatives to support a positive research culture. Formal and informal journal clubs and quality improvement activities were the most common initiatives. The centres from Regional Australia stated that research was not a priority compared to clinical work. Similarly, the centre from Sweden reported that unmet clinical needs tend to impede research activity. The centre from Sweden also reported that the clinician’s interest in research

could also impact their research activity and vary depending on their role. Centres from Metropolitan and Regional China described that it was necessary and a priority to do research and produce research output as part of the clinician's employment and career progression.

5.4.1.3 *Infrastructure and resources to support research activity*

Infrastructure and resources to support research activity were measured using allocated research time and systems to support high-quality data collection (Table 5.11). Four centres (33%) reported that clinicians are allocated research time (Chile, Metropolitan Australia, Singapore, and Sweden). Eight centres (67%) reported using quality data collection systems for research (REDCaps, HIMedc, National Riksstroke) and patient data (AROC, SweReh).

5.4.1.4 *A recognised pathway or strategy to implement research into practice*

More than half the centres (n=7, 58%) responded that recognised pathways or strategies were available for implementing research into practice, with three centres describing clinicians being involved in this process. Chile reported that a formal process was available for research translation.

Table 5.11 Routinely collected data for the indicators in the 'Organisational processes and systems' category.

Centre	Organisation processes and systems				
	Organised initiatives to support a positive research culture		Infrastructure and resources to support research activity		A recognised pathway or strategy to implement research in practice
	Regular research activities for all staff	Embedded quality improvement program	Allocated research time	Systems to support high-quality data collection	
Survey					
Chile	There is no report on regular research activity. Data is routinely collected from clinical processes and stored in database systems.		Specific department coordinated all research-related initiatives, including applying for protected times and funding. Using REDCap registration system for data collection		Research initiatives follow established processes and requirements to develop clinical research.
Denmark	Clinical specialists within each discipline participate in monthly meetings with the head of research within their field of work.		Medical records are imported into a business intelligence portal, which staff may access and use for research purposes.		✗
Ghana	✗		✗		✗
India (Metropolitan)	✓*		✓*		✓*
India (Regional)	Weekly journal club (logged). No report on QI activity		✗		Journal club used as a pathway to implement research in practice.
Singapore	✓*		Monthly reporting of time spent in research activities. FTEs are allocated for research based on grant success. Have access to electronic documentation data that can be used to extract and analyse data for clinical improvement purposes.		Research efforts were translated to clinical practice, and a system of clinician researchers held part clinical and part research workloads.
United Kingdom	The team includes a professor involved in a research project. All staff must complete Level 2 quality improvement training at a minimum.		✗		✗
Interview					
Australia (Metropolitan)	Regularly conference attendance and presentations. Participate in multi-	Completed regularly using local and national database.	Allocated as per discipline.	REDCap and internal database. AROC data collection. Stroke foundation audit	Completion of research translation course, strategic meeting discussing best practices and decisions.

	disciplinary journal club. Interdisciplinary education sessions.				
Australia (Regional)	Informal journal club part of the QI project. Some disciplines are provided with an allowance for training	Patient-reported experience measure used as part of the QI project and AROC data.	×	Quality improvement platform and data collection. AROC data collection.	×
China (Metropolitan)	Journal clubs, training and research lectures once a week. Not documented.	Outcome data completed on admission and discharge.	×	HIMedc system for data collection	Staff implement research into practice.
China (Regional)	Meeting once a week to discuss research papers and projects.	×	×	×	×
Sweden	Organised journal clubs, professional developments and lectures. Uptake is dependent on the clinician's interest and priority.	Annual report or research activity.	Clinicians may be provided time for research	Quality registers (National Riksstroke – for research mostly). Rehabilitation register (SweReh)	Partly involved through Physiotherapy/Occupational Therapy

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.4.2 Formalised Links with External Agencies

Most centres (n=11, 92%) reported collecting data on formalised links with external agencies.

Interviewed centres that provided detailed responses, reported having a link with the universities, mainly due to student involvement through placements. Four (80%) of the interviewed centres reported collaborating in research with other national and international centres. Table 5.12 summarises these indicators.

Table 5.12 Routinely collected data for the indicators in the 'Formalised Links and External Agencies' category.

Centre	Formalised Links with External Agencies	
	Links with universities	Research collaborations with other national and international centres
Survey		
Chile	The research department has links with other centres and encourages collaboration.	
Denmark	Recognised as part of the university research clinic and have to apply to maintain this status. No information on collaborations with other centres, but they are visible through our publications.	
Ghana	✗	
India (Metropolitan)	✓*	
India (Regional)	✗	
Singapore	Academic clinicians hold joint appointments with universities. Have research collaborations with international universities.	
United Kingdom	Allied health professor for stroke & neuro is employed through the university to embed research into service priorities.	
Interview		
Australia (Metropolitan)	Links with universities. Also, links with honours students for research.	Involved in studies through other universities.
Australia (Regional)	Links with the university through students.	Limited involvement in study or trials.
China (Metropolitan)	Links with University	✓*
China (Regional)	Links with the University for teaching tasks and students.	✗
Sweden	Local agreements in place and through students.	Through clinicians with research experience.

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.4.3 Staff Expertise and Culture

Only six (50%) centres reported collecting data on all the indicators pertaining to staff expertise and culture. Most centres (n=9, 75%) reported having the expertise to lead and win research funding, although centres from Metropolitan Australia explained that their successful research grants were not exclusively related to stroke. Over half of the centres (n=8, 67%) reported having research leadership from multiple professional groups, with the centre from Regional China reporting that research leadership was through the professors at the university. Eight centres (67%) reported that there was broad methodological research knowledge across the staff base. Centres from Chile, Singapore, Regional China, and Sweden reported that this was done through access or support from the affiliated university. Ghana responded 'yes' to only the first indicator in the criterion ('Research elements in all job description' – as shown in Table 5.9 above) and indicated a lack of staff expertise and culture in research (as shown in Table 5.13).

Table 5.13 Routinely collected data for the indicators in the 'Staff Expertise and Cultures' category.

Centre	Staff Expertise and Culture		
	Leading research, applying for, and winning research funding	Research leadership from multiple professional groups	Broad methodological research knowledge across staff base
Survey			
Chile	Information sharing and applying for research funds were led by a specialised department.	All investigations were led by medical and non-medical professionals.	Courses offered by the institution to carry out quality research.
Denmark	A position to monitor funding applications, amounts, and success rates.	Research groups led by major occupational groups: medical, occupational therapy, physiotherapy, nurse, and neuropsychologist.	Wards have ongoing research projects, as research is integral to clinical practice.
Ghana	✗	✗	✗
India (Metropolitan)	✓*	✓*	✓*
India (Regional)	Employee database for research	✗	✗
Singapore	Research database with half-yearly tracking of grants, publications and research roles	Research leadership in physiotherapy and occupational therapy.	Link to medical university, so able to consult on specific research designs.

Centre	Staff Expertise and Culture		
	Leading research, applying for, and winning research funding	Research leadership from multiple professional groups	Broad methodological research knowledge across staff base
		They work together with neurologists.	
United Kingdom	Funding for Neuro rehab online as a virtual platform for stroke as part of a research agenda.	✗	✗
Interview			
Australia (Metropolitan)	Successfully won research grants, may not be stroke-specific	Focus on postgraduate training and staff with PhD qualification	Access to research staff within the department
Australia (Regional)	✗	✗	✗
China (Metropolitan)	✗	✓*	Resources available to staff on research methods
China (Regional)	Applying and winning funds is encouraged.	Through professors from the university	Through self-learning but have access to support from university
Sweden	Through clinicians with research experience	Good relationship with leadership positions	Through access to university and clinicians with research experience

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.5 Criterion 3: Interprofessional Working

Criterion 3 is defined as ‘Centres of Clinical Excellence in Stroke Rehabilitation and Recovery ensure inter-professional working and person-centred rehabilitation where colleagues, persons with stroke and carers work together towards a common goal.’⁸ Figure 5.4 below provides an overview of the indicators and sub-indicators from this criterion.

This criterion has nine measurable indicators that were focused on interprofessional relationships and collaborative goal-setting between clinicians, stroke survivors and families. The responses have been summarised in the following the Tables 5.14 and 5.15. The centre from Singapore responded that evidence for the indicators was collected but cannot be extracted; therefore, detailed responses on individual indicators were unavailable.

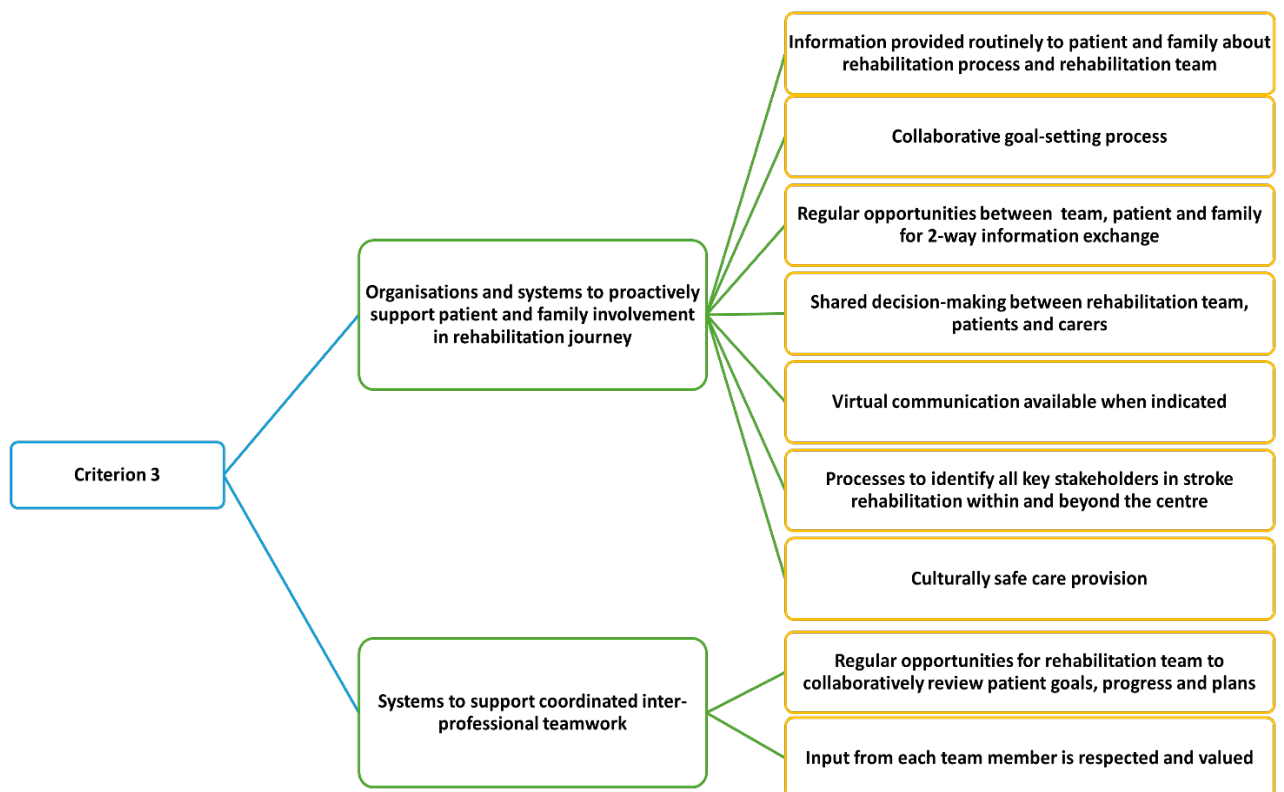


Figure 5.4 Overview of Categories, Indicators and Sub-Indicators of Criterion 3.

5.5.1 Organisations and Systems to Proactively Support Patient and Family Involvement in the Rehabilitation Journey

Table 5.14 below summarises the responses collected from this category.

5.5.1.1 Information provided routinely to patient and family about the rehabilitation process and rehabilitation team

Information was routinely provided to the patient and family during initial meetings or daily ward rounds at 11 centres (92%). The centre from Regional Australia reported that staff have conversations with patients and families about rehabilitation expectations and willingness to participate before starting their rehabilitation journey. Similarly, the centre from Sweden reported that they invited the family to the initial and discharge meeting for information sharing. The multidisciplinary team is also available for informal catch up with the families during their inpatient stay. The centre from Metropolitan Australia highlighted the continual journey from acute care to living in the community and family involvement throughout this process.

Table 5.14 Summary of responses for the indicators in the 'Organisations and Systems to Proactively Support Patient and Family Involvement in Rehabilitation Journey' category.

Centre	Criterion 3						
	Organisations and Systems to Proactively Support Patient and Family Involvement in Rehabilitation Journey						
	Information provided routinely to patient and family about rehabilitation process and rehabilitation team	Collaborative goal setting process (goals agreed upon by team, patient, family)	Regular opportunities between team, patient and family for 2-way information exchange	Shared decision-making between rehabilitation team, patients and carers	Virtual communication available when indicated	Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre	Culturally safe care provision
Survey							
Chile	✗	Documented team goal-setting meetings with patients and families.	During goal-setting meetings with family and patients. Documented.	During goal-setting meetings. Documented.	✗	The physiatrist identifies key stakeholders and coordinates the process.	Cultural safety is monitored by Quality and Safety.
Denmark	The MDT met fortnightly with patients and families.	The MDT met fortnightly with the patient and family to discuss goals. Documented.	Meetings with MDT, patient and family.	✓*	Offered for patients.	Frequent meetings with stakeholders.	✗
Ghana	✗	✗	✗	✗	✗	✗	✗
India (Metropolitan)	✓*	✓*	✓*	✓*	✓*	✓*	✓*
India (Regional)	The material provided to the caregiver was documented and audited twice a year.	Discussed biweekly during MDT round. Documented as per SMART goals.	✗	✗	Virtual follow-ups. Documented. (frequency of home rehab)	✗	✗
Singapore	✓*	✓*	✓*	✓*	✓*	✓*	✓*

Centre	Criterion 3						
	Organisations and Systems to Proactively Support Patient and Family Involvement in Rehabilitation Journey						
	Information provided routinely to patient and family about rehabilitation process and rehabilitation team	Collaborative goal setting process (goals agreed upon by team, patient, family)	Regular opportunities between team, patient and family for 2-way information exchange	Shared decision-making between rehabilitation team, patients and carers	Virtual communication available when indicated	Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre	Culturally safe care provision
United Kingdom	Information provided by the MDT to the patient and stroke review completed at 6-week and 6 months.	Goals are reviewed regularly during MDT meetings with patients. Goals are recorded.	Stroke booklet with information, progress and self-management plan provided to patients and families.	Family meetings and discharge planning copies were provided to the patient and family.	Online platforms are used as part of virtual therapy.	Part of the integrated care board. Service improvements completed regionally. Links to stroke association for therapy.	✗
Interview							
Australia (Metropolitan)	Welcome video and brochure. Family meeting. Rehab process and education start early.	Family meeting with patient/carer and team to review goals.	Family meeting and welcome meet-and-greet. During therapy sessions.	Standard practice of individual discipline or family meetings. Documentation provided to families.	Telestroke program and telehealth in all outpatient clinics.	Through family meetings and external stakeholders through social worker.	Social workers explore cultural heritage. Access to Aboriginal Liaison Officer, interpreter, and cultural training. Journey packs in different languages.
Australian (Regional)	Welcome pack. Conversation at the start of rehab	Key worker sets goals with patients. Family is not always included.	Daily MDT meeting. Family meeting or family present on the ward round.	Conversations with carers and family documents.	Telehealth links for family meetings or social support	Identifying aged care providers. No formal processes	Aboriginal Liaison Officer involvement. Specific stroke journey pack for

Centre	Criterion 3						
	Organisations and Systems to Proactively Support Patient and Family Involvement in Rehabilitation Journey						
	Information provided routinely to patient and family about rehabilitation process and rehabilitation team	Collaborative goal setting process (goals agreed upon by team, patient, family)	Regular opportunities between team, patient and family for 2-way information exchange	Shared decision-making between rehabilitation team, patients and carers	Virtual communication available when indicated	Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre	Culturally safe care provision
							Aboriginal clients.
China (Metropolitan)	Discussed during daily ward rounds. Documented.	Main goals set with patients and families at start of rehab. Team goals set to achieve main goals.	Daily ward rounds. Documented.	Daily ward rounds. Documented	×	×	×
China (Regional)	Discussed during daily ward rounds.	Goals set with patients and families at start of rehab. But rarely reviewed.	Daily ward rounds.	Depends on the team and situation.	×	×	×
Sweden	Information provided to the patient and family. Documented in patient journal.	Family is not always included. Reviewed frequently.	Meet at start and end of rehab. Not always with family. Better with inpatient than outpatient.	Family is not always involved. Most discussions are held with patients.	When needed.	It is a team's responsibility.	Not required by law. Everyone who requires care will receive care.

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.5.1.2 Collaborative goal-setting process

Collaborative goal setting was reported by 11 centres (92%) and goals were documented in the medical records. The centre from Metropolitan China reported they set the primary goals with their patients, and then the team sets ongoing minor goals to assist achieving the main goals. Centres from Metropolitan Australia, Regional India, the UK reported that the goals were reviewed frequently, compared to the centre from Regional China reported that goals are not frequently reviewed. The centre from Regional Australia reported that family was not always included in the goal-setting processes.

“Family not always included – dependent on their presence Keyworker completes goal setting, not always multiple disciplines. Brought back to the team and discussed. At times, visualised goals, however not consistently for each patient. Family meeting completed throughout and discussed updated goals/where to work towards.”

5.5.1.3 Regular opportunities between team, patient and family for 2-way information exchange.

Ten centres (83%) reported that the patient, family and team regularly exchange information during ward rounds. The centre from Sweden reported that family may not always be present in this process.

“It is not a regular meeting, [it is] a meeting in the beginning and [the] end [of inpatient stay]. The communication with family is better with inpatient care than with outpatient. With outpatient, some of them choose not to involve the family as much. The patient chooses not to involve the family.”

5.5.1.4 Shared decision-making between rehabilitation team, patients and carers

Shared decision-making was demonstrated by eleven centres (92%). The centre from Sweden reported that carers may not always be involved in this process.

“A bit of culture in Sweden may be that the patient is more individual than the whole family. Of course, they can have the family as a support. We mostly discuss with the patient.”

5.5.1.5 Virtual communication available when indicated

The centre from Metropolitan China, Regional China, Chile, and Ghana reported that virtual

communication was not offered in their centres. However, the remaining eight centres (67%) had virtual communication available for communication with family members, virtual therapy, and diagnosis purposes. The centre from Metropolitan Australia reported that their clinicians support regional clinical in stroke rehabilitation.

“[Metropolitan] telestroke program evidence of supporting regional...therapists links with [regional] stroke therapists provide education to [regional] stroke clinicians. Telehealth available for all outpatient clinics.”

5.5.1.6 Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre

Up to eight centres (67%) had processes to identify all key stakeholders within and beyond the centres. The centres from Chile and Metropolitan Australia) reported that a specific discipline was responsible for communicating with the stakeholders, while other centres (Regional Australia, Sweden, the UK and Denmark) reported it was a team responsibility.

5.5.1.7 Culturally Safe Care Provision

Half the centres (n=6, 50%) were able to identify and demonstrate evidence of culturally safe care provision. The centres from Metropolitan Australia and Regional Australia have access to cultural support (Aboriginal Liaison Officers). The centre from Sweden interpreted this indicator differently and reported on personal or professional viewpoint on the relationship between stroke survivor and their families:

“A bit of culture in Sweden may be that the patient is more individual than the whole family. Of course, they can have the family support. We mostly discuss with the patient and prompt the patient side.”

5.5.2 Systems to Support Coordinated Inter-Professional Teamwork

Nine centres (75%) described systems supporting coordinated inter-professional teamwork (Table 5.15 below). Four centres (33%) described a multidisciplinary team meeting where goals are discussed. The interviewed centres (n=4, 80%) were able to demonstrate that there were regular opportunities for the rehabilitation team to collaboratively review goals either weekly goal

discussion (Regional Australia and Metropolitan China), formal multi-disciplinary meetings (Metropolitan Australia) and that the system was documented in the policy (Sweden).

Table 5.15 Routinely collected data for the indicators in the 'Systems to Support Coordinated Interprofessional Teamwork' category.

Centre	Systems to Support Coordinated Interprofessional Teamwork	
	Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans	Input from each team member is respected and valued
Survey		
Chile	Multi-disciplinary team meeting to share goals and plans. Documented.	
Denmark	✗	
Ghana	Patients attend scheduled medical appointments with physicians.	
India (Metropolitan)	✓*	
India (Regional)	Biweekly Multi-disciplinary meetings to review and everyone’s inputs are considered. Documented.	
Singapore	✓*	
United Kingdom	Multi-disciplinary team approach to goal setting including nursing, therapists and wider team.	
Interview		
Australia (Metropolitan)	Formal multi-disciplinary team meetings and informal between disciplines. Joint sessions, working in the same space to share information.	Everyone was given a turn to speak.
Australian (Regional)	Weekly case conference. Morning daily meetings. Family meeting	Sections for the team to document. Opportunity for the team to speak.
China (Metropolitan)	Weekly discussion but not formally documented.	Yes – but not documented
China (Regional)	✗	✗
Sweden	Documented in the policy, but it also given	Documented in the policy, but it also given

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.6 Criterion 4: Knowledge Exchange

Criterion 4 is defined as ‘Centres of Clinical Excellence in Stroke Rehabilitation and Recovery exchange new knowledge and actively promote mentorship with National/International colleagues and people living with stroke to advance best practice.’⁸ Figure 5.5 below provides an overview of the indicators and sub-indicators from this criterion.

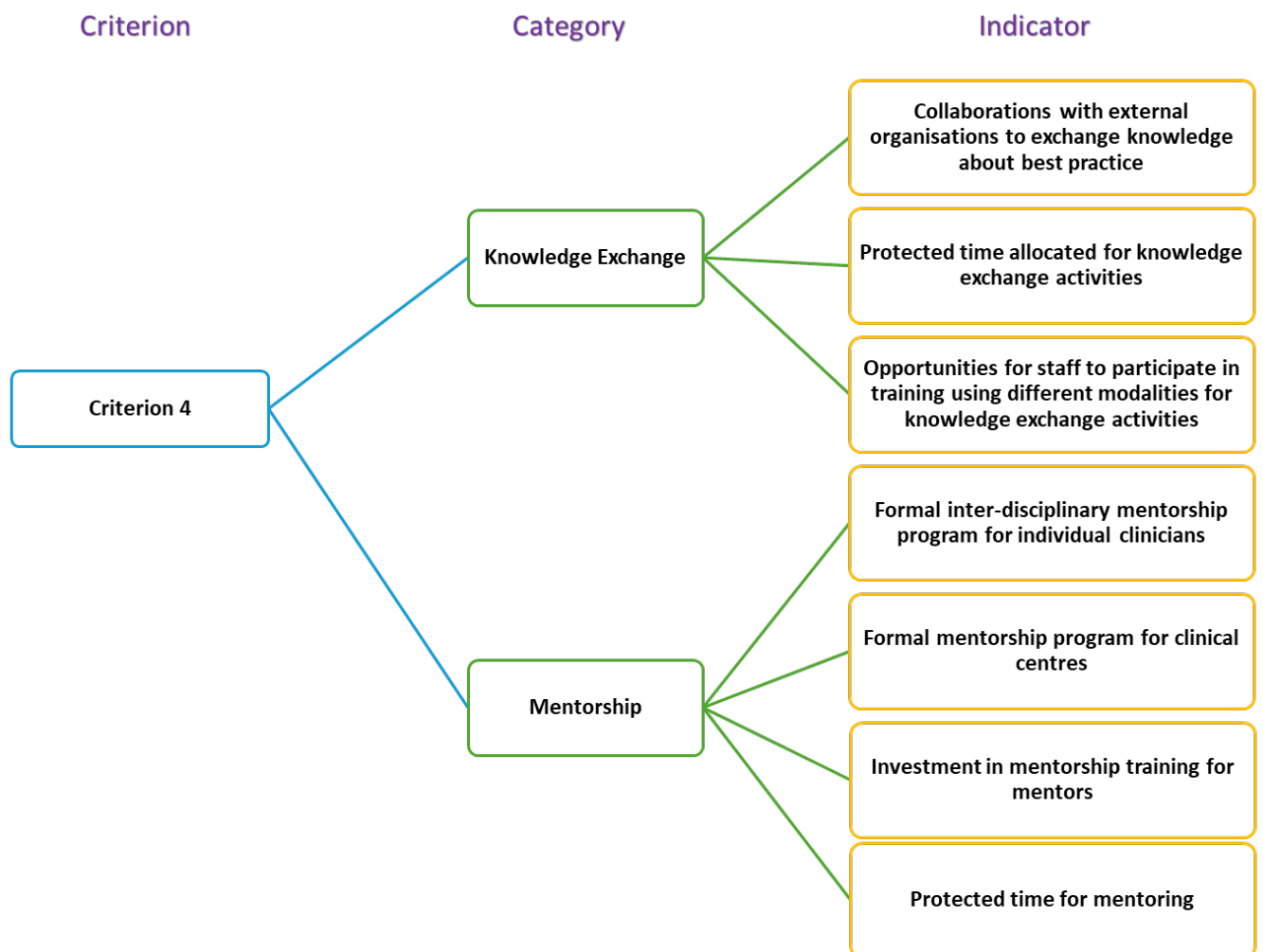


Figure 5.5 Overview of Categories, Indicators and Sub-Indicators of Criterion 4.

Criterion 4 has seven indicators that explored knowledge exchange and mentorship with other experts and people living with stroke. The responses have been described in the following sections.

5.6.1 Knowledge Exchange

Table 5.16 Routinely collected data for the indicators in the 'Knowledge Exchange' category.

Centre	Criterion 4		
	Knowledge Exchange		
	Collaborations with external organisations to exchange knowledge about best practice	Protected time allocated for knowledge exchange activities	Opportunities for staff to participate in training using different modalities for knowledge exchange activities
Survey			
Chile	Collaborate with a university to exchange knowledge about best practices. Other centres visit to improve their care model. Learning objectives collected end of training.		
Denmark	Staff has opportunities to participate in training.		
Ghana	✗		
India (Metropolitan)	✓*		
India (Regional)	✓*		
Singapore	Monthly tracking of time spent in training/education/coaching		
United Kingdom	✗		
Interview			
Australia (Metropolitan)	Discipline-specific interest group, Stroke community of practice, inter-disciplinary education sessions, virtual clinical support for the regional centre.	Encouraged to attend development sessions. Clinicians are encouraged to visit our stroke units.	Encouraged to attend and present at conferences and round tables.
Australian (Regional)	Links with metropolitan centres for support. Stroke foundation audits.	✗	Used different modalities: face-to-face, webinar, conferences, social media. Not formally documented
China (Metropolitan)	Regular clinical practice group. Receives and sends trainees to other hospitals (national and international)	✗	Social media, online lectures, conferences, offline lectures.
China (Regional)	✗	✗	✗
Sweden	Within professional group, network meetings, national clinical practice guidelines, representatives in regional network groups	✗	Webinars, conferences, documentaries.

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

Table 5.16 summarised the responses on how the centres demonstrate knowledge exchange. Five survey centres (71%) demonstrated evidence for knowledge exchange. The centre from Singapore reported that training times were tracked for record-keeping. The interviewed centres responded to the individual indicators from within the knowledge exchange category and reported below.

5.6.1.1 Collaborations with external organisations to exchange knowledge about best practice

Collaboration with external organisations (such as links to another stroke centre) were demonstrated by four interviewed centres (80%). The centres from Metropolitan Australia, China, and Sweden reported collaborations within their professions, while the centre from Regional Australia reported no connections with international groups.

5.6.1.2 Protected allocated time for knowledge exchange activities

Among the interviewed centre, the centre from Metropolitan Australia that reported there was protected time allocated for knowledge exchange activities. The centre from Regional China reported that they were not allocated during work hours. However, there are expectations that these activities were completed outside working hours.

5.6.1.3 Opportunities for staff to participate in training using different modalities for knowledge exchange activities

Four centres (80%) demonstrated opportunities for staff to participate in training using different modalities. The most common modalities described were conferences (n=4, 80%) and webinars (n=2, 40%). The centre from Metropolitan China reported social media use for knowledge exchange, whereas the centre from Metropolitan Australia reported that using different modalities were not a priority to participate in training.

5.6.2 Mentorship

Table 5.17 Routinely collected data for the indicators in the 'Mentorship' category.

Centre	Criterion 4			
	Mentorship			
	Formal interdisciplinary mentorship program for individual clinicians	Formal mentorship program for clinical centres	Investment in mentorship training for mentors	Protected time for mentoring
Survey				
Chile	Have dedicated staff to train new staff and monitor professional, technical and clinical standards through feedback and training initiatives. These staff receive individual coaching and leadership training.			
Denmark	✗			
Ghana	✗			
India (Metropolitan)	✗			
India (Regional)	✓*			
Singapore	Monthly tracking of time spent in training/education/coaching			
United Kingdom	✗			
Interview				
Australia (Metropolitan)	Discipline-specific. Not all disciplines have formal mentorship	Mentor regional hospital	Mentorship training available	✗
Australian (Regional)	✗	✗	✗	✗
China (Metropolitan)	✗	Documented in the hospital system	Training lectures	✗
China (Regional)	✗	✗	✗	✗
Sweden	✗	✗	✗	Included in the job description

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

In the mentorship category, three surveyed centres (43%) collected data, with the centre from Chile reporting that they have a dedicated staff to train and monitor new staff. The other two centres did not describe mentorship in their responses (Table 5.17 above). While the centre from the UK did not describe formal mentorship, it did report that the Trust (external organisation)

offers mentorship or coaching.

The centre from Metropolitan Australia was the only centre to describe that formal and documented discipline-specific mentorship. Although, the centres reported that they did not have formal inter-disciplinary mentorship program, the centres reported discipline-specific informal mentoring (Metropolitan China and Sweden).

The centres from Metropolitan Australia and Metropolitan China reported that formal mentoring programs were available for clinical centres, and the centres were invested in mentorship training. However, these centres did not describe what type of training was available or if it was formal or informal.

The centre from Sweden was the only centre that reported allocated and protected time for staff mentoring, with mentoring documented in the job description. However, Sweden did not have formal mentorship programs.

5.7 Criterion 5: Leadership

Criterion 5 is defined as ‘Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a shared strong ethical and value-based leadership, that inspires, motivates and drives forward successful rehabilitation.’⁸ Figure 5.6 below provides an overview of the indicators and sub-indicators from this criterion.

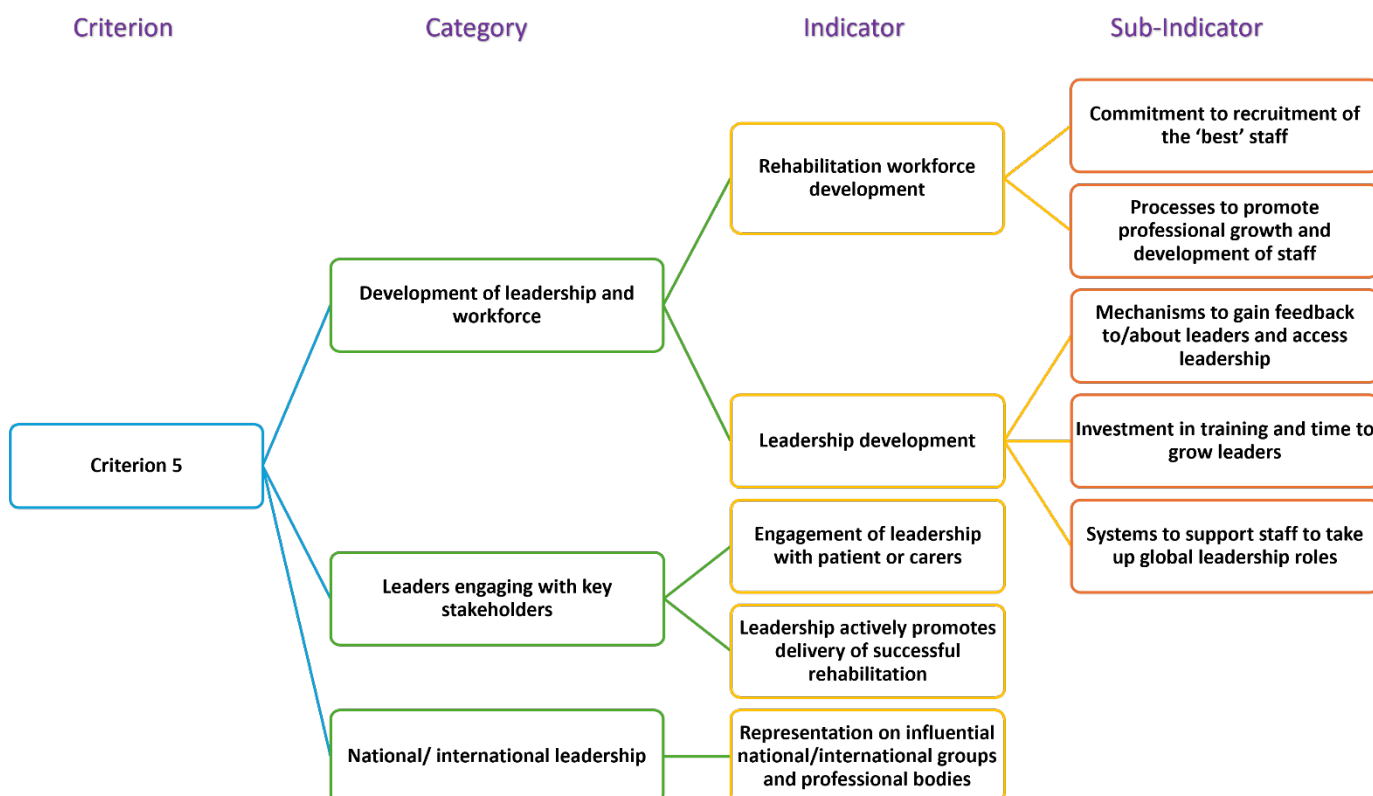


Figure 5.6 Overview of Categories, Indicators and Sub-Indicators of Criterion 5.

Criterion 5 have eight measurable indicators and sub-indicators that explored ethical and value-based leadership in the centre.

5.7.1 Development of Ethical and Value-Based Leadership

Table 5.18 below outlined the responses collected from the surveyed centres as a single response on how the centres develop workforce and leadership.

Table 5.18 Routinely collected data from the surveyed centres for the indicators in the 'Development of Ethical and Valued Based Leadership' category.

Centres	Development of Ethical and Valued-Based Leadership (Surveyed centres)	
	Rehabilitation workforce development	Leadership development
Chile	An up-to-date description of the role profile. Processes for recruitment that leadership used to select the best candidate. Requirement to undergo psychological tests. 3-month trials prior to permanency. All staff completed mandatory training.	Formal feedback of the leaders yearly. Leadership development is voluntary.
Denmark	Yearly development meetings for each employee with their managers. Results are written down and checked the year after.	Training for leaders available.
Ghana	✗	✗
India (Metropolitan)	✓*	✓*
India (Regional)	The team's plan is discussed, and goals are set yearly.	✓*
Singapore	Individual development plan and twice-year appraisal.	Leadership training, mentoring network and recognition of international leadership roles.
United Kingdom	Improvement plan to ensure staff are appropriately trained (using training matrix) in their field. Transition roles are offered to recruit and develop staff before promotion to higher roles.	Internal and external courses are available.

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.7.1.1 Rehabilitation workforce development

'Rehabilitation workforce development' includes the commitment to recruit the best staff and processes to promote professional growth sub-indicators. Six surveyed centres (86%) reported there were pathways for their workforce development. The centres from Denmark and Regional India reported a yearly development review for every employee, and the centre from Singapore reported twice-yearly appraisals.

Table 5.19 Routinely collected data from the interviewed centres for the indicators in the 'Development of Ethical and Valued Based Leadership' category.

Centre	Development of Ethical and Valued-Based Leadership (Interviewed centres)				
	Rehabilitation workforce development		Leadership development		
	Commitment to recruitment of best staff	Processes to promote professional growth	Mechanisms to gain feedback to/about leaders and assess leadership	Investment in training and time to grow leaders	Systems to support staff to take up global leadership roles
Australia (Metropolitan)	Through word of mouth and also a consideration for the sustainability of service	Opportunities for education and work shadowing. Regular sponsorship of conference attendance	Discipline-specific feedbacks	Not formal but discipline-specific	Management support for attending presentations.
Australian (Regional)	Merit-based processes	Performance Review and Development twice a year, scholarship available for staff	Formal appraisal, staff survey. No processes to gain feedback higher than TL	Growing leaders program and leading clinicians program	✗
China (Metropolitan)	Hospital committed to recruiting staff with higher degrees, more academic achievements and clinical skills	Regular training lessons and conferences	Weekly meeting with head of department	✓*	✓*
China (Regional)	Leaders recruit staff with high academic qualification	✗	✗	✗	✗
Sweden	✓*	✓*	Yearly survey	✓*	✓*

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.7.1.1.1 Commitment to recruitment of best staff

All five centres (Table 5.19 above) responded that they were committed to recruiting the best staff. Recruitment could occur through a merit-based process (centres from Regional Australia,

Metropolitan China and Regional China) or recognition of expertise through word-of-mouth (centre from Metropolitan Australia):

“It is not structure. If I see that there’s good staff elsewhere, I will try and approach them. That’s essentially been what I have been doing, approaching people that I know are excellent and constantly providing opportunities.”

Additionally, the centre from Regional Australia identified that while recruitment processes are in place, the commitment to ensure recruitment of the best available staff might be lacking:

“There is a process to recruit the best staff, but struggle to get experienced clinicians, and commitments should be actually putting more value on getting people to move here, should there be more incentives? Therefore not committed?”

5.7.1.1.2 Processes to promote professional growth

The ‘processes to promote professional growth’ were identified by four interviewed centres (80%) (Table 5.19 above). Processes described included conference attendance, regular training and work shadowing (a professional development activity that allows an individual to closely observe a professional in their role to gain insight into their responsibility and skills). The centre from Regional Australia reported that performance reviews and development plans were completed twice a year.

5.7.1.2 *Leadership development*

‘Leadership development’ includes the ‘mechanisms to gain feedback about leaders’ and ‘assess leadership’, ‘investment in training and time to grow leaders’ and ‘systems to support staff in taking up global leadership roles’. Six surveyed centres (86%) (Table 5.19 above) reported that there were pathways in place for leadership training and development. Further, four interviewed centres (80%) reported that there were pathways for team leaders or discipline leaders to receive feedback on their leadership performance.

Although four of the interviewed centres (80%) reported ‘investing in training and time to grow leaders’, only the centres in Metropolitan and Regional Australia provided evidence for this

indicator. The centre from Metropolitan Australia reported that there was no formally allocated time for leadership training within the rehabilitation team, but opportunities were available within the individual disciplines. The centre from Regional Australia reported that there were opportunities for clinicians to participate in leadership programs. Three interviewed centres (60%) reported that there were systems available to support staff to take up leadership roles globally. The centre from Regional Australia indicated that while there were no systems in place to provide formal support, motivated staff were able to pursue international leadership opportunities:

“...[Name] has journal/editorial board opportunities, however not encouraged through work processes. It is personal drive.”

Table 5.20 Routinely collected data on the indicators in the 'Leaders Engaging with Key Stakeholders' and 'National/International Leadership' categories.

Centre	Leaders engaging with key stakeholders		National/ international leadership
	Engagement of leadership with patients and carers	Leadership actively promotes delivery of successful rehabilitation	Representation on influential national/ international groups and professional bodies
Survey			
Chile	Opportunities for continuous improvement, training, courses and workshops are available through university links. Linked to the National Stroke Association and World Stroke Organisation		
Denmark	Staff engaged in groups and professional bodies. No formal process.		
Ghana	✗		
India (Metropolitan)	✓*		
India (Regional)	✓*		
Singapore	Appraisal system to identify national/international leadership.		
United Kingdom	✗		
Interview			
Australia (Metropolitan)	Seniors have clinical caseloads and engage through a feedback system.	✗	Membership in Stroke Foundation living guidelines.
Australian (Regional)	✗	Team leader involved in processes.	Local boards
China (Metropolitan)	Head of department do ward rounds once a week.	Head of department attend weekly reporting of patient progress.	Represented in National Centre for Gerontology.
China (Regional)	✗	✗	✗
Sweden	✓*	✓*	Staff in influential posts, groups and professional organisations.

✓* Participants from the centres responded ‘Yes’ to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

5.7.2 Leaders Engaging with Key Stakeholders and National/International Leadership

When asked if the ‘leaders were engaging with the key stakeholders’ and ‘represented national or international groups’, five surveyed centres (71%) responded that their centres collected data for these categories (Table 5.20 above). The interviewed centres were questioned on the indicators, and three interviewed centres (60%) reported that their leadership engages with patients and carers. The centre from Metropolitan Australia reported that this was part of the clinical senior roles within the team, and the centre from Metropolitan China reported that the head of departments completed this during weekly ward rounds. When the interviewed centres were asked if ‘leadership actively promoted the delivery of successful rehabilitation’, three centres (60%) reported either their team leader (centre from Regional Australia) or head of department (centre from Metropolitan China) was involved in this process. The centre from Sweden did not provide how they demonstrated this indicator. Four interviewed centres (80%) reported that there were staff representatives in the national/international and professional bodies. The centre from Metropolitan Australia reported no formal time allocated for this responsibility.

5.8 Criterion 6: Education

Criterion 6 is defined by 'Centres of Clinical Excellence in Stroke Rehabilitation and Recovery use their specialist knowledge to provide continuous, high-quality education to people with stroke, carers, staff and the general public.'⁸ Figure 5.7 below provides an overview of the indicators and sub-indicators from this criterion.

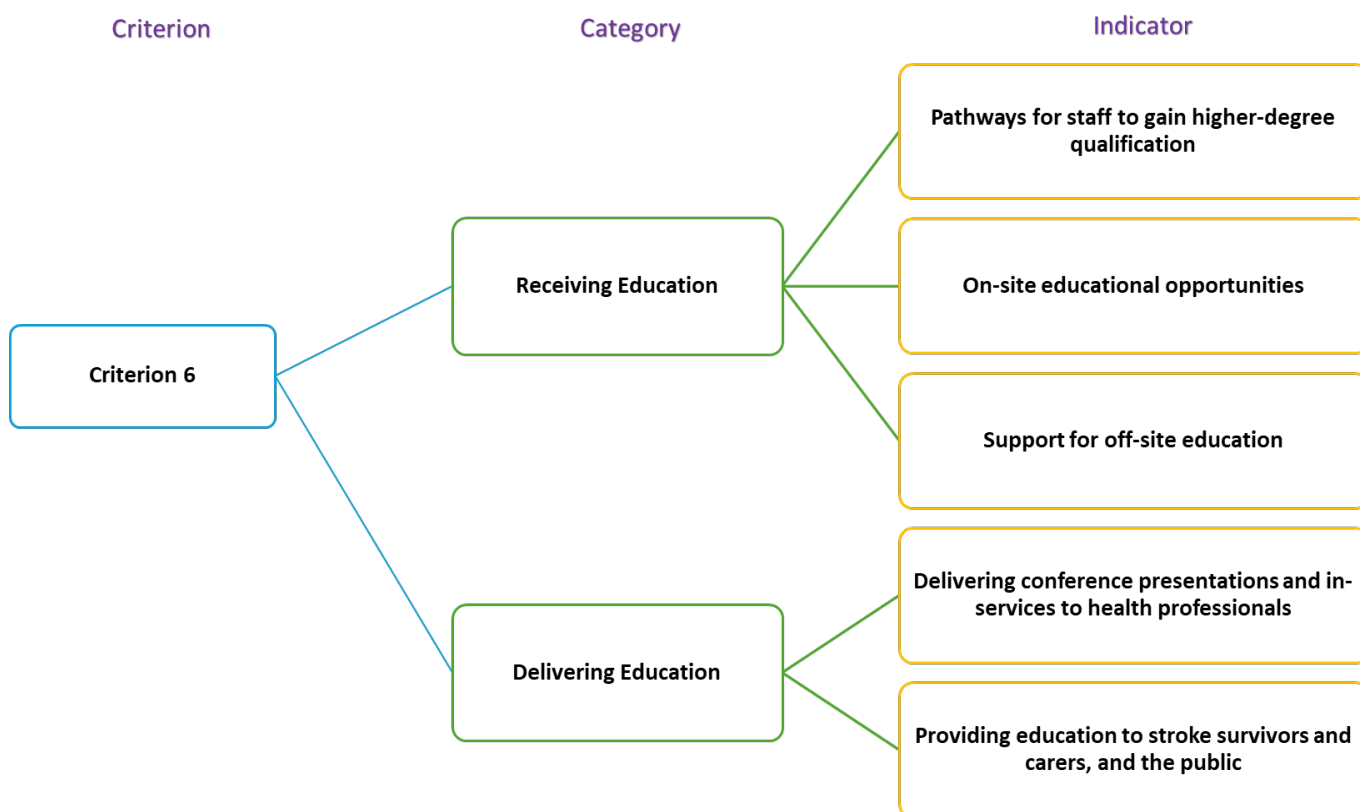


Figure 5.7 Overview of Categories, Indicators and Sub-Indicators of Criterion 6.

Criterion 6 has five measurable indicators designed to explore the concept of staff receiving and delivering education to stroke survivors, carers, staff and the general public. The responses have been summarised in the Table 5.21 below.

5.8.1 Receiving Education

Table 5.21 Routinely collected data on the indicators in the 'Receiving Education' category.

Centre	Receiving Education		
	Pathways for staff to gain higher-degree qualifications	Onsite educational opportunities	Support for off-site education
Survey			
Chile	Rehabilitaiton clinicians teach at the university. Courses, seminars and scientific conferences are available for staff to participate.		
Denmark	✗		
Ghana	In-house training for staff and new recruits.		
India (Metropolitan)	✗		
India (Regional)	Information collected on training programs and the impact of training.		
Singapore	In-house stroke and spasticity workshops available to staff. Overseas conferences and learning trips funded for staff.		
United Kingdom	Staff are offered the essentials to stroke master module as part of their development. Staff are encouraged to attend courses at university, in-house and external training.		
Interview			
Australia (Metropolitan)	Scholarship opportunity for post-graduate courses. Self-driven by clinicians.	Monthly Stroke-specific education, scheduled discipline-specific education, and generic courses are also available.	Department specific.
Australian (Regional)	Opportunity to participate in Rural Generalist Program and Masters of Clinical Rehabilitation. Initiated by University and clinicians.	FIM training, team building sessions but limited in stroke	Some support is available through scholarships and self-directed secondment.
China (Metropolitan)	✓*	✓*	✓*
China (Regional)	Priority to staff applying for Masters and staff are encouraged to complete PhD.	✗	✗
Sweden	Opportunity available for staff.	Discipline-specific and for the rehabilitation team.	Funding is available as it is a requirement of the hospital.

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

Table 5.21 above outlines the responses collected on educational opportunities for staff. The

surveyed centres responded to the category, while the interviewed centres provided more detail by responding to the indicators within the category. Among the survey respondents, five centres (71%) demonstrated how staff receive education, with the most common pathway through in-house training.

All five interviewed centres responded that pathways and opportunities were available for staff to gain higher degree qualifications. The centre from Sweden described that the opportunity was there for all staff, but not everyone wanted to pursue an academic pathway. Four interviewed centres (80%) responded that on-site education was available to staff, with only the centre from Metropolitan Australia reporting stroke-specific education. Similarly, four interviewed centres (80%) responded that supports were available for off-site education opportunities and funding. No centres specified if this was stroke-specific education.

5.8.2 Delivering Education

Table 5.22 below outlines the responses collected on staff delivering education to clinicians via conferences or in-services and providing education to stroke survivors, carers and the public.

Table 5.22 Routinely collected data for the indicators in the 'Delivering Education' category.

Centre	Delivering education	
	Delivering conference presentations and in-services to health professionals	Providing education to stroke survivors and carers, and the public
Survey		
Chile	There are opportunities to participate in scientific societies and clinical congresses, share practices and knowledge with other professionals, and interact with different patient associations.	
Denmark	Presentations on research dissemination at conferences are documented through the university database.	
Ghana	Providing education to stroke survivors and carers.	
India (Metropolitan)	✓*	
India (Regional)	Have the opportunity to participate.	
Singapore	Monthly statistics on the number of talks/services delivered. Recognition for public talks in the appraisal system.	
United Kingdom	Offer staff to attend university to deliver lectures on specialist modules such as neuro assessment. This is documented.	
Interview		

Centre	Delivering education	
	Delivering conference presentations and in-services to health professionals	Providing education to stroke survivors and carers, and the public
Australia (Metropolitan)	Staff frequently present to other sites. Deliver on the Stroke Study day.	Education to stroke survivors once a year. Driving education to patient and family peer support groups for stroke survivors and carers.
Australian (Regional)	Opportunity to present at conferences and in-services. Hands-on mobility, transfer and positioning training with nursing staff.	Education during stroke week. Stroke education for stroke survivors.
China (Metropolitan)	✓*	Through public media or offline lectures.
China (Regional)	✗	Only days with events such as Physiotherapy Day or World Stroke Day.
Sweden	✓*	Patient education was provided. No education for the public.

✓* Participants from the centres responded ‘Yes’ to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

All the centres (100%) provided evidence for this category. Staff within the centres were provided opportunities to present at conferences and to stroke survivors and families. Most centres reported having formal documentation on staff delivering education or conference sessions. Four interviewed (80%) centres reported that staff have opportunities to deliver conference presentations and in-services to health professionals. The centre in Regional Australia reported collaborating with other staff (e.g. nursing staff) to conduct in-service (short training sessions) to improve rehabilitation techniques (e.g. patient transfers, mobility, use of short-handled aids). All the interviewed centres (100%) reported that education was provided to stroke survivors and carers. No centre reported on providing education to the public. While two centres reported education during Stroke Week or World Stroke Day, the centre in Sweden reported that this is not a usual practice:

“[Providing education] for the public is not the hospital’s responsibility. We present for the patient organisation if they ask us to do”

The centre in Metropolitan Australia reported that they had trialled a program that focused on

providing education sessions to the public, but it was not widely received:

“We ran a short pilot program to provide education to the public, but the turnout was very low”

5.9 Criterion 7: Advocacy

Criterion 7 is defined as ‘Centres of Clinical Excellence in Stroke Rehabilitation and Recovery advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research.’¹⁸ Figure 5.8 below provides an overview of the indicators and sub-indicators from this criterion.

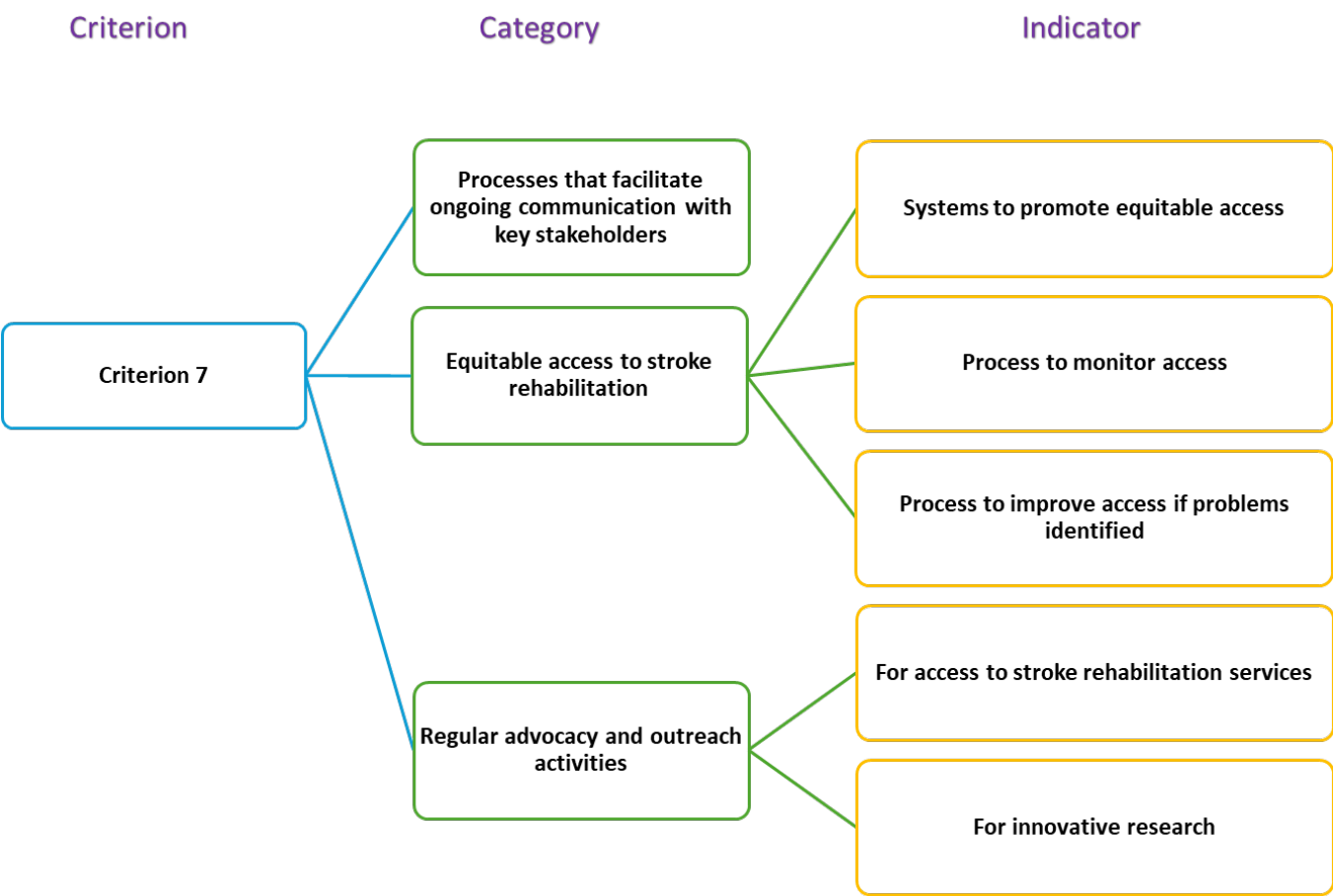


Figure 5.8 Overview of Categories, Indicators and Sub-Indicators of Criterion 7.

Criterion 7 comprises of six measurable indicators aimed to explore advocacy, equitable access, optimal delivery of stroke rehabilitation, and funding availability for innovative research.

Table 5.23 below outlines the responses collected on this criterion.

Table 5.23 Routinely collected data for the indicators and categories in Criterion 7.

Centre	Processes that facilitate ongoing communication with key stakeholders	Equitable access of stroke rehabilitation			Regular advocacy and outreach activities	
		Systems to promote equitable access	Process to monitor access	Process to improve access if problems identified	For access to stroke rehabilitation services	For innovative research
Survey						
Chile	A non-profit organisation designed to service populations with high socioeconomic levels. Identified gap in equity and looking for ways to improve service in lower-income population.					
Denmark	✗					
Ghana	✗					
India (Metropolitan)	✓*					
India (Regional)	✓*					
Singapore	Regular monitoring of discharges to follow-up services with waiting time indicators. The national framework is used to stratify patients; this information was collected via electronic documentation.					
United Kingdom	Links with Stroke Association who are working on access. Completed by training and recognising signs of stroke and access to care. Continual monitoring of access for the minority population to improve accessibility.					
Interview						
Australia (Metropolitan)	Stakeholder meeting as needed. Discharge processes include specific handovers to external agencies	Hospital specific	Have a process and a committee that can be reported to	Yes – processes available	Consultant goes to the acute hospital to identify rehab patients	Answered previously
Australian (Regional)	Not formalised. Staff allocated to coordinate and communicate with key stakeholder	Generic system and acceptance into program were based on postcode	✗	✗	Telehealth for remote patients	✗
China (Metropolitan)	✗	✗	✗	✗	Through public media	Through public media
China (Regional)	✗	Priority is given to government officials	✗	✗	✗	✗

Centre	Processes that facilitate ongoing communication with key stakeholders	Equitable access of stroke rehabilitation			Regular advocacy and outreach activities	
		Systems to promote equitable access	Process to monitor access	Process to improve access if problems identified	For access to stroke rehabilitation services	For innovative research
		and social elites				
Sweden	Ongoing continuously or when needed	Legally bound	✓*	✓*	✗	✗

✓* Participants from the centres responded 'Yes' to the questions but did not provide an explanation or if the explanation was irrelevant to the questions.

Seven centres (58%) reported collecting data on advocacy and equitable access to stroke rehabilitation services. The centres from Singapore, the UK, Metropolitan India, Regional India, Metropolitan Australia, Regional Australia and Sweden reported having documented processes to promote equitable access, but systems to monitor access were less frequently reported. Chile reported that the centre was designed to service populations from a higher socioeconomic status, and gaps have been identified; therefore, work was in progress to improve the service.

Three interviewed centres (60%) reported having 'processes for ongoing communication with key stakeholders', but that these processes were ad hoc. The responses to regular advocacy and outreach activities indicators varied between centres, with centres reporting indicators were not applicable or had previously answered in another criterion. The centre from Regional Australia reported that telehealth was used to improve access to services for remote patients, and the centre from Metropolitan China relied on public media to advocate for access. The centre from Sweden reported:

"We don't have to go out and advertise and promote our care. We are not competing between centres, and people know what to expect when they go to the hospital."

No centre reported conducting advocacy or outreach activities for innovative research.

5.10 Chapter Summary

This chapter outlined and explored the responses from the survey and semi-structured interviews descriptively, whether data was collected and, if yes, the type of data that was collected. The responses indicated that centres could demonstrate evidence for most of the indicators from 'Criterion 1: Optimal Outcomes', 'Criterion 3: Interprofessional Working', Criterion 4: the Knowledge Exchange category' and 'Criterion 6: Education'. Comparatively, the centres demonstrated a lesser number of indicators from 'Criterion 2: Research Culture', 'Criterion 4: the Mentorship category', 'Criterion 5: Leadership', and 'Criterion 7: Advocacy'. No centres recruited in this research were able to demonstrate evidence against all the indicators and criteria of CoCE. The following chapter will explore the outcome of the thematic analysis from the semi-structured interviews to identify patterns and themes that influenced the trialability of the criteria and indicators at stroke rehabilitation centres. The findings from this chapter and the next chapter (Chapter 6: Thematic Analysis) will be discussed together in Chapter 7: Discussion.

CHAPTER 6: THEMATIC ANALYSIS

6.1 Chapter Overview

This chapter presents the analysis of the qualitative responses from the semi-structured interviews collected from the interviewed centres. This chapter was structured to address the research questions below.

- How do the stroke rehabilitation centres view the criteria and indicators of the CoCE in Stroke Recovery and Rehabilitation?
- What were the facilitators and barriers identified by stroke rehabilitation centres when trialling the criteria and indicators of CoCE in Stroke Recovery and Rehabilitation?

Appendix I: Transcribed interview responses from the semi-structured interviews

6.2 Framework Analysis: Coding and Charting Stage Results

The interview responses from the interviewed centres were thematically analysed using the Framework Analysis method (refer to Section 4.10.2), and the codes were mapped to the Consolidated Framework for Implementation Research (CFIR). Tables 6.1 and 6.2 below portray the coding and charting processes undertaken during thematic analysis for two questions asked during the semi-structured interviews.

6.2.1 Integration into Practice

Participants were asked to describe or explain how the indicators could be integrated into their practice at their centres for each criterion. The responses to this question have been coded and charted, and presented in Table 6.1 below. These responses were explored in detail throughout this chapter and specific quotations from the table were used to support the analysis.

Table 6.1 The ‘integration into practice’ thematic coding using Framework Analysis Method and mapping to CFIR domains and constructs.

Interviewed Centres	Quote: indicators were integrated into practice	Theme Codes	CFIR domains and constructs
CRITERION 1			
Metropolitan Australia	<p>“Indicators are embedded well into practice.”</p> <p>“Indicators are well documented and integrated into practice.”</p>	Indicators are part of everyday practice	<p>Innovation Domain <i>Construct G: Design</i></p> <p>Outer Setting Domain <i>Construct B: Local Attitudes</i></p> <p>Inner Setting Domain <i>Construct F: Compatibility</i></p>
Regional Australia	“Service outcomes – collected and documented well.”	Information on indicators easily available or accessible	Inner Setting Domain <i>Construct F: Compatibility</i>
	“Some are integrated well and some are not”	Some indicators are part of everyday practice, and some are not routinely used	Inner Setting Domain <i>Construct F: Compatibility</i>
Metropolitan China	“Not routine to collect patient experience.”	Indicators not collected as not routinely used	<p>Inner Setting Domain <i>Construct F: Compatibility</i></p> <p><i>Construct D: Culture</i></p>
	“Not routine to measure delivering outstanding rehabilitation.”		
	“We don’t record therapy provided as we follow doctor’s orders.”	Indicator is not applicable or relevant due to the current system in place	<p>Innovation Domain <i>Construct D: Adaptability</i></p> <p>Inner Setting Domain <i>Construct A.3: Work Infrastructure</i> <i>Construct F: Compatibility</i></p>
Regional China	“Patient outcomes are measured informally using verbal feedback.”	Information not formally measured – no formal systems in place	Inner Setting Domain <i>Construct F: Compatibility</i>
	“Not routine to collect carer outcomes.”	Indicator not collected as not routinely used	Inner Setting Domain <i>Construct F: Compatibility</i>
Sweden	“Supposed to be using but still trying to use.” (coordinate ongoing care)	Aware of criterion, priority for service but difficult to meet as not collecting data on it.	Inner Setting Domain <i>Construct A.3: Work Infrastructure</i>

Interviewed Centres	Quote: indicators were integrated into practice	Theme Codes	CFIR domains and constructs
	“Carer outcomes – made us think as not something we will consider a priority, but we do have tools.”	Have tools available but not a priority to be measured	Outer Setting Domain <i>Construct B: Local Attitudes</i> <i>Construct C: Local Conditions</i> <i>Construct G: External Pressure</i> Inner Setting Domain <i>Construct D.2: Recipient-Centeredness</i> <i>Construct G: Relative Priority</i>
CRITERION 2			
Metropolitan Australia	“We’re doing a lot of it [based on] our examples. [However], no structured pathway. So for it to be ongoing, we’d probably need to make a bit more formalised process”	Indicators are part of everyday practice Need formalised pathway	Inner Setting Domain <i>Construct F: Compatibility</i>
Regional Australia	“Poorly integrated and not a priority” “We have some sort of infrastructure for PD – lots of hoops to jump through to get funding”	Not part of everyday practice	Inner Setting Domain <i>Construct D: Culture</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i> Implementation Process Domain <i>Construct B: Assessing Needs</i>
	“Some are integrated well, and some are not”	Some indicators are part of everyday practice, and some are not routinely used	Inner Setting Domain <i>Construct F: Compatibility</i>
Metropolitan China	“Mostly [integrated]” “All the staff are required of research achievements, especially those with deputy or senior titles.”	Part of everyday practice, with some indicators formally document	Inner Setting Domain <i>Construct D: Culture</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
Regional China	“Our clinicians and physios are very involved in their research work. Because they need to publish papers and attend research projects for their professional title evaluation”	Part of everyday practice, with some indicators formally document	Inner Setting Domain <i>Construct D: Culture</i> <i>Construct G: Relative Priority</i>

Interviewed Centres	Quote: indicators were integrated into practice	Theme Codes	CFIR domains and constructs
	"Not routine to collect carer outcomes"	Indicator not collected as not routinely used	Inner Setting Domain <i>Construct F: Compatibility</i>
Sweden	"Mostly clinical priorities first, but we have activities all the time going on that will support the research part"	Clinical tasks are prioritised, and incidental activities that support research	Inner Setting Domain <i>Construct B: Relational Connection</i> <i>Construct G: Relative Priority</i>
	"Many researchers still have a part in the clinic, so they don't just do research"	Researchers are involved in clinical work	Implementation Process Domain <i>Construct B: Assessing Needs</i>
CRITERION 3			
Metropolitan Australia	"Frequently [integrate] and good at this one"	Indicators are part of everyday practice	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i>
Regional Australia	"Well integrated" "We can do better at culturally safe provision...help support while in hospital" "We are missing a layer of clinical seniors that will help us work together"	Indicators are part of everyday practice Improve on data collection Need more support to achieve some indicators	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i> <i>Construct J: Available resources</i> Individual domain <i>Construct B: Mid-level leaders</i>
Metropolitan China	"We have shift handover every morning. Nurses and physios attend. Weekly meeting that all the doctors and therapist will attend, we will communicate patient's detailed information." "It is in practice, but it is not implemented due to time factor – we know it has to happen but there is no policy to enforce it"	Part of everyday practice – long-standing work culture Systems available but not utilised	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i> <i>Construct J: Available resources</i>

Interviewed Centres	Quote: indicators were integrated into practice	Theme Codes	CFIR domains and constructs
Regional China	“Every morning all clinicians will get together to share information . We don’t share detailed information, just state how many patients we have now and how many are discharged”	Part of everyday practice – long-standing work culture	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i>
Sweden	“This is the foundation of how we work” “It is a team, with the team and with the patients and their relatives”	Long-standing culture of work Inclusive practice and collaboration with patients and family	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i> <i>Construct D.2: Recipient-Centeredness</i>
CRITERION 4			
Metropolitan Australia	“Clear indicators. Mentorship is important.” “Can formalise it more as it is not integrated into standard practice. Also stroke specific mentorship, not just discipline-specific mentorship”	Indicators are part of everyday practice Systems not available to collect data	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i> <i>Construct J: Available resources</i>
Regional Australia	“Well integrated except for protected time for knowledge exchange and mentorship” “There are huge gaps – mentorship is very valuable as resources, particularly with knowledge sharing” “No rehab clinical network in the state- a big loss”	Some Indicators are part of everyday practice Systems not available to collect data	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i> <i>Construct J: Available resources</i>
Metropolitan China	“Well integrated into practice”	Part of everyday practice	Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i>

Interviewed Centres	Quote: indicators were integrated into practice	Theme Codes	CFIR domains and constructs
Regional China	<p>"[The ones that are applicable are] integrated well into practice"</p> <p>"Never heard of some indicators"</p>	Some Indicators are part of everyday practice	<p>Outer Setting Domain</p> <p><i>Construct B: Local Attitudes</i></p>
Sweden	<p>"Well integrated except for mentorship"</p> <p>"The hospital has a framework that says that the University Hospital and in order to be University Hospital and university unit, there are certain criteria that you have to do"</p>	<p>Long-standing culture of work</p> <p>Systems in place</p>	<p>Outer Setting Domain</p> <p><i>Construct B: Local Attitudes</i></p> <p><i>Construct D: Partnership and Connections</i></p> <p>Inner Setting Domain</p> <p><i>Construct D: Culture</i></p>
CRITERION 5			
Metropolitan Australia	<p>"It would be helpful to have leadership defined as some professions in the ward does not have stroke leaders"</p> <p>"Well and truly integrated"</p>	<p>Indicators are part of everyday practice</p> <p>Not clear indicators</p>	<p>Innovation Domain</p> <p><i>Construct G: Innovation Design</i></p> <p>Outer Setting Domain</p> <p><i>Construct B: Local Attitudes</i></p>
Regional Australia	<p>"Some integrated well but no all."</p> <p>"Engaging leadership with patients and carers – interesting – what does it mean, what is the purpose? Very vague"</p>	<p>Some Indicators are part of everyday practice</p> <p>Not clear indicators</p>	<p>Innovation Domain</p> <p><i>Construct G: Innovation Design</i></p> <p>Outer Setting Domain</p> <p><i>Construct B: Local Attitudes</i></p>
Metropolitan China	<p>"Confused about the concept of best staff and the commitment to recruit"</p> <p>"[Is it] for both research and clinical practice?"</p>	Not clear indicators	<p>Innovation Domain</p> <p><i>Construct G: Design</i></p> <p>Outer Setting Domain</p> <p><i>Construct B: Local Attitudes</i></p>
Regional China	"We have group leader, sector leader and hospital leader – don't know which one is asked for the criterion"	Not clear indicators	<p>Innovation Domain</p> <p><i>Construct G: Design</i></p>
Sweden	<p>"Indicators not very clear"</p> <p>"Do you really need this [indicator -best staff]"</p>	<p>Not clear indicators</p> <p>Not relevant indicators</p>	<p>Innovation Domain</p> <p><i>Construct G: Design</i></p>

Interviewed Centres	Quote: indicators were integrated into practice	Theme Codes	CFIR domains and constructs
	"[Indicators] not clear"		Outer Setting Domain <i>Construct B: Local Attitudes</i>
CRITERION 6			
Metropolitan Australia	"Repetitive on the education and conference"	Repeated indicators	Innovation Domain <i>Construct G: Design</i>
Regional Australia	"Yes, education opportunity out there but is self-driven, impacted by staffing levels and clinical priorities" "Lots more opportunity in metro" "off-site versus on-site – need clarification"	No system in place to identify data Vague indicator	Innovation Domain <i>Construct G: Design</i> Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D: Culture</i> <i>Construct J: Available resources</i>
Metropolitan China	"The criterion and KPI are clear"	Clear indicators	Innovation Domain <i>Construct G: Design</i>
Regional China	"What is in-services - never heard of some indicators"	Different terminology	Innovation Domain <i>Construct G: Design</i>
Sweden	"Many of the indicators were also in earlier questions we went through. Felt like we have answered this before – structured in different ways or have less KPI for each criterion. Some questions were for clinical and some for patients"	Repeated indicators	Innovation Domain <i>Construct G: Design</i>
CRITERION 7			
Metropolitan Australia	"Integrated well but needed explanation on KPI. Not very clear – need more explanation or different wording or examples"	Vague indicators	Innovation Domain <i>Construct G: Design</i>
Regional Australia	"We all in same page about advocating patients to access stroke rehab, however, limited by resources"	Need a system in place	Innovation Domain <i>Construct D: Adaptability</i>

Interviewed Centres	Quote: indicators were integrated into practice	Theme Codes	CFIR domains and constructs
	"Advocating – outside our control to accept within recovery window"		
Metropolitan China	"Straightforward criterion but vague KPI"	Vague indicators	Innovation Domain <i>Construct G: Design</i>
Regional China	"Straightforward criterion but vague KPI"	Vague indicators	Innovation Domain <i>Construct G: Design</i>
Sweden	"I think it's important to have it because we have quite a large part of a population where with immigrants and, as you said, with health literacy, we use quite a lot of translators and there's been discussion in the policies in the by the politicians that certain political parties say that we would save money by not using interpreters as much as we do."	Need a system in place	Innovation Domain <i>Construct D: Adaptability</i>

6.2.2 Facilitators and Barriers to Achieving the Indicators

The participants' responses to the question asking to identify the facilitators and barriers to collecting data against the indicators have been coded and charted and presented in Table 6.2 below. These responses were explored in detail throughout this chapter and specific quotations from the table were used to support the analysis.

Table 6.2 The ‘facilitators and barriers to achieving the indicators’ thematic coding using Framework Analysis Method and mapping to CFIR domains and constructs.

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
CRITERION 1			
Metropolitan Australia	“Some indicators similar” “Some indicators are vague” “Service outcomes – vaguely worded – unsure how to answer”	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct G: Design</i>
	“Some indicators are not a priority”	Not a priority to collect information on indicator	Innovation Domain <i>Construct D: Adaptability</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	“Some indicators not documented or no formalised tools used, however part of therapy”	No documentation and no formalised tools in place, however indicators measured informally	Inner Setting Domain <i>Construct C: Communication</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i> Implementation Process Domain <i>Construct I: Adapting</i>
	“Patient-reported experience more valuable than outcomes”	Some indicators are a priority	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct C: Relative Advantage</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	“Would prefer examples with each one”	Need examples to understand indicators	Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i>
Regional Australia	“Indicator too big/broad”	Indicators are vague, ambiguous	Innovation Domain

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	"Need clarification"	and too broad	<i>Construct G: Design</i>
	"Outcome could mean complications"	Indicators could have different meanings – need examples Indicators could be called something different – need to be generic globally	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i>
	"No system and resources available to document each indicator – time utilised for clinical work, even if indicators are important and relevant"	Workload demands impacting service priority No systems in place	Outer Setting Domain <i>Construct G: External Pressure</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i> <i>Construct J: Available Resource</i> Implementation Process Domain <i>Construct I: Adapting</i>
	"Not well documented in records to identify indicator"	Information not easily available to collect on indicators	Inner Setting Domain <i>Construct F: Compatibility</i> Implementation Process Domain <i>Construct I: Adapting</i>
	"Confusing terminology – are they measures or observations along the way" "Different terminology – not called patient reported outcome, but goal setting" "Not sure what procedure/methods mean"	Indicators could have different meanings – need examples Indicators could be called something different – need to be generic globally	Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct I: Adapting</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	"Duration versus dose is vague"		
	"Collecting data but no feedback loop to complete process"	Indicators are used, but the system does not allow for feedback on the data collected	Outer Setting Domain <i>Construct G: External Pressure</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i>
	"No ambulatory feedback, but the tool is available"	Have tools available but indicators not measured – no process	Inner Setting Domain <i>Construct F: Compatibility</i> Individuals Domain <i>Construct H: Innovation Deliverers</i>
	"No formal processes available for self-management skills"	Not using formalised tools	Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i>
	"Indicator not well documented"	The indicator was not documented therefore, unable to seek out information	Inner Setting Domain <i>Construct A.3: Work Infrastructure</i> <i>Construct F: Compatibility</i>
Metropolitan China	"Don't deliberately collect indicators separately. Covered in medical documentation"	Indicators are incidentally collected during daily clinical processes	Inner Setting Domain Construct A: Structural Characteristic
	"Confused about rehabilitation interventions"	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i>
	"Confused about the difference between clinical measures and patient-reported outcomes"		Implementation Process Domain <i>Construct I: Adapting</i>
	"We don't quite understand what the dose stands for"		
	"Clinical skills, self-reported outcomes and self-management skills are overlapping"	Cross-over between indicators	Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i>
	"We don't use the word optimal outcome"	Indicators could be called	Innovation Domain

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
		something different – needs to be generic globally	<i>Construct D: Adaptability</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i>
Regional China	“Optimal outcomes – vaguely worded”	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct G: Design</i>
	“I don’t know what that coordinated, ongoing care and support”	Indicators could be called something different – needs to be generic globally	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct I: Adapting</i>
Sweden	“No regulation or recommendation for duration, but should be”	Gaps in service identified	Outer Setting Domain <i>Construct E: Policies & Law</i>
	“Don’t have service outcome and FIM is under used”		Inner Setting Domain <i>Construct A: Structural Characteristic</i>
	“Struggling with the question dose, know it is important but we have no clue”	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i>
	“Easy to understand delivering outstanding rehabilitation”	Information on indicators easily available	Innovation Domain <i>Construct G: Design</i>
	“Some information was not easily accessibly”	Information not easily available to collect information on indicators	Inner Setting Domain <i>Construct F: Compatibility</i> Implementation Process Domain

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
			<i>Construct I: Adapting</i>
	<p>“Carer outcome – we don’t explore much”</p> <p>“Carer outcome is vague”</p> <p>“Who is a carer” need definition</p>	<p>Indicators are ambiguous therefore need clarification before collecting information on the indicators</p> <p>Indicators could have different meanings – need examples</p>	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct I: Adapting</i></p>
	<p>“We don’t want carers to be involved”</p>	<p>Indicator is not applicable or relevant due to the current system in place</p>	<p>Innovation Domain <i>Construct D: Adaptability</i></p> <p>Outer Setting Domain <i>Construct B: Local Attitudes</i></p> <p>Inner Setting Domain <i>Construct D.2: Recipient-Centeredness</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i></p>
	<p>“Tricky part is the vocabulary and what answer to give”</p> <p>“Don’t use abbreviation”</p> <p>“Use of easy/everyday words” “helpful to have examples for each one”</p> <p>“What is duration and intensity – terminology a little bit different”</p> <p>“Not everyone knows patient reported outcomes and experiences”</p> <p>“Not everyone understands time of commencement”</p>	<p>Indicators are ambiguous therefore need clarification before collecting information on the indicators</p> <p>Indicators could have different meanings – need examples</p> <p>Indicators could be called something different – need to be generic globally</p> <p>The terminology used describe the indicator is unclear</p>	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
CRITERION 2			
Metropolitan Australia	<p>"We regularly attend conferences, and often as a team with aim to present in conference."</p> <p>"Embedded within work for PD – for study leave/to attend the conference with funding"</p> <p>"QI done regularly from database however no set program just strongly encouraged by seniors."</p>	<p>Indicators were relevant to current system</p> <p>Information on indicators easily available</p>	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i></p> <p>Outer Setting Domain <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct A: Structural Characteristics</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i></p>
	"No particular barriers"	No barriers identified	<p>Innovation Domain <i>Construct D: Adaptability</i></p> <p>Implementation Process Domain <i>Construct H: Reflecting & Evaluating</i></p>
Regional Australia	<p>"Not always fit within all roles."</p> <p>"Quality improvement is included in the job description but no specifics about research."</p>	Gaps in service identified	<p>Outer Setting Domain <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct A: Structural Characteristic</i></p>
	<p>"No allocated time for research."</p> <p>"Not a priority and not emphasis as part of day to day working"</p> <p>"No – vary – dependent on position and experience"</p> <p>"We should have the opportunity to attend relevant conferences, but it doesn't triumph clinical load when short-</p>	Workload demands impacting service priority	<p>Outer Setting Domain <i>Construct G: External Pressure</i></p> <p>Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct G: Relative Priority</i> <i>Construct J: Available Resource</i></p> <p>Implementation Process Domain</p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	staffed”		<i>Construct I: Adapting</i>
	“We have some sort of infrastructure for PD – lots of hoops to jump through to get funding” “Look different in metro”	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct F: Compatibility</i>
	“No – we are not doing it so no information to collect – not applicable. We still think it should be a priority”	Gaps in service identified	Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct G: Relative Priority</i>
Metropolitan China	“No, we don’t have such a thing. Everyone just has to use their spare time”	Gaps in service identified	Outer Setting Domain <i>Construct C: Local Conditions</i> <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i>
	“Yes, it would be better to give an example to illustrate” “Would prefer examples for each KPI”	Not easy to understand indicators without examples	Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i>
	“But we don’t document it.”	No documentation and no formalised tools in place, however indicators measured informally	Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct C: Communication</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i> Implementation Process Domain <i>Construct I: Adapting</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
Regional China	“Can’t collect some (e.g quality improvement program, regular collection of outcome data, allocated research times, systems to support high-quality data collection, a recognised pathway or strategy to implement research into practice) because we don’t have this”	Not a priority to collect information on indicator	Innovation Domain <i>Construct D: Adaptability</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	“Would prefer examples for each KPI” “Research culture - “I don’t understand what research culture mean”	Not easy to understand indicators without examples Indicators could have different meanings – need examples Indicators could be called something different – needs to be generic globally	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i>
Sweden	“In daily clinical work, these activities are unfortunately quite often down-prioritized prior clinical work.”	Workload demands impacting service priority	Outer Setting Domain <i>Construct G: External Pressure</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct G: Relative Priority</i> <i>Construct J: Available Resource</i> Implementation Process Domain <i>Construct I: Adapting</i>
	“The research is quite accessible at the University Hospital in general and compared to other hospitals.” “I found these criteria relatively easy to check because we have many of those organisation structures just because we are a university hospital. Those structures and their organisation is roughly in place and are positive, it is also in	Indicators were relevant to current system Information on indicators easily	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i> Outer Setting Domain <i>Construct D: Partnership & Connection</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	<p>the university hospital's mission. It is the patient work, clinical work, research innovation and teaching"</p> <p>"We have documentation, plans, and work descriptions to state this"</p> <p>"It was quite easy – because of the closeness to university. What we were struggling with was that we may not live up to these as much as we would like"</p>	available	<p><i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i></p>
CRITERION 3			
Metropolitan Australia	<p>"No barriers – have these documented (e.g. accreditation process)"</p> <p>"KPIs are straightforward"</p>	<p>No barriers identified</p> <p>Information on indicators easily available</p>	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct H: Reflecting & Evaluating</i></p>
	<p>"Vague" cultural evidence as it is more in practice than documentation. "...but that's quite vague...harder to provide evidence because we just know we do it."</p>	<p>Indicators are incidentally collected during daily clinical processes</p> <p>Indicators are vague, ambiguous and too broad</p>	<p>Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Inner Setting Domain <i>Construct A: Structural Characteristic</i></p>
	<p>"Collaborative goal setting – covered in the first criteria"</p>	<p>Information collected from another indicator or criterion</p>	<p>Innovation Domain <i>Construct G: Design</i></p>
Regional Australia	<p>"Very informal and not formally documented"</p>	<p>No documentation and no formalised tools in place, however indicators measured informally</p>	<p>Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct C: Communication</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i></p> <p>Implementation Process Domain <i>Construct I: Adapting</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	"Needed clarification – what does it mean"	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct G: Design</i>
	"Do well in virtual communication as "we are a country site therefore provide a lot of services to other areas"	Indicators were relevant to current system	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i> Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i>
	"Need better process for goal setting" "Systems to support coordinated interprofessional teamwork - I think we are missing a whole layer of clinical seniors that will help us work together"	Gaps in service identified	Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i>
Metropolitan China	"I think it's overlapping with a.."	Cross-over between indicators	Innovation Domain <i>Construct G: Design</i>
	"Yes, but we don't document this." "It is in practice but it is not implemented due to time factor – we know it has to happen but there is no policy to enforce it"	No documentation and no formalised tools in place, however indicators measured informally	Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct C: Communication</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i> Implementation Process Domain <i>Construct I: Adapting</i>
Regional China	"Sometimes we do not. Sometimes the treatment or therapy of clinicians and physios can not reach a consensus. Sometimes we overlook someone's opinion."	No documentation and no formalised tools in place, however indicators measured informally	Inner Setting Domain <i>Construct A.3: Work Infrastructure</i> <i>Construct C: Communication</i> <i>Construct F: Compatibility</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
			<i>Construct J: Available Resources</i> Implementation Process Domain <i>Construct I: Adapting</i>
	“Culturally safe care provision - “They don’t care about this and asked my leader and they don’t know anything”	Indicators not relevant to current system	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i> Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i>
Sweden	Culturally safe care provision “I don’t think we are required by law”	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D.2: Recipient-Centeredness</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	“We discussed the meaning of culturally safe care provision and equal rights. We made a greater inclusion in that” – should be explained more and what information required with an example as it will differ a lot in different countries. I am thinking man, woman, sex, ethnicity, religion”	Indicators could have different meanings – need examples Indicators could be called something different – needs to be generic globally	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct I: Adapting</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	“Same discussion we had earlier about the importance of relatives and family, we would not involve them to be actual caregivers. They are important but in a different way. They support more mentally or more psychologically or as a partner or whoever but role in their family role and not the carer”.	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> Inner Setting Domain <i>Construct D.2: Recipient-Centeredness</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	“Under this KPI the teamwork is addressed only as system support; I think the teamwork as a way of working should be more visible somehow – maybe lift it into the KPI 1 more clearly – it is more the culture of teamwork and the holistic view on team and common understanding of teams that somehow disrepairs in the presented KPIs. Important to make the TEAM work more visible.”	Additional indicators to be explored	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i>
CRITERION 4			
Metropolitan Australia	“Not well backfilled – not a priority” “Different modalities – not a priority”	Not a priority to collect information on indicator	Innovation Domain <i>Construct D: Adaptability</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	Formal mentorship program for clinical centres – “Unsure how to answer this – mentor Geraldton Hospital”	The terminology used to describe the indicator is unclear	Innovation Domain <i>Construct G: Design</i>
	“No clear pathway for mentorship training”	Gaps in service identified	Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i>
Regional Australia	“There is a gap – no stroke support group”	Gaps in service identified	Outer Setting Domain <i>Construct C: Local Condition</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	"No connection with any international rehab group"		<i>Construct D: Partnership & Connections</i> <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i>
	"No allocated time" "Nothing formal"	No documentation and no formalised tools in place, however indicators measured informally	Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct C: Communication</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i> Implementation Process Domain <i>Construct I: Adapting</i>
	"Nothing to collect – so no barrier" "Barrier to mentorship is the distance from major centres"	Gaps in service identified	Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i>
Metropolitan China	"Vague – "What does it mean"? need clarification"	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct G: Design</i>
	"No, we don't have interdisciplinary mentorship program, just within rehabilitation" "? Protected time for knowledge exchange and mentorship – none allocated within work hours – expectation to be completed outside work hours or during however it is relevant to be included as KPI"	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i> Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	"No difficulty with knowledge exchange with other hospitals, but more difficulty with national groups and rarely with international groups"	Gaps in service identified	Outer Setting Domain <i>Construct D: Partnership & Connections</i> <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct A: Structural Characteristic</i>
Regional China	"No – only do face-to-face communication – not other modalities"	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct G: Design</i>
	"Difficult to find some information on knowledge exchange. Only have information within own university"	Information not easily available on indicators	Inner Setting Domain <i>Construct F: Compatibility</i>
	"? Protected time for knowledge exchange and mentorship – none allocated within work hours – expectation to be completed outside work hours"	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i> Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i>
	"Never heard about some key performance indicators" "Very young rehab unit – developing city"	Indicators could have different meanings – need examples Indicators could be called something different – needs to be generic globally	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct I: Adapting</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
Sweden	<p>Formal mentorship program for clinical centres – “what is the difference from point a)”</p> <p>“Criteria 4 is more the clinical exchange or collaboration or the research because we have talked about the research collaboration already in the earlier points. Is there any difference in clinical collaboration, research collaboration.”</p> <p>“In general, we had a little bit trouble with those 4,5 and 6 to differentiate and others – we struggled a little bit. Differentiate from the others and there were many questions little bit similar.”</p>	<p>Cross-over between indicators</p> <p>Information collected from another indicator or criterion</p> <p>Indicators could have different meanings – need examples</p> <p>Indicators could be called something different – needs to be generic globally</p>	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct I: Adapting</i></p>
	<p>“The hospital has a framework that says that the University Hospital and in order to be University Hospital and university unit, there are certain criteria that you have to do.”</p> <p>“Most people are aware that teaching and research are part of requirements” and “with that there goes the collaboration”</p> <p>“We are said to be the last line, so we are to support everyone around”. “more qualified hospital, decided by politicians, so we have to support”. “It is the policy” “We need to help not because we have to help”</p>	<p>Indicators were relevant to current system</p>	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i></p> <p>Outer Setting Domain <i>Construct D: Partnership & Connections</i> <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i></p>
CRITERION 5			
Metropolitan Australia	<p>“Mostly through word of mouth.”</p> <p>“Not formal”</p>	<p>No documentation and no formalised tools in place, however indicators measured informally</p>	<p>Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct C: Communication</i></p> <p>Implementation Process Domain <i>Construct I: Adapting</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	<p>Leadership actively promotes delivery of successful rehabilitation – “Vague – did not understand”</p> <p>Leaders engaging key stakeholders – “it is very vague. Needs explanation”</p>	<p>Indicators are ambiguous therefore need clarification before collecting information on the indicators</p> <p>The terminology used describe the indicator is unclear</p>	<p>Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>
Regional Australia	“There is process to recruit best staff but struggle to get experienced clinicians and commitments should be actually putting more value on getting people to move here, should there be more incentives?”	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i>
	<p>“Not encouraged through work processes, personnel-driven.”</p> <p>“No systems in place to access through work”</p>	Gaps in service identified	<p>Outer Setting Domain <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct A: Structural Characteristic</i></p>
	<p>“Vague – need clarification – TL role or clinician role? “is it clinical leadership or patient related” Need more definition or explanation – difficult to answer”</p> <p>“Is it clinical or non-clinical leadership” – vague and a big difference between these”</p>	<p>Indicators are ambiguous therefore need clarification before collecting information on the indicators</p> <p>Indicators could have different meanings – need examples</p> <p>The terminology used describe the indicator is unclear</p>	<p>Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>
	“Not much information available”	Information not easily available to collect on indicators	<p>Inner Setting Domain <i>Construct F: Compatibility</i></p> <p>Implementation Process Domain <i>Construct I: Adapting</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
Metropolitan China	<p>“What do you mean by “leaders”?”</p> <p>“Confused about the concept of “best staff” and the commitment to recruit the best staff – do we need to provide more salary to attract the best staff or something else”</p> <p>“Best staff – both research and clinical practice?”</p>	<p>Indicators are ambiguous therefore need clarification before collecting information on the indicators</p> <p>The terminology used describe the indicator is unclear</p>	<p>Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>
	<p>“Yes. But we don’t document it.”</p>	<p>No documentation and no formalised tools in place, however indicators measured informally</p>	<p>Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct C: Communication</i> <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i></p> <p>Implementation Process Domain <i>Construct I: Adapting</i></p>
	<p>“Needs to be clearer”</p> <p>“Leadership – vague as well – department or hospital?”</p> <p>“Need to make it clear what is this leadership about”</p>	<p>Indicators are ambiguous therefore need clarification before collecting information on the indicators</p> <p>The terminology used describe the indicator is unclear</p>	<p>Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>
Regional China	<p>“Yes, our leaders desire to recruit staff with high academic qualifications. We recruit clinicians with PhD”</p>	<p>Indicators were relevant to current system</p>	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i></p> <p>Outer Setting Domain <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct F: Compatibility</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	"No, the only way to assess the leader's leadership is how the leader leads us to make a profit. Most of the mechanisms of assessing leadership is confidential."	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct F: Compatibility</i>
	"Needs to be clearer"	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i>
	"We lack communication – "we are not like a big family" "I provide service and they receive service" "We don't have right to lead patients". "My responsibility is to tell them what to do"	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct D.2: Recipient-Centeredness</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	"We have group leader, sector leader and hospital leader – so we don't know which one you mentioned here"	Indicators are ambiguous therefore need clarification before collecting information on the indicators The terminology used describe the indicator is unclear	Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i> Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i>
Sweden	"Need to ask the questions differently – as you won't get anything from this question otherwise"	Indicators are ambiguous therefore need clarification	Innovation Domain <i>Construct D: Adaptability</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
	<p>“This was partly taken up under research and knowledge exchange, mentoring KPIs, I think a better discrimination between these is needed.”</p> <p>“We don’t know what 360 means – you have a lot of examples but we don’t know that it means. If you are doing this internationally, it is not clear”</p> <p>“I am convinced we have this, but your questions were not very clear to us”</p>	<p>before collecting information on the indicators</p> <p>The terminology used describe the indicator is unclear</p> <p>Indicators could have different meanings – need examples</p> <p>Indicators could be called something different – needs to be generic globally</p> <p>Cross-over between indicators</p>	<p><i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>
	<p>“We talked about career stages, and discussion with leadership. It is encouraged but not listed”</p>	<p>No documentation and no formalised tools in place, however indicators measured informally</p>	<p>Innovation Domain <i>Construct D: Adaptability</i></p> <p>Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i></p>
	<p>“Suggestion: this part had a bit too many different angles but difficult to separate”</p>	<p>Indicators are ambiguous therefore need clarification before collecting information on the indicators</p> <p>The terminology used describe the indicator is unclear</p>	<p>Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>
CRITERION 6			
Metropolitan Australia	<p>“Repetitive on the education and conference”</p> <p>“Receiving education: Covered in other criteria”</p>	<p>Information collected from another indicator or criterion</p>	<p>Innovation Domain <i>Construct G: Design</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
Regional Australia	<p>“There are no pathways, they are just sent out by universities”</p> <p>“Education opportunity out there but is self-driven, impacted by staffing levels and clinical priority”</p>	Gaps in service identified	<p>Outer Setting Domain <i>Construct D: Partnership & Connection</i> <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i></p>
	“Offsite versus onsite – need clarification (face to face versus telehealth)”	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct G: Design</i>
Metropolitan China	The criteria and KPI “It is pretty clear”	Information on indicators easily available	Innovation Domain <i>Construct G: Design</i>
Regional China	“Our hospital encourages the staff to apply for PHD and supports staff to finish their PHD, including financial support, but staff must go back to our hospital when they graduate.”	Indicators were relevant to current system	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i></p> <p>Outer Setting Domain <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i></p>
	“What is in-services” – not a terminology used in China	The terminology used describe the indicator is unclear	<p>Innovation Domain <i>Construct G: Design</i></p> <p>Implementation Process Domain <i>Construct B: Assessing Needs</i> <i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
Sweden	"It is an opportunity – "not everyone needs to or wants to go the whole academic way".	Indicator is not applicable or relevant due to the current system in place	Innovation Domain <i>Construct D: Adaptability</i> Outer Setting Domain <i>Construct B: Local Attitudes</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	"The region sets money to apply and also to apply within its own organisation "It is encouraged and requirement at the hospital that certain amount of money have to set aside for staff development"	Indicators were relevant to current system	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i> Outer Setting Domain <i>Construct E: Policies & Law</i> Inner Setting Domain <i>Construct F: Compatibility</i> <i>Construct J: Available Resources</i>
	"Many of these questions were also in earlier questions we went through. Felt like we have answered this before – structured in different ways or have less KPI for each criteria. Some questions was for clinical and some for patients"	Information collected from another indicator or criterion	Innovation Domain <i>Construct G: Design</i>
CRITERION 7			
Metropolitan Australia	For innovative research - "Answered in previous criteria"	Information collected from another indicator or criterion	Innovation Domain <i>Construct G: Design</i>
	"Not very clear – need more explanation or different wording or example"	Indicators are ambiguous therefore need clarification before collecting information on the indicators	Innovation Domain <i>Construct D: Adaptability</i> <i>Construct F: Complexity</i> <i>Construct G: Design</i>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
		<p>Indicators could have different meanings – need examples</p> <p>Indicators could be called something different – needs to be generic globally</p>	<p>Implementation Process Domain</p> <p><i>Construct B: Assessing Needs</i></p> <p><i>Construct E: Tailoring Strategies</i></p> <p><i>Construct I: Adapting</i></p>
Regional Australia	<p>“Vague”</p> <p>For access to stroke rehabilitation services – “vague indicator”</p>	Indicators are ambiguous therefore need clarification before collecting information on the indicators	<p>Innovation Domain</p> <p><i>Construct D: Adaptability</i></p> <p><i>Construct G: Design</i></p>
	“Not formalised process to facilitate communication – it is general knowledge”	No documentation and no formalised tools in place, however indicators measured informally	<p>Inner Setting Domain</p> <p><i>Construct A: Structural Characteristic</i></p> <p><i>Construct C: Communication</i></p> <p><i>Construct F: Compatibility</i></p> <p>Implementation Process Domain</p> <p><i>Construct I: Adapting</i></p>
	<p>“Limited opportunities to be involved with stroke research.”</p> <p>“Location barrier for research and monitoring and lack of acute unit stroke care – therefore processes to rehab are muddled”</p>	Gaps in service identified	<p>Outer Setting Domain</p> <p><i>Construct D: Partnership & Connection</i></p> <p><i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain</p> <p><i>Construct A: Structural Characteristic</i></p> <p><i>Construct F: Compatibility</i></p> <p><i>Construct G: Relative Priority</i></p>
Metropolitan China	<p>“Not sure what this means”</p> <p>“What do you mean by equitable access of stroke rehabilitation”</p> <p>“Straight forward criteria and KPI but vague”</p>	<p>Indicators could have different meanings – need examples</p> <p>Indicators could be called something different – needs to be generic globally</p>	<p>Innovation Domain</p> <p><i>Construct D: Adaptability</i></p> <p><i>Construct F: Complexity</i></p> <p><i>Construct G: Design</i></p> <p>Implementation Process Domain</p> <p><i>Construct B: Assessing Needs</i></p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
			<i>Construct E: Tailoring Strategies</i> <i>Construct I: Adapting</i>
Regional China	<p>“Not fair and equitable in my hospital – because we have 90 beds, but most of the are occupied. Some patients take priority, especially within sector. The clinicians will select who will receive treatment in our sectors”</p> <p>“selected according to severity sometimes and other times down to social class” “We have VIPs”</p> <p>“Sometime citizens have to wait up to a month – so longer waiting period”</p> <p>“limited medical resources”</p>	Gaps in service identified	<p>Innovation Domain <i>Construct D: Adaptability</i></p> <p>Outer Setting Domain <i>Construct D: Partnership & Connection</i> <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct A: Structural Characteristic</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i></p>
	“Straight forward criteria and KPI but vague”	Indicators are ambiguous therefore need clarification before collecting information on the indicators	<p>Innovation Domain <i>Construct D: Adaptability</i> <i>Construct G: Design</i></p>
Sweden	“Sweden has strong laws for that”	Indicators were relevant to current system	<p>Innovation Domain <i>Construct G: Design</i></p> <p>Outer Setting Domain <i>Construct E: Policies & Law</i></p> <p>Inner Setting Domain <i>Construct F: Compatibility</i></p>
	<p>“Not applicable”</p> <p>“We don’t have to go out and advertise and promote our care clearly. We are not competing between centres, people know what to expect when they go the hospital</p>	Indicator is not applicable or relevant due to the current system in place	<p>Innovation Domain <i>Construct D: Adaptability</i></p> <p>Outer Setting Domain <i>Construct B: Local Attitudes</i></p> <p>Inner Setting Domain</p>

Interviewed Centres	Quote: Facilitators and barriers to achieving the indicators	Codes	CFIR
			<i>Construct D.2: Recipient-Centeredness</i> <i>Construct F: Compatibility</i> <i>Construct G: Relative Priority</i>
	For innovative research - "Not clear for us why this is here or what should be included here - feels like this was added on and it didn't fit anywhere so it was included here."	Cross-over between indicators	Innovation Domain <i>Construct F: Complexity</i> <i>Construct G: Design</i>

6.3 Framework Analysis – Mapping and Interpretation Stage

The final stage in the Framework Analysis method is the ‘Mapping and Interpretation’ stage. The mapped CFIR constructs and domains for two questions asked during the interviews for all seven criteria have been recorded in Table 6.3, as shown below.

Table 6.3 Framework Analysis - Mapping and Interpretation Stage for two questions from the interview using CFIR.

Criterion	Questions asked in semi-structured interview	
	How are the indicators integrated into practice?	What are the facilitators and barriers to achieving the indicators?
Criterion 1	<u>Innovation Domain</u> Construct D: Adaptability Construct G: Design <u>Outer Setting Domain</u> Construct B: Local Attitudes Construct C: Local Conditions Construct G: External Pressure <u>Inner Setting Domain</u> Construct A.3: Work Infrastructure Construct D: Culture Construct D.2: Recipient-Centeredness Construct F: Compatibility Construct G: Relative Priority	<u>Innovation Domain</u> Construct C: Relative Advantage Construct D: Adaptability Construct F: Complexity Construct G: Design <u>Outer Setting Domain</u> Construct B: Local Attitudes Construct E: Policies & Law Construct G: External Pressure <u>Inner Setting Domain</u> Construct A: Structural Characteristic Construct A.3: Work Infrastructure Construct C: Communication Construct D.2: Recipient-Centeredness Construct F: Compatibility Construct G: Relative Priority Construct J: Available Resources <u>Individuals Domain</u> Construct H: Innovation Deliverers <u>Implementation Process Domain</u> Construct B: Assessing Needs Construct E: Tailoring Strategies Construct I: Adapting
Criterion 2	<u>Inner Setting Domain</u> Construct B: Relational Connection Construct D: Culture Construct F: Compatibility Construct G: Relative Priority <u>Implementation Process Domain</u> Construct B: Assessing needs	<u>Innovation Domain</u> Construct D: Adaptability Construct F: Complexity Construct G: Design <u>Outer Setting Domain</u> Construct B: Local Attitudes Construct C: Local Conditions Construct D: Partnership & Connection Construct E: Policies & Law Construct G: External Pressure

Criterion	Questions asked in semi-structured interview	
	How are the indicators integrated into practice?	What are the facilitators and barriers to achieving the indicators?
		<u>Inner Setting Domain</u> Construct A: Structural Characteristics Construct C: Communication Construct F: Compatibility Construct G: Relative Priority Construct J: Available Resources <u>Implementation Process Domain</u> Construct B: Assessing Needs Construct E: Tailoring Strategies Construct H: Reflecting & Evaluating Construct I: Adapting
Criterion 3	<u>Outer Setting Domain</u> Construct B: Local Attitudes <u>Inner Setting Domain</u> Construct D: Culture Construct D.2: Recipient-Centeredness Construct J: Available resources <u>Individual domain</u> Construct B: Mid-level leaders	<u>Innovation Domain</u> Construct D: Adaptability Construct F: Complexity Construct G: Design <u>Outer Setting Domain</u> Construct B: Local Attitudes Construct E: Policies & Law <u>Inner Setting Domain</u> Construct A: Structural Characteristic Construct A.3: Work Infrastructure Construct C: Communication Construct D.2: Recipient-Centeredness Construct F: Compatibility Construct G: Relative Priority Construct J: Available Resources <u>Implementation Process Domain</u> Construct B: Assessing Needs Construct H: Reflecting & Evaluating Construct I: Adapting
Criterion 4	<u>Outer Setting Domain</u> Construct B: Local Attitudes Construct D: Partnership and Connections <u>Inner Setting Domain</u> Construct D: Culture Construct J: Available resources	<u>Innovation Domain</u> Construct D: Adaptability Construct F: Complexity Construct G: Design <u>Outer Setting Domain</u> Construct C: Local Condition Construct D: Partnership & Connections Construct E: Policies & Law <u>Inner Setting Domain</u> Construct A: Structural Characteristic Construct C: Communication Construct F: Compatibility Construct G: Relative Priority

Criterion	Questions asked in semi-structured interview	
	How are the indicators integrated into practice?	What are the facilitators and barriers to achieving the indicators?
		<p>Construct J: Available Resources</p> <p><u>Implementation Process Domain</u> Construct B: Assessing Needs Construct I: Adapting</p>
Criterion 5	<p><u>Innovation Domain</u> Construct G: Innovation Design</p> <p><u>Outer Setting Domain</u> Construct B: Local Attitudes</p>	<p><u>Innovation Domain</u> Construct D: Adaptability Construct F: Complexity Construct G: Design</p> <p><u>Outer Setting Domain</u> Construct B: Local Attitudes Construct E: Policies & Law</p> <p><u>Inner Setting Domain</u> Construct A: Structural Characteristic Construct C: Communication Construct D.2: Recipient-Centeredness Construct F: Compatibility Construct G: Relative Priority Construct J: Available Resources</p> <p><u>Implementation Process Domain</u> Construct B: Assessing Needs Construct E: Tailoring Strategies Construct I: Adapting</p>
Criterion 6	<p><u>Innovation Domain</u> Construct G: Innovation Design</p> <p><u>Outer Setting Domain</u> Construct B: Local Attitudes</p> <p><u>Inner Setting Domain</u> Construct D: Culture Construct J: Available resources</p>	<p><u>Innovation Domain</u> Construct D: Adaptability Construct G: Design</p> <p><u>Outer Setting Domain</u> Construct B: Local Attitudes Construct D: Partnership & Connection Construct E: Policies & Law</p> <p><u>Inner Setting Domain</u> Construct A: Structural Characteristic Construct F: Compatibility Construct G: Relative Priority Construct J: Available Resources</p> <p><u>Implementation Process Domain</u> Construct B: Assessing Needs Construct E: Tailoring Strategies Construct I: Adapting</p>
Criterion 7	<p><u>Innovation Domain</u> Construct D: Adaptability Construct G: Design</p>	<p><u>Innovation Domain</u> Construct D: Adaptability Construct F: Complexity Construct G: Design</p>

Criterion	Questions asked in semi-structured interview	
	How are the indicators integrated into practice?	What are the facilitators and barriers to achieving the indicators?
		<u>Outer Setting Domain</u> Construct B: Local Attitudes Construct D: Partnership & Connection Construct E: Policies & Law <u>Inner Setting Domain</u> Construct A: Structural Characteristic Construct C: Communication Construct D.2: Recipient-Centeredness Construct F: Compatibility Construct G: Relative Priority <u>Implementation Process Domain</u> Construct B: Assessing Needs Construct E: Tailoring Strategies Construct I: Adapting

6.4 Facilitators and Barriers Identified when Trialling the Centres of Clinical Excellence criteria and indicators

The responses to this research question were collected for all seven criteria in the semi-structured interviews by asking the participants to identify any facilitators and barriers that impacted data collection when the criteria and indicators were trialled at the centres. The responses (for all seven criteria) were mapped to all five CFIR domains, with most of the themes mapped to the Innovation Domain (i.e. characteristics of the criteria and indicators), Outer Setting Domain (i.e. the healthcare system) and Inner Setting Domain (i.e. the rehabilitation centre). Fewer barriers and facilitators were mapped to the Individuals Domain (i.e. personnel) and Implementation Process Domain (i.e. how the indicators were trialled at the centres). Figure 6.1 below provides a summary of the CFIR domains that were coded and mapped to the participants' responses across the seven criteria of CoCE.

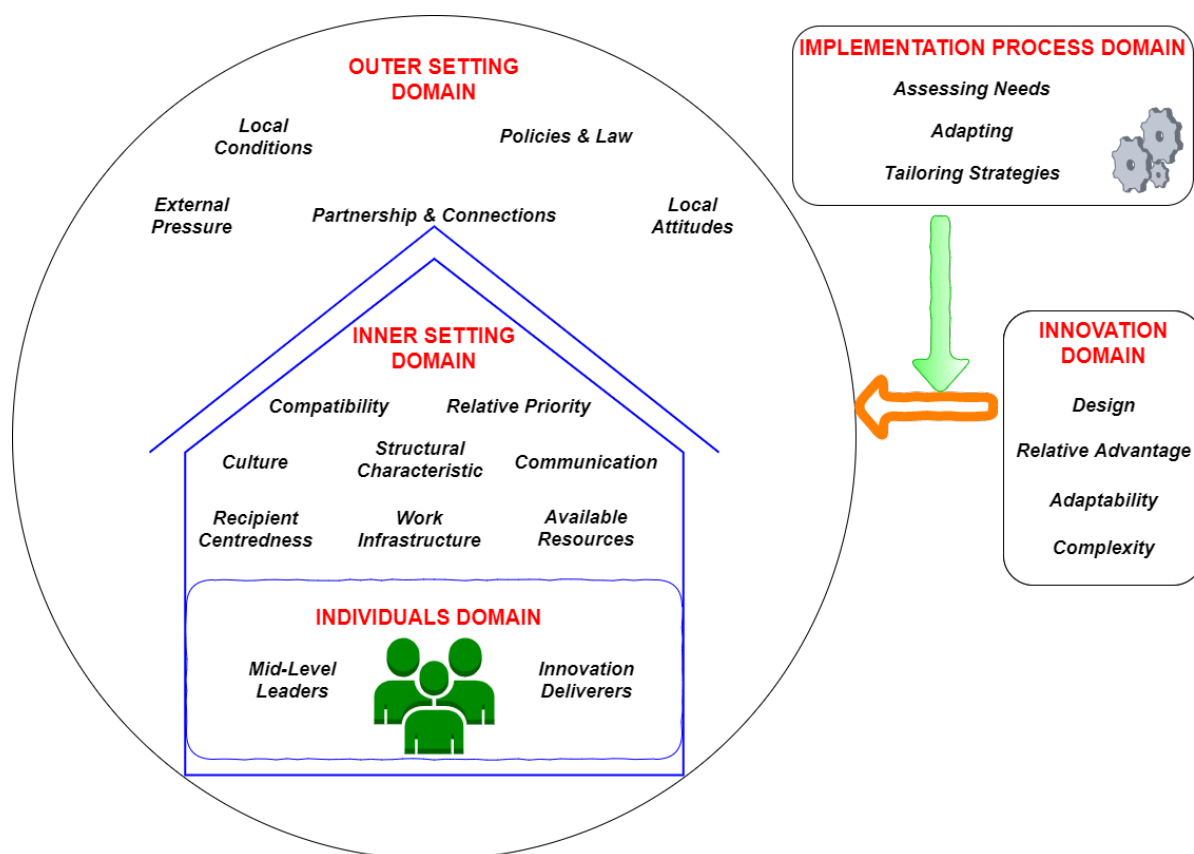


Figure 6.1 Summary of all the CFIR domains mapped across seven CoCE criteria.

The facilitators and barriers identified when the criteria and indicators were trialled at stroke rehabilitation centres are presented below with examples, in the order of the greatest number of facilitators and barriers to the least. The constructs that were identified in two or less criteria were explained briefly within each domain.

6.4.1 Inner Setting Domain

The most identified facilitators and barriers were mapped to the Inner Setting domain, a total of eleven constructs, with some themes categorised as both facilitators and barriers (Figure 6.2 below). The Inner Setting domain was described as where the innovation was trialled, i.e., in this research, stroke rehabilitation centres.¹⁴⁴ The most frequently mapped constructs, 'Compatibility', 'Relative Priority', 'Culture' (& the sub-construct 'Recipient Centredness'), 'Structural Characteristic' (& the sub-construct 'Works Infrastructure'), 'Available Resources', and

'Communication' have been explained in detail below.

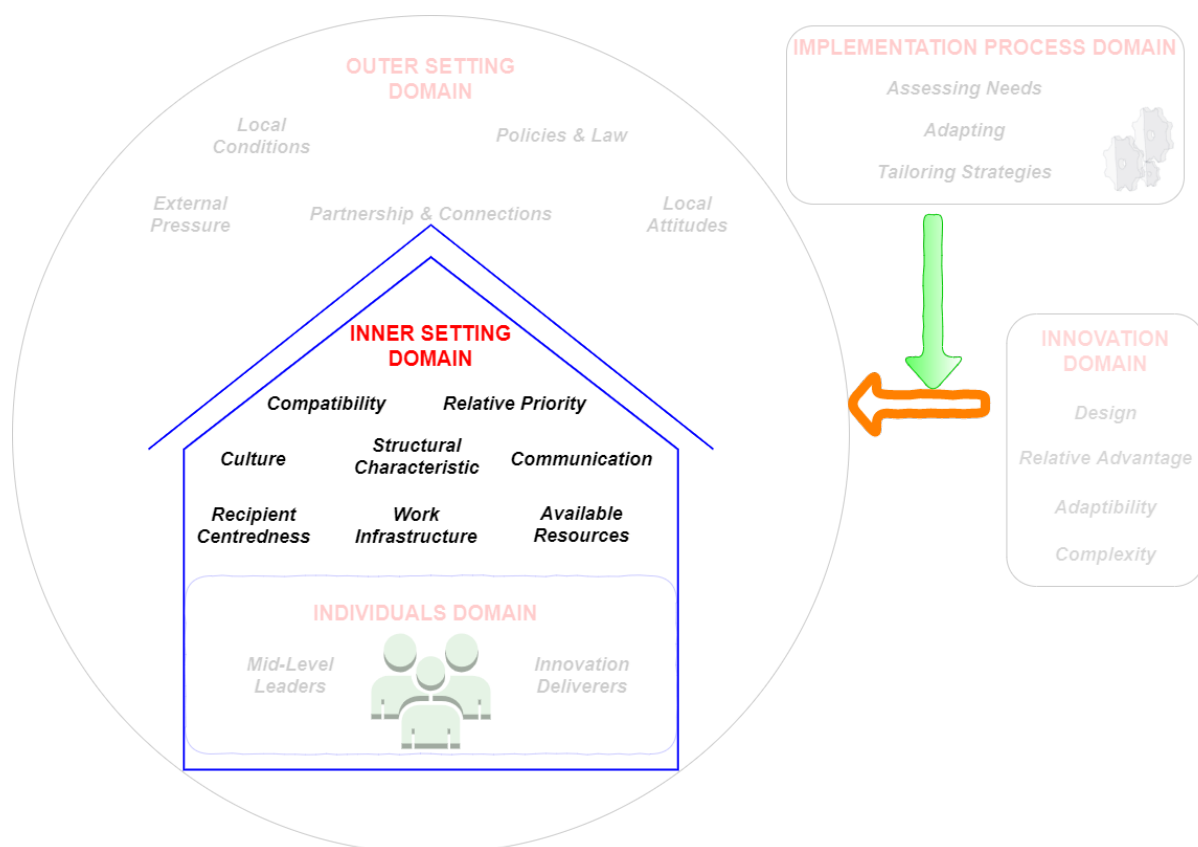


Figure 6.2 Summary of the constructs mapped to the CFIR - Inner Setting Domain across seven CoCE criteria.

6.4.1.1 Compatibility

All seven criteria were identified as compatible with the centre's current workflow and processes.

Participants reported that the indicators, particularly those within Criterion 1 (Optimal Outcomes) were well used within their practice:

"I think [Criterion 1] is embedded into our practice in a lot of the disciplines. So we've got discipline-specific outcome measures, procedures, protocol that is the expectation of staff to do when they're rotated, it's including orientations for most disciplines." (Metropolitan Australia)

Additionally, participants also reported that regular opportunities were available to complete research or quality improvement projects, either through formal processes or informally through encouragement from senior staff. This was either through research activities:

“The research [Criterion 2] is quite accessible at the University Hospital in general and compared to other hospitals.” (Sweden)

“We regularly attend conferences [Criterion 2], and often as a team with aim to present in conference.” (Metropolitan Australia)

or quality improvement projects:

“Quality improvement [Criterion 2] is included in the job description but no specifics about research.” (Regional Australia)

“[Quality improvement – Criterion 2] done regularly from database however no set program just strongly encouraged by seniors.” (Metropolitan Australia)

Centres also regularly collaborated with universities for research projects:

“Our hospital is the affiliated hospital of We clinicians and physios undertake some teaching tasks. We are also tutors of university students. We can use ... university library to search data.” (Criterion 2, Regional China)

“Hospital belongs to ... University therefore there is a lot of collaboration between this hospital and around China. It might be a little personal because the collaboration is based on someone’s project” (Criterion 2, Metropolitan China)

The participants from some centres reported the data was easily identified and collected against some criteria and indicators due to the current structure in place:

“Do well in [virtual communication] as “we are a country site therefore provide a lot of services to other areas.” (Criterion 3, Regional Australia)

“I found these criteria [Organisational processes and systems] relatively easy to check because we have many of those organisation structures just because we are a university hospital. Those structures and their organisation is roughly in place and are positive, it is also in the university hospital’s mission. It is the patient work, clinical work, research innovation and teaching.” (Criterion 2, Sweden)

“[Support for offsite education] is encouraged and requirement at the hospital that certain amount of money have to set aside for staff development.” (Criterion 6, Sweden)

In contrast, participants from Regional China reported that evidence for some criteria were not easily collected evidence because the indicators were not relevant due to the current system in place:

“[Mechanisms to gain feedback about leaders and assess leadership] No, the only way to assess the leader’s leadership is how the leader leads us to make a profit. Most of the mechanisms of assessing leadership is confidential.” (Criterion 5, Regional China)

“[Processes that facilitate ongoing communication with key stakeholders] no formalised process [available] to facilitate communication [with key stakeholders] – it is general knowledge.” (Criterion 7, Regional Australia)

Additionally, two out of three indicators from the Knowledge Exchange category in Criterion 4 (Knowledge Exchange and Mentorship) were well established within all the centres, with participants describing various modalities and collaboration to exchange knowledge within the centre and program.

6.4.1.2 Relative priority

All centres identified that time was not allocated for research, with participants from Regional Australia and Sweden indicating that clinical tasks take precedence over research tasks. Therefore, there was limited information and opportunities to participate in research:

“In daily clinical work, these activities [research – Criterion 2] are unfortunately quite often down [less] prioritised prior [compared to] clinical work” (Sweden)

“Research [Criterion 2] is not necessarily a priority compared to clinical – use more QI and that is more important” (Regional Australia)

“[Criterion 2 – Allocated research time] No, we don’t have such a thing. Everyone just has to use their spare time” (Metropolitan China)

The participants from Metropolitan Australia reported that patient-reported outcomes in Criterion 1 were not a priority:

“It’s vague more because...[we’re] not good at patient-reported outcome...I’m sure there are centres that concentrate a lot on patient-reported outcome that would know exactly what this is about. So I think that’s more of a reflection on us as a unit rather than it shouldn’t be measured.” (Metropolitan Australia)

Additionally, participants from Metropolitan and Regional China reported that all clinicians, especially senior clinicians, were required to undertake research tasks as part of employment and career development:

“For one thing, clinicians and physios are more involved in the research work, because they must publish papers or attend research projects for their professional title evaluation.”
(Criterion 2, Regional China)

6.4.1.3 Culture & Recipient – Centredness

Culture refers to the organisational culture that influences the employees and their environment.¹⁴³ Culture was a commonly identified facilitator when collecting evidence on Criteria 2 (Research Culture) and 3 (Interprofessional Working and person-centred rehabilitation). This construct captures a centre's values and norms that align with the indicators. Participants from Metropolitan and Regional China described a daily routine that was part of their work culture for sharing information with all health professionals:

“We have shift handover every morning. Nurses and physios attend. Weekly meeting that all the doctors and therapist will attend, we will communicate patient’s detailed information.”
(Criterion 3, Metropolitan China)

Similarly, participants from Sweden described inter-professional working as:

“The foundation of how we work—it is a team, with the team and with the patients and their relatives.”

The sub-category ‘Recipient-Centeredness’ was identified in four out of seven criteria. This construct explores the needs of the recipient. The participants from Sweden reported that while family is important for support in Swedish culture, family members are not considered to be carers. They highlighted how the role of families is considered in their plans for discharge.

“[Criterion 3] ...importance of relatives and family, we would not involve them to be actual caregivers. They are important but in a different way. They support more mentally or more psychologically or as a partner or whoever but role in their family role and not the carer.”

6.4.1.4 Structural Characteristic & Work Infrastructure

The participants’ responses regarding their centres’ documentation systems, staffing levels, and workflow processes were mapped to this construct. The identified themes were all barriers. Routine protocols and documentation systems currently in place affected the trialling of the

indicators at all centres:

“[Rehabilitation Intervention – Criterion 1] We don’t deliberately collect the indicators separately. It is covered in medical documentation.” (Metropolitan China)

“[Systems to support staff to take up global leadership roles – Criterion 5] – Not encouraged through work processes, [it is] personnel-driven. There are no systems in place to access through work.” (Regional Australia)

6.4.1.5 Available Resources

Facilitators were not identified for this construct. A lack of resources (time, personnel, funding) was reported to be a barrier to collecting evidence for the indicators in almost all (six of the seven) criteria:

“No system and resources available to document each indicator – time utilised for clinical work, even if indicators are important and relevant.” (Criterion 1, Regional Australia)

“Protected time for knowledge exchange and mentorship? [Criterion 4] – None allocated within work hours – expectation to be completed outside work hours or during however it is relevant to be included as indicator.” (Metropolitan China)

“[Allocated research time – Criterion 2] No, we don’t have such a thing. Everyone just has to use their spare time” (Metropolitan China)

This construct was sometimes mapped together with the ‘Relative Priority’ construct because resources were prioritised to the most important responsibilities. For example, clinicians prioritise clinical work over research due to their limited time to complete their tasks; therefore, a lack of resources influences the priority of services.

6.4.1.6 Communication

This construct is used to explore information sharing in the Inner Setting domain and was mapped across six out of seven criteria as a barrier when trialling the indicators. This was mainly related to a lack of documentation or familiar tools to collect/ share information to enable ease of data collection against the indicators.

“[Criterion 7 - Advocacy] Not formalised process to facilitate communication – it is general knowledge.” (Regional Australia)

6.4.2 Innovation Domain

The Innovation domain explores the innovation (i.e. the criteria and indicators) that were being trialled at the centres.¹⁴⁴ Within this domain, the facilitators and barriers were mapped to four constructs across all seven criteria: ‘Design’, ‘Adaptability’, ‘Relative Advantage’ and ‘Complexity’ constructs (Figure 6.3 below).

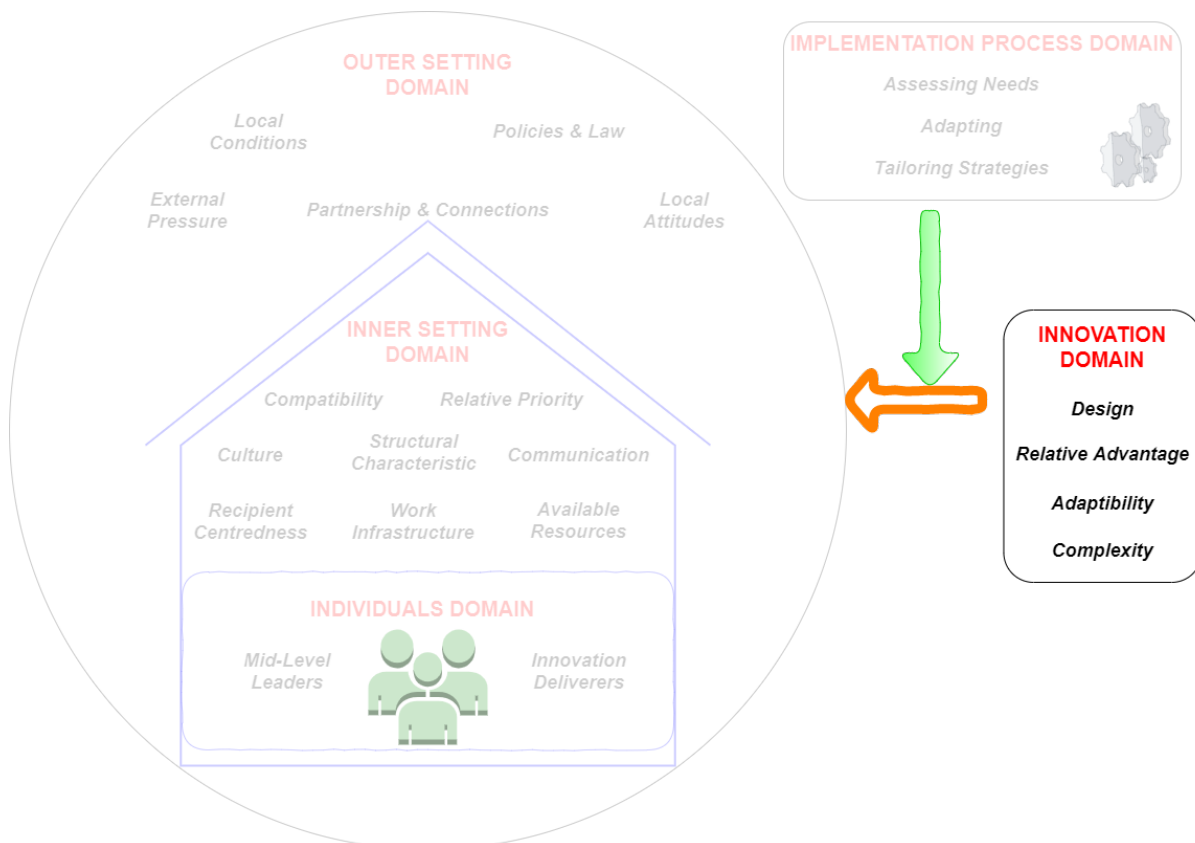


Figure 6.3 Summary of the constructs mapped to the CFIR - Innovation Domain across seven criteria.

6.4.2.1 Design

The design of all seven criteria and numerous indicators were identified as either a facilitator or barrier, or both. This construct includes how the innovation was created and presented. The participants recognised that the indicators in Criteria 1 and 4 were well presented; therefore, it was easier to seek information, and also identified that it integrated well at the centre:

“Clinical measures are fine, [easy to understand]” (Criterion 1, Metropolitan Australia)

While, some centres understood the indicator (as quoted above), others had difficulty (as below).

“Does patient-reported outcome [Criterion 1] refer to the quality of life, function status and fatigue and pain? We use quality of life score, numerical rating scale to evaluate pain.”
(Regional China)

Unclear terminology or complex wording was identified as a barrier to collecting information against indicators in all the criteria. The most common feedback was that the indicators needed refining to improve the ease of understanding, so information could be easily collected:

“[Commitment to recruitment of the best staff – Criterion 5] - Best? Do you really need this question? Would we answer no here? Don’t see the point in this question - They may have different opinions about what’s best for the organization, because whether you look at in your own domain, or take helicopters with perspective and need to ask the questions differently – as you won’t get anything from this question otherwise.” (Sweden)

“We discussed the meaning of culturally safe care provision and equal rights – should be explained more and what information required with an example as it will differ a lot in different countries. I am thinking man, woman, sex, ethnicity, religion.” (Criterion 3, Sweden)

“Who is a carer? – we distinguish as next of kin, family and carer – what do you mean? You mean someone who actually performs care daily activities for another person? Or do you mean someone who lives in the same household?” (Criterion 1, Sweden)

“Confused about the difference between clinical measures and patient-reported outcomes.”
(Criterion 1, Metropolitan China)

Other indicators were described as vague, and participants were unsure how the evidence of meeting the criteria could be provided:

“Vague” cultural evidence [Criterion 3] as it is more in practice than documentation... Quite vague, some of that valued and respected and that culture stuff is harder to provide evidence for because we know we do it.” (Metropolitan Australia)

[Input from each team member is respected and valued – Criterion 3] “Not sure how to answer – vague question and how do document this?” (Regional Australia)

Difficult to distinguish the difference between Indicators ‘formal interdisciplinary mentorship program for individual clinicians’ and ‘formal mentorship program for clinical centres.’
(Criterion 4, Sweden)

Furthermore, feedback was received that some indicators were described using unfamiliar

terminologies, particularly in countries where English was not the primary language:

“Depends on patient. We don’t use the word optimal outcome [Criterion 1]. We just do our best with the patient. Maybe the patient wants to be more able to look after themselves or hand function. If we can do that, maybe that’s the optimal outcome for us” (Metropolitan China)

“We don’t know what 360 [degree feedback – Criterion 5] means – you have a lot of examples, but we don’t know what it means. If you are doing this internationally, it is not clear. I am convinced we have this, but your questions were not very clear to us.” (Sweden)

“What are in-services? [Criterion 6] – Not a terminology used in China” (Regional China)

Participants from Sweden identified no barriers when gathering evidence on some indicators because they recently submitted similar evidence for the Commission on Accreditation of Rehabilitation Facilities (CARF). However, while the participants reported they had the evidence available, they were not sure if the evidence fit for the indicators due to ambiguity and unfamiliar terminology used. The centre from Metropolitan Australia also reported that the indicators were ambiguous and needed clarification:

“And if you were to reformat this document to try to differentiate and maybe give example to differentiate between patient-reported outcome versus patient-reported experience [Criterion 1].” (Metropolitan Australia)

Two criteria (Criterion 5: strong ethical and value-based leadership; Criterion 7: advocacy and promoting equitable access) and their underpinning indicators were particularly unclear to participants. All centres reported that the indicators were vague and could not ascertain whether they were relevant to their centre. Some indicators described a broad range of evidence. For example, the statement for leadership in Criterion 5 was reported to be ambiguous, and a clearer definition was needed to determine the type of leadership included in the indicators:

“We have group leader, sector leader and hospital leader – so we don’t know which one you mentioned here. Needs to be clearer” (Regional China)

Additionally, the participants identified overlapping indicators either within or between criteria,

which was a barrier to collecting relevant information for Criteria 3,4 and 6:

“Criteria 4 is more the clinical exchange or collaboration or the research because we have talked about the research collaboration already in the earlier points. Is there any difference between clinical collaboration and research collaboration? We thought this is something we already discussed and already answered – so it needs to be differentiated it much more” (Criterion 4, Sweden)

“Receiving education [Criterion 6] were covered in other criteria” (Metropolitan Australia)

“Collaborative goal setting [Criterion 3] – covered in the first criteria.” (Metropolitan Australia)

6.4.2.2 Relative Advantage

The relative advantage construct was used when the innovation was better than the current processes in place. The participants from some centres reported that some of the indicators within Criterion 1 were more important than routinely collected data at their centre; for example, the information from patient-reported experience was noted to be more valuable than the information from patient-reported outcomes:

“We probably don't have too many patients reported outcomes [Criterion 1] measures, but the [patient reported] experience seems a bit more valuable.” (Metropolitan Australia)

6.4.2.3 Adaptability

This construct was identified in all seven criteria as either a facilitator and/or barrier to assess whether the indicators were adaptable to the centres. Participants from Sweden and Regional Australia indicated that some indicators in Criterion 3 were adaptable to the current processes at their centres:

“[Indicators] goes under the CARF for accreditation. Here I think we are quite good, by individual planning meetings of care/rehab with patients and family and team. Individual meetings with doctor, nurse, and patient responsive health professional (not always family.)” (Criterion 3, Sweden)

“Do well in virtual communication [Criterion 3] as we are a country site therefore provide a lot of services to other areas.” (Regional Australia)

Comparatively, feedback was also received that selected indicators within the criteria were not

relevant to the health centre:

“[Service outcome – Criterion 1] don’t have anything like that. How long [patient stay in rehabilitation] depends on their need and gain and development in the time period. Clinical estimate using technical experience. I think the Functional Independence Measure is underused.” (Sweden)

“No length of stay for patients – sometimes they can stay up to half a year in the hospital.” (Criterion 1, Regional China)

“[Culturally safe care provision – Criterion 3] - They don’t care about this and asked my leader, and they don’t know anything.” (Regional China)

“[Culturally safe care provision – Criterion 3] - I don’t think we are required by law. It is a natural process, we don’t discuss it.” (Sweden)

6.4.2.4 Complexity

This construct was mapped as a barrier in six out of seven criteria. Some participants reported that the indicators or the mechanism to achieve the indicators were complex; therefore, obtaining evidence for these indicators was challenging:

“No, the only way to assess the leader’s leadership [Criterion 5] is how the leader leads us to make a profit. Most of the mechanisms of assessing leadership is confidential.” (Regional China)

6.4.3 Implementation Process Domain

Four constructs were identified as barriers in this domain: ‘Assessing Needs’, ‘Adapting’, and ‘Tailoring Strategies’ (Figure 6.4 below). This domain identifies the factors or strategies that were used to trial the criteria and indicators at the stroke rehabilitation centres.¹⁴⁴ The ‘Assessing Needs’ and ‘Adapting’ constructs were identified across all the criteria, while ‘Tailoring Strategies’ was identified as a barrier for some criteria.

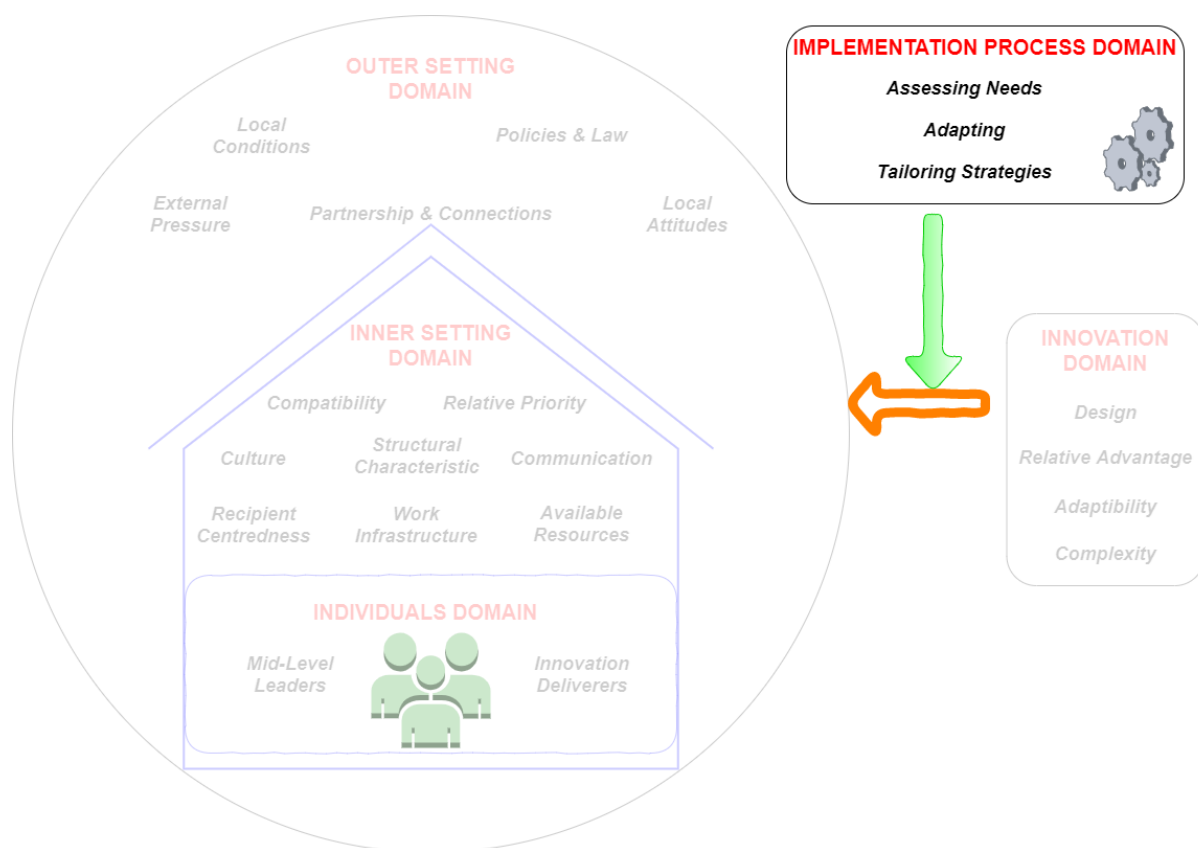


Figure 6.4 Summary of the constructs mapped to the CFIR – Implementation Process Domain across seven criteria.

The construct ‘Assessing Needs’ was mapped across all the criteria with common feedback that the indicators needed to reflect the participant' priorities, preferences and needs during the trialling process.¹⁴⁴ Participants from the centres reported that trialling of these indicators was not a priority compared to clinical work, therefore the data collection was influenced by their limited resources:

“No system and resources available to document each KPI – time utilised for clinical work, even if KPIs are important and relevant.” (Criterion 2, Regional Australia)

Working in conjunction with this construct is the ‘Tailoring Strategies’ which explores the strategies used in the trialling process to reduce the barriers. Five of seven criteria were mapped to this construct as a barrier because the indicators needed additional information to support data collection:

“[Criterion 2- A recognised pathway or strategy to implement research into practice] Yes, it would be better to give an example to illustrate” (Metropolitan China)

“[Indicators within Criterion 7] is not very clear – need more explanation or different wording or example.” (Metropolitan Australia)

In addition to the centres’ priorities and preferences, the indicators were explored from the perspectives that they were adaptable to fit into the centres’ current systems and processes. The ‘Adapting’ construct was mapped to all the criteria, and the participants from the centres reported that the indicators should be flexible and, adapting to the current workflow was deemed crucial to ensure that evidence could be collected against the indicators:

“No system and resources available to document each indicator – time utilised for clinical work, even if indicators are important and relevant.” (Regional Australia)

“We discussed the meaning of culturally safe care provision and equal rights [Criterion 3]. We made a greater inclusion in that” – should be explained more and what information required with an example as it will differ a lot in different countries. I am thinking man, woman, sex, ethnicity, religion.” (Sweden)

6.4.4 Outer Setting Domain

Six constructs were identified within this domain: ‘Local Conditions’, ‘Policies & Laws’, ‘External Pressure’, ‘Partnership & Connections’, and ‘Local Attitudes’ (Figure 6.5). This domain includes the system from the Inner Setting (e.g., stroke rehabilitation centres) and explores the influence of the external environment on the criteria and indicators.¹⁴⁴

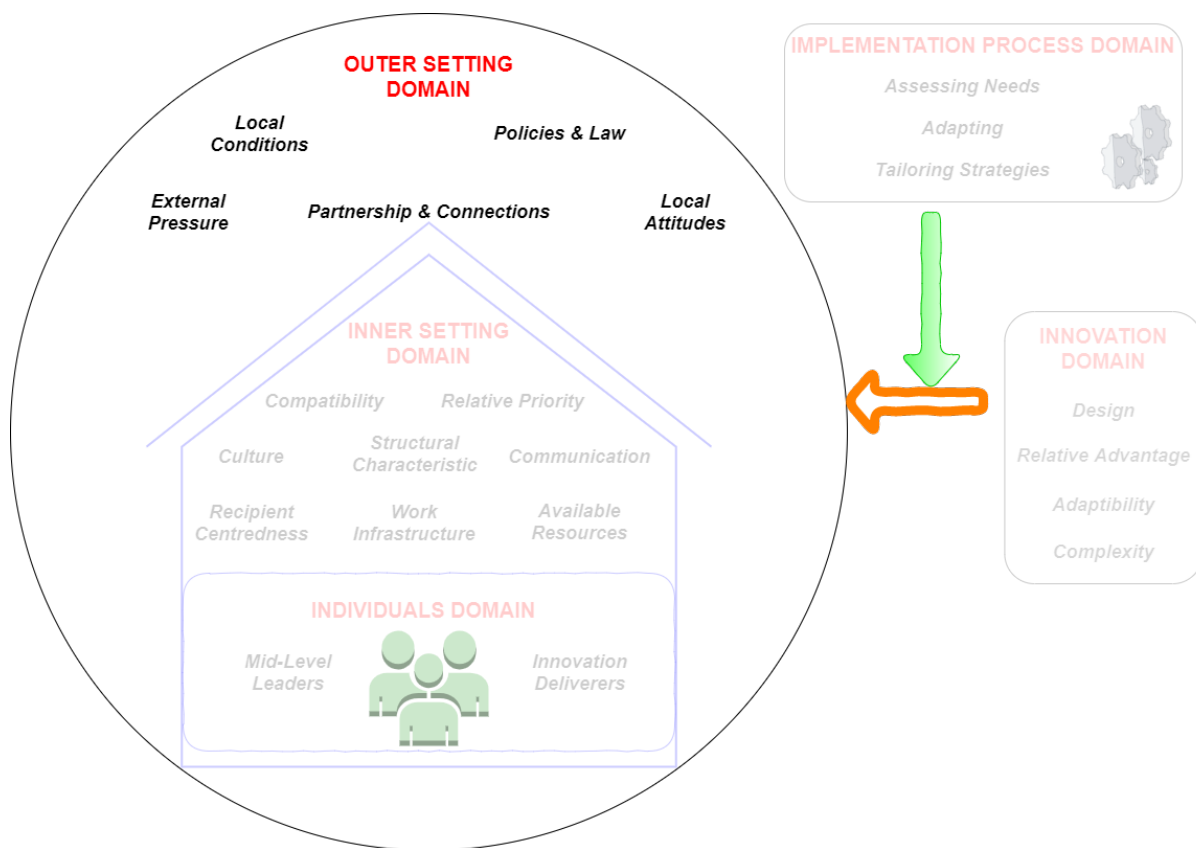


Figure 6.5 Summary of the constructs mapped to the CFIR - Outer Setting Domain across seven criteria.

The participants reported that trialling and collecting evidence against the indicators were impacted by the current systems and processes in place, external to the rehabilitation centres. This theme coded to the 'Local Conditions' (for two of seven criteria) and 'Policies & Law' (in all the criteria) constructs. Participants from Regional Australia recognised that evidence for some indicators was not commonly documented and could not be collected using their current systems. However, the recent shift towards electronic medical records enabled more thorough information documentation and easier access, facilitating the evidence collection for the indicators. Participants from Sweden also discussed the pre-existing structure that assisted with data collection:

"I found these criteria [Criterion 2] relatively easy to check because we have many of those organisation structures just because we are a university hospital."

While the participants from Sweden reported the connection with external organisations to be a facilitator, participants from other centres reported this as a barrier. This barrier can also relate to the constructs 'External Pressure' and 'Partnerships & Connections'. These constructs are coded together as the pressures are from external connections (i.e. university), which can impose different pressures and expectations, which can shift the priority of a service. For example, the participants from Metropolitan China stated that systems and processes influenced by external bodies impacted their ability to collect evidence:

“[Organisations and systems to proactively support patient and family involvement in rehabilitation journey – Criterion 3] If you want to give advice to patient through phone or far distance, then we don't have a policy that encourage us because we can't charge fees for that and no standard. Maybe it is more government problem if we want to ensure the patient gets more consistency in their treatment.” (Criterion 3, Metropolitan China)

An aligned barrier was the lack of partnership with other external groups which also influenced data collection for some indicators (e.g. Criterion 2: Research collaboration with other national and international centres).

Finally, the 'Local Attitude' construct was coded to five of seven criteria. This refers to the cultural norms and beliefs of the local community (external to the rehabilitation centres) that aligned with the criteria and indicators when trialled at the centres. This ties in with other coded constructs explored above within the Outer Setting domain. The examples below demonstrate how local beliefs and views could influence care provided, thereby affecting data collection for particular indicators, i.e. equitable access, Criterion 7:

“Not fair and equitable in my hospital (Criterion 7) – because we have 90 beds, but most of the are occupied. Some patients take priority, especially within sector. The clinicians will select who will receive treatment in our sectors” (Regional China)

“What do you mean by equitable access of stroke rehabilitation...We also have 'VIP' with higher priority, [other patients] will receive same treatment but may not be same quality.” (Criterion 7, Metropolitan China)

6.4.5 Individuals Domain

This domain identifies the roles and characteristics of individuals that impact on providing evidence on the indicators.¹⁴⁴ Only two constructs were identified in this domain: ‘Innovation Deliverers’ and ‘Mid-level Leaders’ (Figure 6.6 below).

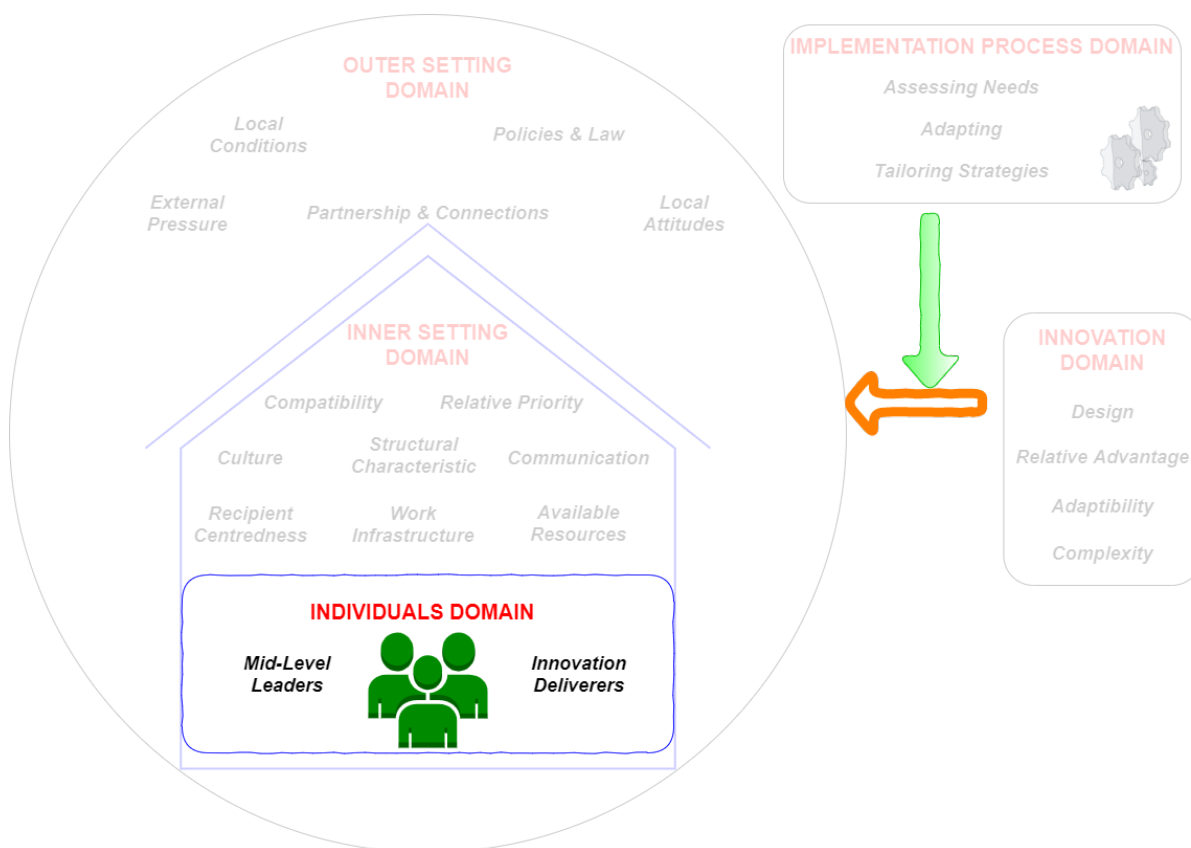


Figure 6.6 Summary of the constructs mapped to the CFIR - Individuals Domain across seven criteria.

Both these themes were identified in Criteria 1 and 3, respectively. The ‘Mid-level Leaders’ referred to individuals in leadership positions responsible for data collection on the indicators, and the ‘Innovation Deliverers’ were individuals who were responsible for using the indicators. Despite having tools and systems to collect evidence against the indicators, participants from the centres reported that the tools were not being utilised therefore, no data were collected for certain indicators:

“No ambulatory feedback [on patient-reported outcome measures – Criterion 1], but the tool

is available.” (Regional Australia)

6.5 Impact Health Service Provision

6.5.1 Adaptability to the Healthcare Model

Participants from Metropolitan Australia reported that the indicators fitted quite well within the current healthcare system. They related this to Australia's versatile healthcare model, which focused on different aspects of stroke rehabilitation, such as patient experience, research funding, and staff development:

“I think it fits in quite well. Yes, in Australia, we're very spoiled with funding for health.”
(Metropolitan Australia)

Conversely, participants from Regional Australia stated that geographical location impacts funding availability and allocation, especially for research and education opportunities. The participants stated that being in a regional area had an impact on opportunities to attend professional development and funding for research projects, both of which were limited. This potentially affects the centre's ability to meet all the indicators and criteria for the designation as a Centre of Clinical Excellence, which implied that the indicators were not as adaptable to the healthcare service in regional services:

“Country sites don't receive funding for research and none of them will be considered stroke centres because there are no funding for research like metro site.” (Regional Australia)

Participants from Sweden, Metropolitan and Regional China reported that most indicators were relevant to their health services. Metropolitan and Regional China reported that some indicators were difficult to obtain due to a lack of transparency and restricted access to information:

“It is impossible for me to ask my leader how to evaluate their leadership – we don't have right and some things are confidential” (Regional China)

6.5.2 Impact on the Current Rehabilitation Service

Metropolitan and Regional Australia participants recognised that being involved in this research

had highlighted gaps in the current service that could be addressed. The participants also reported that the indicators could be used to measure and improve their services and the outcomes for stroke survivors and families. For example, patient experiences were not formally collected, and tools to initiate the process were not available. Therefore, the team reported actively seeking support to change this practice to include this indicator within the service:

“Well, you've prompted us to check patient experience outcome. Yeah, which we hadn't formalized before. And that's probably one of the most important things.” (Metropolitan Australia)

Similarly, participants from Metropolitan and Regional China reported that they were interested in investigating and adapting relevant and useful aspects of some indicators that were not currently being collected:

“Indicators that we don't use in our routine work, we will consider to document more regular or officially.” (Metropolitan China)

The five centres perceived the indicators' usability both positively and negatively. They observed that the indicators fit well within the healthcare service and, to a certain extent, the healthcare model. Conversely, the centres reported that resource limitations influenced indicators' usability within the centres.

When asked about how the indicators may change their current rehabilitation services, most centres identified gaps within their service that could be improved by adapting their practice to align with the indicators, except for one centre (Sweden) that reported these indicators will not impact current rehabilitation services. Participants from Sweden indicated that these criteria and indicators would not change the current service provision, especially with the current CARF accreditation process, which is comprised of similar requirements. However, these indicators are a good reminder of the accreditation requirements that need to be met:

“I don’t think it is going to change anything but it was good to see because we had CARF accreditation a few months earlier so we already gone through most of these questions.”
(Sweden)

6.6 Drivers for Rehabilitation Centres Seeking Recognition as Centres of Clinical Excellence

When asked about the reasons for identifying as a Centre of Clinical Excellence (CoCE), the participants highlighted similar reasons for the centre’s rehabilitation service standing out from customers’ perspectives. The participants from Metropolitan Australia reported that the centre’s achievement should be promoted, and achieving the status of a CoCE will display this:

“That looks good for patients as well, saying that they're receiving rehab at a centre for excellence... If you're going to receive good rehab, you're going to have better rehab. So, like building that trust with them quickly.” (Metropolitan Australia)

Participants from Regional Australia reported that the CoCE label will attract more resources, promoting higher quality rehabilitation services in the regional areas:

“You would get higher quality services, due to meeting all the criteria therefore will have better resources. But you need everything that comes with it to meet the indicators.”
(Regional Australia)

Metropolitan and Regional China participants reported that identifying as a CoCE could set a standard within the health system to attract more patients and provide the best clinical outcomes. Participants from Sweden identified that it was important to have goals to strive for, and labelling as a CoCE will encourage the centre and team to strive to meet all the standards and encourage competition to be the best in service delivery and patient outcomes:

“Proudness – Competition – Goals to strive for – have good internal standards for ourselves”
(Sweden)

6.7 Chapter Summary

This chapter explored the emerging patterns and commonly identified themes using Framework Analysis and coded them to CFIR. The constructs that were frequently coded, which investigated

the influences from the rehabilitation centres' perspectives (Inner Setting domain), the design of the indicators (Innovation domain) and the policies surrounding the rehabilitation centre (Outer Setting domain). It also explored the participants' perceptions of the criteria and indicators and how they influence current practice. The participants from the centres reported that while all criteria and indicators were highly relevant, some indicators were ambiguous and overlapped and they did not have systems to collect evidence for every indicator. The next chapter (Discussion), will triangulate, interpret and discuss the results from Chapters 5 (Descriptive Results) and 6 (Thematic Analysis).

CHAPTER 7: DISCUSSION

7.1 Chapter Overview

This research was designed to trial and evaluate the criteria and indicators of Centres of Clinical Excellence (CoCE) at national and international healthcare centres that provide stroke rehabilitation. Following on from the last two results chapters, this chapter draws together and discusses the findings from Chapter 5 (Descriptive Analysis) and Chapter 6 (Thematic Analysis) and contextualises these with current literature (Chapter 2) and the literature review (Chapter 3).

This chapter is structured to:

1. Discuss how the outcomes from the scoping review (Chapter 3) guided the main research, in addition to summarising the main findings from Chapter 5 and Chapter 6.
2. Discuss the factors that influenced the data collection against the indicators.
3. Discuss the usability of the criteria and indicators.
4. Explore the macro (CFIR: Outer Setting), meso (CFIR: Inner Setting) and micro (CFIR: Individuals) systems and how this influences the use of the indicators.
5. Discuss how application and perceptions of the criteria and indicators differ between countries, within a country and in comparison, to other established CoCE from the current literature.
6. Discuss the strengths and weaknesses of this research.

And answer the following research questions:

- What elements influenced the data collection against the indicators at the stroke rehabilitation centres?
- What drives healthcare centres to seek recognition as CoCE in stroke rehabilitation?

7.2 Summary of Findings

7.2.1 Scoping Review on Centres of Clinical Excellence (Chapter 3)

While the aim of this research was to trial and evaluate the criteria and indicators at stroke centres globally, it was imperative to identify how CoCE were defined, measured and evaluated in

other clinical settings. To achieve this, a scoping review was completed before commencing the primary research and has been presented in Chapter 3. The scoping review highlighted that there were marked inconsistencies in how the CoCE were defined, and an absence of clear and transparent criteria and processes used to identify or establish, monitor, and evaluate CoCE. Additionally, the review found that there was no published literature that described a CoCE in a stroke rehabilitation setting. This underscores the importance of this research in defining the criteria and indicators of aspirational CoCE in Stroke Recovery and Rehabilitation. The findings from this scoping review were considered when the criteria and indicators were trialled at the stroke centres globally and assisted with the evaluation of this research.

7.2.2 Outcome from the Descriptive Analysis (Chapter 5)

The responses from the survey and interviews were descriptively analysed to record whether data were collected against the indicators and, if so, what information was collected to demonstrate the performance of the indicators. Overall, the number of centres were able to show evidence for most of the indicators within 'Optimal Outcome' (Criterion 1), 'Interprofessional Working' (Criterion 3) and 'Education' (Criterion 6). The least collected data were for indicators for 'Research Culture' (Criterion 2), 'Leadership' (Criterion 5) and 'Advocacy' (Criterion 7). In 'Knowledge Exchange' (Criterion 4), most centres collected data against the Knowledge Exchange category, but very few collected data for the 'Mentorship' category. The centres reported that processes to gather information on the criteria and indicators were available; however, different elements influenced the data collection on the indicators at their centres. These elements will be discussed in this chapter from Section 7.3.

7.2.3 Factors that Influenced the Usability of the Criteria and Indicators (Chapter 6)

The interview responses were thematically analysed using Framework Analysis to identify the common themes on the usability of the criteria and indicators at the centres. The identified

themes were mapped to the CFIR domains: Innovation, Outer Setting, Inner Setting, Individuals, and Implementation Process. The recurring themes that were coded across the criteria were ambiguous terminology and overlapping indicators, which were mapped to the Innovation domain. The compatibility of the indicators with the current healthcare systems and the priority of the service and tasks also emerged as important themes and were mapped to the Outer Setting and Inner Setting domains, respectively. Lastly, the clinicians' knowledge of the processes used within the centre and the processes on how the criteria and indicators were trialled influenced the ease of use and were mapped to the Individuals and Innovation Process domains, respectively.

Table 7.1 below summarises the criteria, the relevant categories, and the participants' feedback from the centres. It highlights whether data could be collected for the indicators within each category, whether the categories and the underpinning indicators were important and if the indicators within the categories required revision for clarity. 'Partial' has been used when data was not collected for more than half the indicators within the category.

Table 7.1 Overall summary of criteria, relevant categories and participant's feedback on data availability, the importance of the indicators and if the indicators/categories needed revision for clarity.

Criterion	Categories encompassing the indicators	Data available	Important/ Relevant	Clear
Criterion 1: Optimal Outcomes	Optimal outcomes	✓	✓	✓
	Delivery outstanding rehabilitation	✓	✓	✓
Criterion 2: Research Culture	Organisational processes and systems	Partial	✓	✓
	Formalised links with external agencies	✓	✓	✓
	Staff expertise and culture	✗	✓	✓
Criterion 3: Interprofessional Working	Organisations and systems to proactively support patient and family involvement in the rehabilitation journey	✓	✓	✗
	Systems to support coordinated inter-professional teamwork	✓	✓	✓
Criterion 4: Knowledge Exchange	Knowledge exchange	Partial	✓	✓
	Mentorship	✗	✓	✗
Criterion 5: Leadership	Development of workforce and leadership	Partial	✓	✓

Criterion	Categories encompassing the indicators	Data available	Important/ Relevant	Clear
	Leaders engaging with key stakeholders	✗	✓	✗
	National/ international leadership	✓	✓	✓
Criterion 6: Education	Receiving education	✓	✓	✓
	Delivering education	✓	✓	✓
Criterion 7: Advocacy	Processes that facilitate ongoing communication with key stakeholders	✓	✓	✓
	Equitable access of stroke rehabilitation	✗	✗	✗
	Regular advocacy and outreach activities	✗	✗	✗

7.3 Commonly Used Criteria and Indicators

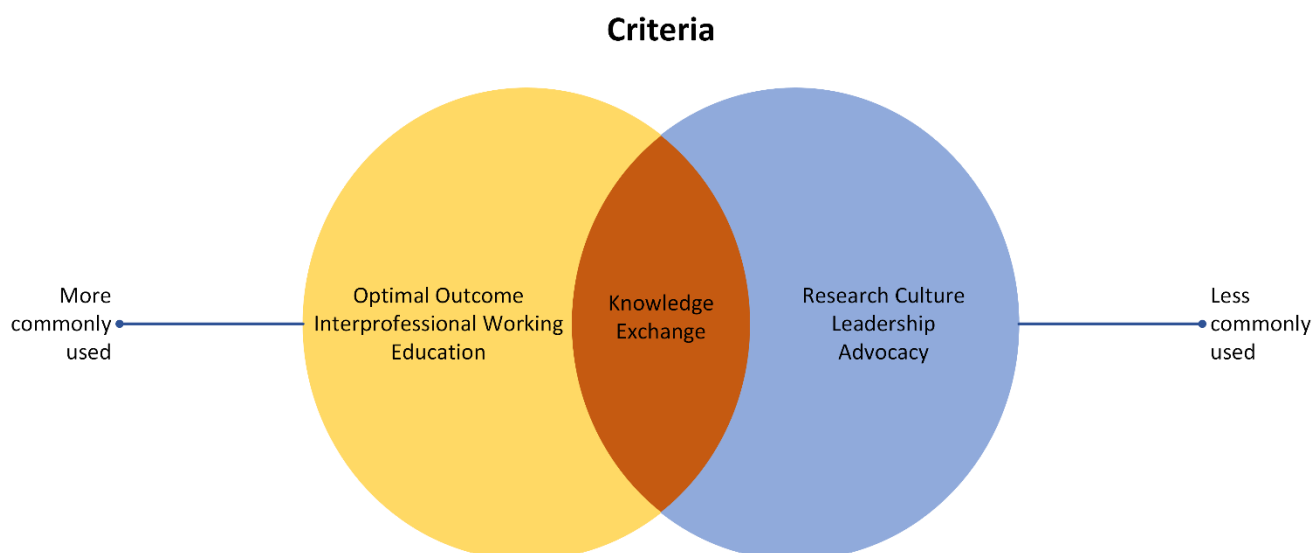


Figure 7.1 Commonly and less commonly used criteria.

Participants from the centres deemed all seven criteria identified by the Expert Working Group⁸ were valuable in establishing an aspirational CoCE in stroke rehabilitation. ‘Optimal Outcomes’ (Criterion 1), ‘Interprofessional Working’ (Criterion 3) and ‘Education’ (Criterion 6) were perceived as more usable by the centres because current data recording systems facilitated the collection of information against most of the indicators within these criteria (Figure 7.1).

Participants from every centre identified data collected against the indicators from the optimal outcome and delivery of rehabilitation categories (Criterion 1), regardless of the centre's geographical region or socioeconomic status. This is not surprising, given that clinical outcomes were ranked the most important aspect of rehabilitation in a clinical setting by international research experts, clinicians and people with lived experience of stroke.⁸ Furthermore, the core business of rehabilitation centres are to provide recommended care and often governed by quality and safety accreditation standards, that require minimum standards for delivering safe, effective and patient-centred care.¹⁵⁹ Compliance with these accreditation processes is usually the prerequisite to operating a healthcare centre (or a stroke rehabilitation centre), thereby ensuring patients are receiving care that is of benchmarked quality.

National and international stroke bodies also recognise the importance of delivering high-quality rehabilitation to stroke survivors. For example, in 2014, the World Stroke Organisation developed a guideline and action plan with specific core evidence-based recommendations for clinical practice, including rehabilitation assessment, therapy requirements, and patient education.¹ Further, several countries (Chapter 2: Table 2.1) have developed stroke rehabilitation guidelines reflecting their unique healthcare contexts and priorities, often primarily focusing on clinical care provision that is aligned with the best clinical outcomes.

From a clinician's perspective, it was unsurprising that the data for indicators for the 'Optimal Outcomes' category were well documented because clinicians generally collect patient outcome data routinely as part of their assessment and ongoing management plan. These indicators align with both the primary priority of stroke rehabilitation centres and with the defining features of CoCE in other clinical areas that have been described in the literature, which were patient-centred care, encompassing timely access to care,⁷⁵ patient-reported outcomes,⁷⁵ and coordinated care.¹⁰² Patient outcomes and related information (e.g. goal setting, access to care) are also collected for

national stroke registries and auditing requirements and will be discussed in Section 7.5.1.1 below.

In addition to routinely monitoring and documenting clinical care delivery and optimal patient outcomes, most participating centres also demonstrated that they had systems and processes in place to build relationships between the clinicians in the rehabilitation team, stroke survivors, and their families/carers (Criterion 3). This is reassuring, given that interprofessional teamwork plays an important role in evidence-based stroke care by including and promoting holistic care, thereby providing efficient healthcare service.^{2, 160} Similarly, patient-centred or collaborative goal setting is an important aspect of rehabilitation that supports shared decision-making and can promote self-management skills.¹⁶¹ Centres reported that information sharing and goal setting (either during ward rounds or family meetings) were almost always provided to patients, and some centres also included their carers and families. Accordingly, the participants reported routinely performing and recording collaborative activities that could be used as evidence for this criterion. Demonstrating alignment between clinical excellence in different clinical areas, previous literature on CoCE has highlighted the importance of coordinated, interdisciplinary care,^{83, 102, 108, 116} and collaboration between clinicians to share knowledge.¹⁶²

Most centres collected data on 'Education' (Criterion 6), with participants from the centres stating that educational opportunities were widely available for staff. However, limited time and funding impacted the staffs' education uptake. High-quality stroke rehabilitation is recommended to have education systems in place for both patients and families as well as to improve clinicians' skill levels.² It is imperative in a stroke rehabilitation centre that centres provide support and training to stroke rehabilitation clinicians, as part of maintaining excellent evidence-based knowledge and skills to ensure the centre is serviced by specialised staff.^{84, 116} The limited resources identified by the centres reaffirm what has been described in the literature, wherein organisational practice barriers such as inadequate time, systems, and resources negatively affect education uptake or

delivery.^{163, 164} This is important to address because whether Centres provide dedicated time for staff education may discriminate between Centres that do and do not achieve recognition as CoCE.

The 'Education' Criterion was closely related to the 'Knowledge Exchange' criterion (Criterion 4). While the 'Receiving Education' category from the 'Education' criteria included pathways for higher qualification, as well as on-site and off-site educational opportunities, the 'Knowledge Exchange' category consisted of the time allocation to network and collaborate with other organisations. These indicators required further clarification during the trialling process to enable data collection, which will be discussed in the following section as part of the design. All centres generally were able to demonstrate activities in the 'Knowledge Exchange' category well. As continual education and knowledge plays an important role in the growth of clinicians, it would be valuable if a stroke rehabilitation centre has systems in place to ensure the rehabilitation staff met their professional development requirements, to enable evidence-based practice and ongoing growth in the professional capacity.²⁰ The importance of training and education^{84, 116} and networking with other centres to share experience¹¹⁶ were recognised as important features in CoCE described in the published literature.

Centres in this PhD research project did not widely collect data for the indicators in the mentorship category, the second category within Criterion 4. This was due to a reported absence of systems to promote mentorship within the centres unlike the stringent processes for knowledge exchange and continual professional development that were identified by participants. Mentorship can be integrated into development programs and staff training^{165, 166} and has been described as an important aspect of a CoCE to support the development of clinical skills and promote service growth and advocacy.¹⁶⁷ Highlighting the importance of mentorship through its inclusion as a criterion of a CoCE in Stroke Recovery and Rehabilitation can promote advances in stroke rehabilitation by ensuring systems are in situ at stroke rehabilitation centres to support

holistic excellence, encompassing staff skill development, service delivery, and community advocacy.

7.3.1 Why was less Data Collected on Some Indicators?

The centres inconsistently collected data for the indicators from 'Leadership' (Criterion 5) and 'Advocacy' (Criterion 7). With further exploration through the interviews, it was found that the participants questioned the relevancy of these indicators to a CoCE in stroke rehabilitation, and perceived that the indicators were less important (Figure 7.1 above). Other factors also influenced the usability of these indicators, including participants' limited knowledge and understanding of the healthcare systems, the current processes in place in their centres and the complexity of the terminologies used to describe the indicators.

In addition to the factors above, participants reported that they were uncertain about how 'Leadership' could be measured. Important feedback received from the participants was around the level of leadership. Participants wanted clarification on the level of leadership that was referred to by the indicators, as this would affect the type of data collected against those indicators. While the centres reported difficulty collecting data to demonstrate the indicators from 'Leadership' in this research, it was still identified as an important feature of a Centres of Excellence in a review conducted by Manyazewal.⁷ The role of leadership within a CoCE is to provide structure and support for staff, work with stakeholders to improve service, and establish processes to support sustainability.^{7, 109} Leadership encompasses many levels, from hospital directors to unit directors to informal opinion leaders, all of whom can influence staff morale and clinical service delivery.¹⁶⁸ Clinical leadership is crucial and entails different responsibilities compared to hospital leadership (e.g., team leader/manager). Moreover, clinical leaders are responsible for the decisions surrounding patient care pathways and clinical processes.¹⁶⁹ To address these challenges, future efforts could focus on developing clear and transparent metrics

to measure leadership across different levels of leadership, to align with overarching goals of CoCE.

Similar to the factors that influenced centres' ability to demonstrate 'Leadership', centres were unclear on how to collect data for the indicators in 'Advocacy'. Studies have shown that patient care can be greatly improved when clinicians are involved in patient advocacy, and a lack of advocacy can negatively impact service delivery.¹⁷⁰ Features of CoCE in other clinical areas include recruiting highly skilled staff,¹¹⁶ adopting equitable care, and focusing on patient access,⁹² which resonate with indicators from the 'Leadership' and 'Advocacy' criteria.⁷⁵ Therefore, more work is needed to determine how to demonstrate the achievement of these indicators in stroke rehabilitation settings.

The participants reported that while they agreed that research activity and culture (Criterion 2) were important, there was very little evidence collected against the indicators. All centres reported that there were opportunities for the clinicians to participate in local quality improvement activities and journal clubs, but there were limited resources and few systems in place to support clinicians' attendance at these activities. In general, most centres reported low levels of research activity due to external limitations or factors, such as a lack of resources (time, staffing challenges) and an imbalance in clinical and research priority. Barriers to research activity were most frequently observed in the centres from regional areas and low- to mid-socioeconomic status. These centres reported that clinical care tended to be prioritised over research activities unless it was part of an individual's job description. Similar barriers were cited in wider literature that resource-poor¹⁶⁴ settings and lack of processes¹⁷¹ in place negatively impact clinicians' abilities to participate in research and service improvement initiatives. Other studies on CoCE have described 'Research Culture' as an important facet of a CoCE.^{108, 116}

Healthcare inequities persist, particularly in rural and remote areas where access to quality services is often limited.¹⁷² Therefore, this highlights the importance of clinicians working in rural and remote areas having access to opportunities for professional development and engagement in clinical research, to enhance service delivery and patient outcomes.^{172, 173} Patients treated in research-active hospitals experience better clinical outcomes, including reduced mortality rates, hence, healthcare leaders and centres should recognise the importance of clinical research and actively support it to improve patient outcomes.¹⁷³ Fostering an active research-positive culture not only improves patient care but also boosts staff morale and retention.¹⁷⁴ Encouraging research participation across all healthcare settings, including rural areas, is vital to achieve equitable health outcomes nationwide.

7.4 Usability of Criteria and Indicators

Beyond the trialability of the criteria and indicators at the centres, the usability of the indicators was also explored in this research. The responses from the interview identified that the usability was influenced by ambiguous indicators (too specific or not specific enough), language (using terms that were not conventional), overlapping indicators (between the criteria or with other indicators), user fatigue (length of the criteria and indicators) and applicability to the centre.

The centres reported that some of the indicators were ambiguous or too broad. They required clarification from the PhD candidate on the definition of the indicators and requested that examples be included as a supporting document with the criteria and indicators. This feedback was also tied in with the language and terminology that were not globally applicable, which was seen as a barrier when trialling the indicators. It is important to adapt diverse and globally applicable terminology, because inconsistent and contradictory language and terminology can act as barriers in health research and implementation. Furthermore, a language barrier can hinder the understanding of the indicators, especially in countries that do not speak English as a primary

language.¹⁷⁵ Addressing the language barrier can improve the criteria and indicators' usability by ensuring simpler, more succinct, culturally appropriate language and terminology are used, without alternative meaning to describe the indicators.¹⁷⁶ In this research, steps were taken to translate the indicators for Chinese users, with the participants from both the centres from China reporting it was easier to understand the translated criteria and indicators. Thereby, translating them into other languages may also have been useful in assisting participants from other countries understand the terminology used for the indicators.¹⁷⁷

Finally, the participants advised that there were too many indicators, and some indicators overlapped with other indicators both within and between criteria. While the interviewed participants had the opportunity to seek clarification of the overlapping indicators, the participants responding to the survey did not. The survey participants suggested that some of the indicators had been answered in the previous questions.

Moreover, the number of indicators and lack of clarity between indicators may have led to user fatigue, which was reported and observed in the final interviews at several sites. The interviews were scheduled for 1 or 1.5 hours, run over four weeks, and the participants were asked to find information on each indicator outside this time. With hindsight, this was a substantial amount of work for participants. Comparatively, during an accreditation process, a longer preparation period (up to 12 months) is allowed for the hospital to prepare for the organisation-wide survey.

7.5 Interplay of Outer Setting, Inner Setting and Individuals

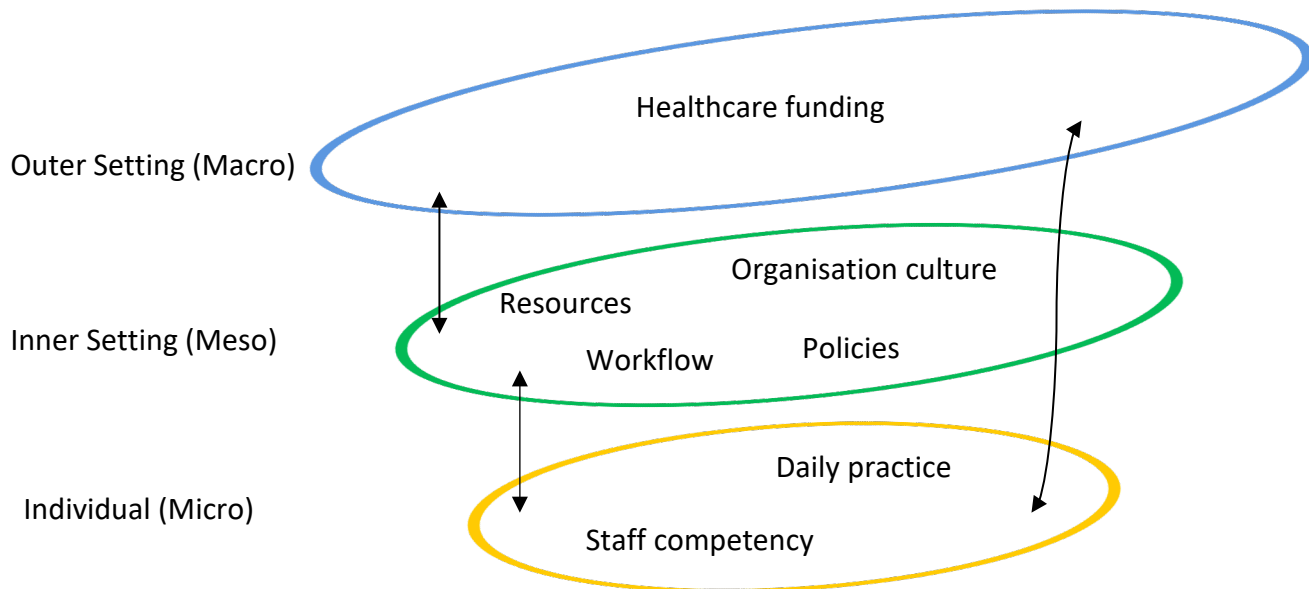


Figure 7.2 The relationship between CFIR - Outer Setting (Macro), Inner Setting (Meso) and Individuals (Micro) Domain.

7.5.1 Impact of Systems and Processes on the Use of Criteria and Indicators

Healthcare systems (e.g., healthcare funding or rehabilitation centres) and processes play an important role in determining the feasibility, relevancy and adaptability when testing, trialling or implementing new frameworks or policies. Different elements at various healthcare system levels could impact this, independently or interconnectedly. The World Health Organisation discussed the importance of systems thinking to understand the interplay within and between health systems when evaluating interventions.¹⁷⁸

The implementation of interventions (or innovations) is multifaceted, and complexity arises from factors such as the intervention having multiple components or the implementation pathway involving multiple steps and multiple individuals or teams.¹⁷⁹ Complexity could be rooted in different levels within a healthcare intervention (Figure 7.2 above), ranging from the macro level

(the healthcare system and policies, CFIR: Outer Setting), the meso level (community or organisational structure, CFIR: Inner Setting), to the micro level (individual clinicians or patients, CFIR: Individuals). Beyond this, the complexity could stem from the implementation process or the innovation itself (discussed in Section 7.4). The interaction between the different systems levels can influence the processes, structures and outcomes of innovation, thereby recognising healthcare systems as complex adaptive systems.^{180, 181} The interaction between the levels (macro, meso and micro) within healthcare system are referred to as 'healthcare vortex'. These levels are not only interconnected within and across the levels, but they are also dynamic, with a focus on the healthcare needs shaping the interaction within the healthcare system.¹⁸

Similarly, various factors at different levels influenced the trialling and evaluation processes of the criteria and indicators. At the system and policy level (macro or Outer Setting), the funding allocation, accreditation processes, healthcare regulations and healthcare standards were a few examples of what influenced (positively or negatively) the trial of these criteria and indicators.

7.5.2 Macro level

Countries have different macro-level (CFIR: Outer Setting) factors that can influence the implementation of an innovation. This research found that some macro-level factors that influence the uptake of criteria and indicators are national/regional data registry, accreditation processes and funding allocation for different levels of care. The national-level healthcare policies influenced data collection for certain criteria and indicators. Policies such as the National Strategic Action Plan for Heart Disease and Stroke¹⁸² in Australia or Action Plan for Stroke in Europe¹⁸³ promote standardised care across the stroke continuum (spanning from hyperacute to chronic stroke). These policies promote a standard approach to stroke care, ensuring consistency and quality across the individual region, country, or health systems, aligning with their funding models.

Along with the standardised policies that influenced the trial and evaluation of the criteria and

indicators, different centres also had national-level data collection infrastructures (for example, clinical registries) that were already in place. Registries serve as a data repository to collect information from all aspects of clinical outcomes within the country. Some examples of national stroke registries that were available to participating centres:

- Australia The Australian Stroke Clinical Registry¹⁸⁴ and the National Stroke Foundation Audit¹⁸⁵
- United Kingdom South London Stroke Register¹⁸⁶ and Sentinel Stroke National Audit Programme¹⁸⁴
- China China National Stroke Registry¹⁸⁷
- India Indian National Stroke Registry¹⁸⁸
- Singapore Singapore Stroke Registry¹⁸⁹
- Denmark DanStroke (Dansk Stroke Register)¹⁹⁰
- Sweden Riksstroke (The Swedish Stroke Register)¹⁸⁴

These systems assist in keeping track of data to improve stroke care by setting benchmarks to adhere to national and international guidelines on stroke management. Participants in this research reported that they knew how to gather data for certain indicators because the data were commonly collected for the audit or as part of the registry. However, most stroke registries collect data for acute stroke care, with minimal information collected from the sub-acute rehabilitation phase. A study systematically reviewed 21 stroke registries (inclusive of Australia, UK, Sweden, Singapore, Denmark) and reported that the majority of the stroke registries within their review focussed on acute stroke care and predominately collected patient and service outcomes (related to 'Optimal Outcome' in this research).¹⁹¹

In addition to the registries, all the participating centres were also involved in national-level accreditation processes. As described in the background chapter (Chapter 2), accreditation processes seek to validate healthcare centres against pre-defined standards to ensure the centres meet high quality and safety standards. Participants from eight centres reported that their centre participated in the accreditation process for inpatient services. Among all the accreditation bodies used by the centres participating in this research, only one accreditation body had a framework for stroke speciality programs and rehabilitation, which is the Commission on Accreditation of Rehabilitation Facilities.¹⁹² A more general accreditation process that is generic to healthcare centres is the Joint Commission International¹⁹³ (three centres) and the Australian Council on Health Care Standards International¹⁹⁴ (two centres), which have various categories used in the accreditation process. Two other centres participated in national hospital specific accreditation programs. Accreditation includes a review of processes for patient outcomes, staff competency and leadership, depending on the accreditation body.¹⁹⁵ Some of these elements align with the criteria and indicators used in this research, with all accreditation bodies collecting data on patient outcomes, aligning with Criterion 1: Optimal Outcomes.

Finally, the healthcare funding model influences resource allocation, service prioritisation and data collection infrastructure within a healthcare system and, subsequently, in a healthcare centre, thereby affecting data collection for the criteria and indicators.¹⁹⁶ Funding affects how outcomes are measured, especially in terms of health equity and health outcomes.¹⁹⁶ Healthcare centres within all healthcare funding models collect data on components of patient outcomes, and other data are collected depending on the funding model. Countries with Universal Health Care funding (Australia, UK, Sweden) have national-level centralised data collection systems focusing on health outcomes and preventative health.²⁴ The focus for stroke rehabilitation is achieving higher Functional Independence Measures on discharge with reintegration into the community.

Comparatively, the healthcare systems adopting the National Health Insurance funding model (United States of America) have detailed and centre-specific financial and operational information, focusing on shorter lengths of stay and intensive treatment to promote early discharge.²⁴

Similarly, funding levels differ between high-income and low-to-middle-income countries, impacting resource allocation, outcome data collection, and the establishment of national and local policies.¹⁹⁷ Regardless of the funding level and geographical area, all centres in this research collected data on clinical outcomes. However, less priority was given to other areas, such as research or mentorship in low- to middle-income countries. While the centres from low- to middle-income countries reported wanting to delve into other priority areas within a stroke CoCE, the higher priority was to collect formalised data on the clinical outcome criterion. Comparably, a cancer CoCE established in a low-income country discussed the limited resources such as infrastructure, personnel, training, treatment and data infrastructure that influenced the cancer service in a resource-constrained setting.⁹⁶

Comparing the centres, it can be inferred that the centres based in high-income countries were more likely to focus on refining their established stroke rehabilitation services to improve patient outcomes and satisfaction, and advance their treatment approach through innovative techniques.¹⁹⁸ Comparatively, low- to middle-income countries would focus on setting up basic, equitable, and affordable care, depending on resource availability.¹⁹⁸ This is likely because the centres from high-income countries would already have more access to resources, infrastructure and a basic rehabilitation centre level; therefore, they would aim to meet higher than the standard level of care.

7.5.3 Meso level

The trialling process of the criteria and indicators was influenced at the meso-level (CFIR: Inner Setting) practices such as local centre policies, culture, leadership, resource allocation and

communication.¹⁹⁹ The meso level in this research refers to the healthcare centres, including the stroke rehabilitation centres. For some centres, the stroke rehabilitation unit was part of the bigger rehabilitation centre. Therefore, the policies were not specifically applicable only to stroke rehabilitation.

The policies and procedures of the stroke rehabilitation centres influenced the data collection processes from the perspective of how the data was collected and the complexity of the data infrastructure.²⁰⁰ As presented previously, the pre-existing policies and data infrastructure made it easier for centres to identify the required data to collect against some of the indicators of the CoCE in stroke rehabilitation. The participants recognised there were minimal barriers to collecting information on indicators with pre-existing data collection processes, such as 'Optimal Outcome', 'Interprofessional Relationship' and 'Education' criteria. Conversely, their policies did not explicitly recommend documentation of other indicators (e.g., respectful behaviour and culturally safe care provision from within 'Interprofessional Relationship' criterion). However, they are part of the job and person specification and were reported as a value that was upheld by the team.

In addition to the pre-existing policies discussed above, the healthcare centre's workflow influenced how the data were gathered for the indicators. An example is the embedded quality improvement programs reported by many centres (Criterion 2 – Background). Healthcare centres often have quality improvement projects as part of their routine processes to improve their service, which can work in collaboration with accreditation processes or service audits.²⁰¹ Quality improvement cycles can run in conjunction with audit or accreditation cycles to improve the service and meet compliance, especially in the patient and service outcome.²⁰¹ Another example of the local systems supporting excellence was the relationship centres had with external organisations (e.g. universities). These relationships facilitated pathways for staff to access professional development and, particularly in the teaching centres, to collaborate with

universities. The participants reported that the collaboration with the university for student placements opened up opportunities for staff to access resources.

The responses from this research highlighted that the stroke rehabilitation centres' priority setting also influenced the data collection at the stroke rehabilitation centres. While funding impacts resource availability at the macro level, resource allocation depends on the healthcare centre's policies. Funding allocations within healthcare organisations tend to be determined by factors such as stakeholders' input, community needs and funding availability.²⁰² For example, in the wider literature, a stroke rehabilitation centre in a low-to-middle-income country may prioritise patient outcomes, whereas centres in high-income countries might focus on equity, advocacy, and innovative surgeries, confident in their provision of high-quality care.²⁰²

Finally, the documentation or lack of documentation also impacts data availability against the indicators. This is related to the workflows and policies at the healthcare centres, affecting data collection. For example, some centres did not document some aspects of the indicators (e.g., 'Optimal Outcomes' – carer-reported outcome measures, duration of therapy provided) as it was not a local requirement. Lack of documentation processes was also identified as a barrier that impacted the trialling process. A similar documentation gap was recognised as a challenge in another CoCE in the wider literature, and it was suggested that using electronic medical records would improve data collection.⁹⁶ Participants from this research provided similar responses; centres that used electronic medical records were able to find data for optimal outcomes, whereas centres using paper-based records reported that electronic medical records would have improved the ease of finding data for the optimal outcome criterion.

Data were also compared across the centres within the same country or against other countries. There were varying results within each criterion that could be linked to the above-mentioned

influences, such as funding, resources and priorities of each centre. Delving deeper into this, even within the same funding model (i.e. within-country comparisons of the two Australian centres, two Chinese centres and two Indian centres), the responses varied based on local priorities and resources. The centres had different infrastructure and resources; the metropolitan centres had staff with research roles and research links with universities, therefore were already collecting data on 'Research Activities' (Criterion 2). Additionally, the funding level is often higher in metropolitan areas, promoting better infrastructure, resources, and specialised skills.²⁰³ This distinction can also be seen in 'Advocacy' (Criterion 7), where centres based in regional areas were able to identify the need for equitable access for stroke survivors and held strong value towards advocacy.

7.5.4 Micro level

The final system that influenced the data collection on the indicators was the micro level (CFIR: Individuals domain). Micro level refers to the participants (primarily clinicians) who trialled the indicators at their centres. In this research, the three factors that influenced the data gathering at the micro level were the participant's understanding of the indicators, whether the indicator reflected the participants' priorities (e.g. clinical versus research), and the participants' information documentation (e.g. documenting in clinical case notes). It was found that the participants frequently required clarification on the indicators and often requested examples, especially when trialled at centres with English as a secondary language. The usability of the criteria and indicators depends on the user's ability to understand, comprehend, and evaluate them to ensure best possible outcome. This highlights that future users of these indicators will likely benefit from training or access to a manual on the types of data to collect against the indicators.

On the micro-level, the clinicians' view of the indicators and the alignment to their daily practice

influenced the data collection for the indicators. For example, the participants deemed that identifying data for indicators within the 'Leadership' criterion was a lower priority compared to the 'Optimal Outcome' criterion. This was due, in some cases, to participants not being confident about how to collect data for these indicators, and at other centres, the participants did not deem the indicators a priority and, therefore, did not collect data.

7.6 Research Findings Compared to other Established Centres of Clinical Excellence

The scoping review identified that multi-disciplinary input and patient outcomes were the commonly described features of a CoCE. This corresponds to the 'Optimal Outcome' and 'Inter-professional Working' criteria and indicators in this research, which collected data against most of the indicators. Resources and infrastructure were also described as important components of a CoCE. The scoping review also found that a CoCE can be a combination of patient-centric, service-centric or economic-centric, again primarily discussed in this research in the 'Optimal Outcome' criterion.

In this wider literature, the studies described multiple steps, pathways, or criteria required to establish a CoCE. For example, a publication on a prostate cancer CoCE¹⁰⁵ discussed a four-step process that included the clinical step (multi-disciplinary team members and services), the research step (monitoring of outcomes), the education step (certification of the centre through fellowships) and quality control (data infrastructure and outcome measurements). Comparatively, the publication on oral healthcare CoCE⁹⁴ described the CoCE as an initiative that is dependent on essential features such as patient outcomes and experiences, standardised processes, leadership and a multi-disciplinary approach. Another example is the CoCE of Nutritional Care¹¹⁵, which described three themes of excellence in clinical care (clinical outcomes, practice guidelines), research (research programs, data sharing) and knowledge translation (education, resources for

patients and clinicians, stakeholder engagement, guideline development). Based on the three brief summaries of the features of a CoCE established in other clinical areas, it can be extrapolated that the criteria and indicators used in the aspirational CoCE in Stroke Recovery and Rehabilitation align with similar requirements of CoCE discussed in the wider literature. Taking it further, the criteria explored in this research were also prioritised according to perceived importance and were inclusive of other factors such as equitable access, mentoring, and delivering education to patients, which are not frequently seen in other CoCE in the literature. Additionally, the criteria and indicators developed by the International Stroke Recovery and Rehabilitation Alliance are aspirational criteria with the aim of identifying the top-performing stroke rehabilitation centres internationally.

Beyond the realm of healthcare, a scoping review⁷ explored 78 literature (from healthcare, research, education, information technology and industry), and concluded that 12 essential foundations were encompassing a centre of excellence. Six out of the 12 essential foundations reviewed by this publication were similar to the criteria that were established for the CoCE in Stroke Recovery and Rehabilitation. The identified essential foundations were specialised expertise, leadership, high-impact research, collaboration and partnership, organisational structure and innovation.

7.7 Contribution of this Research to the Field of Stroke Rehabilitation

Healthcare centres undergo accreditation processes to ensure they comply with quality and safety standards, typically defined by country-specific guidelines. These standards focus on achieving baseline compliance for patient care and operational safety. In contrast, the criteria and indicators for CoCE in stroke rehabilitation have been designed to emphasise global adaptability and an aspiration to strive for excellence beyond compliance. The criteria and indicators developed are flexible and adaptable to various healthcare funding models, socioeconomic contexts, and

resource constraints. Unlike accreditation, which generally assesses adherence to a static snapshot matrix using predefined standards,²⁰⁴ the CoCE in stroke rehabilitation criteria and indicators prioritise innovation and superior outcomes in addition to patient-centric care, rather than simply aiming for the minimum standards set by the accreditation. The indicators focus on a more inclusive approach by addressing stroke rehabilitation holistically, incorporating aspects such as interdisciplinary coordinated care, education and mentorship, leadership and coordinated ongoing care. Additionally, it expects continuous quality improvement and data-driven decision-making, allowing stroke rehabilitation centres to continually strive for excellence. While adherence to guidelines is fundamental, it is not synonymous with achieving clinical excellence. Overall, the CoCE in Stroke Recovery and Rehabilitation initiative focuses on moving past standard quality and safety compliance and encourages healthcare centres to aspire to be the leaders in stroke rehabilitation globally. Furthermore, beyond the contribution to the field of stroke rehabilitation, this research also outlined methods in which the parameters of a CoCE (criteria and indicators) can be tested and refined in other clinical centres. This will be discussed further in Section 8.1 (Chapter 8: Conclusion).

7.8 Recommended Revision of Criteria and Indicators

Based on the findings from this research, a few of the criteria and indicators⁸ of the CoCE in Stroke Recovery and Rehabilitation could be revised to improve usability and reduce duplication of data collection (suggestions colour coded and presented in Table 7.2 below):

Green: Participants deemed the indicator usable. However, some indicators overlapped, or participants needed examples to provide a response.

Orange: The indicator may benefit from further refinement to improve its usability.

Additionally, including a glossary to define and contextualise each indicator is strongly

recommended, as the glossary will provide clear definitions and examples to ensure consistent interpretation across different rehabilitation centres.

Red: The recommendation is to exclude the indicator due to duplication or because it was perceived as irrelevant to a CoCE in Stroke Recovery and Rehabilitation.

Table 7.2 Recommended Revision of the Criteria and Indicators.

	Category	Indicator	Sub-indicator		Participants' feedback
Criterion 1: Optimal Outcomes	Optimal outcomes	Patient outcomes	Clinical/ physiological measures		Too broad. Direction on which measures to use.
			Patient-reported outcomes		Requires clarification. Reported overlapping.
			Patient-reported experience		
			Self-management skills		
		Carer outcomes	Carer reported outcomes		Clarification on carer. May also not be relevant to some centres
			Carer reported experience		
			Carer self-management skills		
		Service outcomes			
	Deliver outstanding rehabilitation	Assessment of rehabilitation requirements	Comprehensive/ holistic assessment		
			Ongoing assessment at regular time points		
		Rehabilitation interventions	Evidence-based 1. Time of commencement 2. Duration 3. Dose 4. Procedures/ methods		Requires clarification on dose, duration and procedures/ methods

	Category	Indicator	Sub-indicator		Participants' feedback
			Addresses person's goals		
			Integrated delivery		
		Coordinated ongoing care and support			
Criterion 2: Research Culture	Organisational processes and systems	Research elements in all job descriptions and role profiles			Need clarification
		Organised initiatives to support a positive research culture	Regular research activities for all staff		
			Embedded quality improvement program (Regular collection of outcome data)		
		Infrastructure and resources to support research activity	Allocated research time		
			Systems to support high-quality data collection		
		A recognised pathway or strategy to implement research into practice			
	Formalised links with external agencies	Links with universities			
		Research collaborations with other national and international centres			
	Staff expertise and culture	Leading research, applying for and winning research funding			
		Research leadership from multiple professional groups			
		Broad methodological research knowledge across staff base			
Criterion 3: Interprofessional Working	Organisations and systems to proactively support patient and family involvement in rehabilitation journey	Information provided routinely to patient and family about rehabilitation process and rehabilitation team			
		Collaborative goal setting process			
		Regular opportunities between team, patient and family for 2-way information exchange			Overlap with first indicator
		Shared decision-making between rehabilitation team, patients and carers			Overlap with first indicator
		Virtual communication available			

	Category	Indicator	Sub-indicator		Participants' feedback
		when indicated			
		Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre			
		Culturally safe care provision			Vague (clarification on documentation)
	Systems to support coordinated inter-professional teamwork	Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans			
		Input from each team member is respected and valued			Vague (clarification on documentation)
Criterion 4: Knowledge Exchange	Knowledge exchange	Collaborations with external organisations to exchange knowledge about best practice			
		Protected time allocated for knowledge exchange activities			
		Opportunities for staff to participate in training using different modalities for knowledge exchange activities			
	Mentorship	Formal interdisciplinary mentorship program for individual clinicians			
		Formal mentorship program for clinical centres			
		Investment in mentorship training for mentors			
		Protected time for mentoring			
Criterion 5: Leadership	Development	Rehabilitation workforce development	Commitment to recruitment of the 'best' staff		Clarification on 'best', participants were not keen on this term
			Processes to promote professional growth and development of staff		Overlapping with indicator in knowledge exchange
		Leadership development	Mechanisms to gain feedback to/about leaders and assess leadership		Needs rewording

	Category	Indicator	Sub-indicator		Participants' feedback
			Investment in training and time to grow leaders		
			Systems to support staff to take up global leadership roles		
	Leaders engaging with key stakeholders	Engagement of leadership with patients and carers			Vague (level of leadership)
		Leadership actively promotes delivery of successful rehabilitation			Vague between clinical and non-clinical
	National/inter national leadership	Representation on influential national/international groups and professional bodies			
Criterion 6: Education	Receiving education	Pathways for staff to gain higher-degree qualifications including master's and PhD			Covered in other criteria
		Onsite educational opportunities			Offsite versus on-site needs clarification
		Support for off-site			
	Delivering education	Delivering conference presentations and in-services to health professionals			
		Providing education to stroke survivors and carers, and the public			
Criterion 7: Advocacy	Processes that facilitate ongoing communication with key stakeholders				Vague (need more clarification, overlap)
	Equitable access of stroke rehabilitation	Systems to promote equitable access			Vague and not applicable
		Process to monitor access			Vague
		Process to improve access if problems identified			Vague
	Regular advocacy and outreach activities	For access to stroke rehabilitation services			Vague
		For innovative research			Answered previously

7.9 Strengths and Limitations

The strengths and limitations of this research should be acknowledged and considered. One notable strength of this research was the global scope due to the recruitment of participating centres internationally. The centres were successfully recruited from regions with various healthcare funding models, socioeconomic status (low, middle and high-income countries) and geographical areas (metropolitan and regional centres). While the recruitment for this research was relied on voluntary participation from the stroke rehabilitation centres, the PhD Candidate successfully recruited centres from LMIC and regions with spoken languages other than English to participate in both the survey and interview groups. However, centres with established processes and more resources were more likely to participate or provide complete data, therefore resulting in an over-representation of HIC responses. This diversity deepened the data collected and offered valuable insight into how these criteria and indicators could be applied internationally. This research also highlighted the key challenges encountered during the trialling process, such as variability in data collection infrastructure and influences of local and national policies and processes. These findings highlighted the complexity of adapting and integrating the criteria and indicators at diverse stroke rehabilitation centres. Finally, the participants expressed that they were keen to understand the criteria and indicators and explore their applicability to their centres, which allowed for comprehensive data collection from the semi-structured interviews.

The mixed method approach allowed for a more holistic but comprehensive exploration of research questions, integrating the breadth of data (through quantitative data) and depth of responses (through qualitative data). The integration of the quantitative data provided a broad overview, capturing the pattern of evidence against the indicators across the rehabilitation centres. The responses from the qualitative data offered an in-depth understanding of participants' perceptions, experiences and thoughts regarding the criteria and indicators.

Therefore, by triangulating the results, this research was able to delve into the complexities of the reasons behind data collection against the indicators. This strengthened the validity of findings, capturing a multi-level or systems perspective, thereby contributing to the vigour of the research outcomes.

While this research was carefully designed and the most appropriate data collection and analysis methods were employed, the methodology and recruitment strategies used were novel, which limits comparability to previous research on CoCE. In addition to this, other limitations were still present. One limitation was the time restriction and the prolonged and complex ethics approval processes, which limited the number of stroke rehabilitation centres participating in the in-depth analysis via semi-structured interviews. Additional centres in Singapore (3 x centres) and Malaysia (1 x centres) participated in semi-structured interviews in the second half of 2024, but these data are not presented in the thesis due to time constraints to analyse the data. The option to complete a survey was offered as an alternative to address this limitation because most centres did not require ethical approvals to complete the online survey. Further, the option to complete a survey rather than weekly interviews facilitated participation of centres with time and staff constraints. The surveys provided a snapshot of information at the time; however, recruiting additional centres to participate in the semi-structured interviews would have provided more comprehensive and in-depth responses. It would have been particularly beneficial to better understand the perception of the CoCE from centres in low-income countries, especially on how the CoCE would operate in resource-constrained settings. Additionally, the indicators were analysed collectively rather than segmented by type due to the limited timeframe and resources. This research did not explicitly categorise the indicators according to the structure–process–outcome framework. While this framework offers a valuable lens for examining service standards, the primary aim of this research was to trial and explore the usability and relevancy of the CoCE

criteria and indicators. Future research may benefit from mapping these indicators onto the structure–process–outcome framework to support more granular evaluation and benchmarking.

Researchers and clinicians from United States of America and Canada, who were affiliated with the International Stroke Recovery and Rehabilitation Alliance, were invited to participate in this research to trial the proposed criteria and indicators. Unfortunately, these invitations were declined, primarily due to increased workload and resource constraints faced post COVID-19 pandemic. Given that most of the literature on CoCE identified in the scoping review (Chapter 3) focused on centres based in the USA, for future studies, it will be valuable to engage with clinicians from these regions, as their insights and experiences can contribute to the understanding and applicability of CoCE criteria and indicators.

Although it may not be a direct limitation, the participants' roles within the centres could have influenced the responses provided for the indicators. While this research aimed to recruit a balanced group of managers and clinicians to capture a range of perspectives, the majority of the participants were clinicians with clinical experience and active caseloads. As a result, their responses may have been framed through the clinical lens and reflective of their perspectives from their clinical experience, focusing more on patient and operational aspects instead of broader organisational and strategic considerations. This was evident from their responses on their understanding of the indicators, such as 'Optimal Outcome' compared to 'Leadership'. It is possible that the latter would have been responded to differently if the participants held managerial or exclusive leadership roles. The predominance of clinician participants could have led to narrower perspectives on these indicators. While this focus on clinicians' perspectives aligns with the research aims, it highlights the potential benefit of engaging a broader range of participants from different roles for future research to capture a more holistic view and understanding of the criteria and indicators.

Additionally, the data collected relied on participants' self-reported experiences and current knowledge of the systems and processes. While this was very valuable to this research, the absence of structured data documentation or infrastructure in some centres could have impacted the participants' recall and accuracy of information. Furthermore, there is also a chance that the participants may not have access to all the information required for the indicators, and also might be up to date with the activities within their centres. Finally, another potential limitation is the integration of barriers and facilitators within the same thematic units. While this approach reflected the interwoven nature of participants' experiences, it may have reduced the clarity in distinguishing specific enablers from challenges. Future research may benefit from the analysis of these dimensions separately to provide a more targeted response.

Despite the limitations, this research contributes to significant original knowledge in Stroke Recovery and Rehabilitation, as well as the establishment of CoCE. In addition to evaluating the indicators at the centres, it offers a critical analysis of their applicability, relevance and challenges in real-world settings. It also offers a 'bottom-up' perspective from the clinicians' point of view on how these indicators may work at their centres. This research provided valuable insights into the facilitators and barriers to applying the criteria and indicators at stroke rehabilitation centres aiming to achieve excellence in stroke care.

7.10 Chapter Summary

This chapter triangulated and discussed the findings from Chapter 5 (Descriptive Analysis) and Chapter 6 (Thematic Analysis), in light of Chapter 3 (Scoping Review). It also discussed the elements that influenced data collection and the usability of the criteria and indicators. Additionally, this chapter also explored the relationship between macro (CFIR: Outer Setting), meso (CFIR: Inner Setting) and micro (CFIR: Individuals) systems and the influence on the trialability of these indicators. Finally, the differences between the countries were also

highlighted, along with the strengths and limitations of this research. While the aims of this research to trial the criteria and indicators at international stroke rehabilitation centres were achieved (**Aim 4:** To identify data collected for the CoCE criteria and indicators; **Aim 5:** To analyse the facilitators and barriers to identifying and/or documenting evidence regarding the criteria and indicators ; **Aim 6:** To evaluate the practices that align with the criteria and indicators), further work is needed prior to international implementation as this research found that several indicators were not well-understood and, therefore, needs further refinement.

CHAPTER 8: CONCLUSION AND RECOMMENDATIONS

This research was designed and conducted to trial and evaluate the criteria and measurable indicators of Centres of Clinical Excellence (CoCE) in Stroke Recovery and Rehabilitation. It was conducted at international stroke rehabilitation centres and included countries from different socioeconomic status levels, funding models, resource allocation, and national languages, as detailed in the Method and Methodology chapter (Chapter 3). The outcomes from the research were explored and discussed in Chapters 5 (Descriptive Results), 6 (Thematic Analysis) and 7 (Discussion).

None of the centres were able to provide evidence meeting all the criteria and indicators, reflecting the aspirational nature of these criteria and indicators. While numerous factors, as discussed in Chapter 8 (Discussion), influenced the trialability of the criteria and indicators at the stroke rehabilitation centres, the outcomes from this research do not diminish their validity and potential value. Instead, it highlights that the criteria and indicators are aspirational and were designed to set excellent standard, aiming to inspire excellence at stroke rehabilitation centres. The inability to meet all the criteria and indicators does not suggest a failure but rather underscores the challenges within the field.

The centres recruited for this research were not exclusively top-performing stroke rehabilitation centres. Instead, they represent the broader spectrum of stroke rehabilitation services, selected based on the willingness to participate and trial the criteria and indicators at their centres. This is to ensure the findings from the research reflect the real-world application of the criteria and indicators and inclusive of the centres regardless of their geographical location or socioeconomic status.

The primary aim of the work was to develop the criteria and indicators of CoCE was to identify

international leading centres exemplified by their ability to demonstrate performance on the majority of the criteria and indicators. These centres have the potential to represent “gold standard” benchmarks in Stroke Recovery and Rehabilitation care and to show what is possible in the field of stroke rehabilitation. Establishing a systematic and transparent process to determine these leading centres is critical for advancing global stroke rehabilitation practices. Once identified, these centres could shape the foundation of a global network of Centres of Clinical Excellence in Stroke Recovery and Rehabilitation. This network could facilitate the sharing of resources and best practices, and foster collaborative clinical and research partnerships, especially in under-resourced centres.

8.1 Implications for Practice

This section answers the final research question of:

- How did the trial of the CoCE in stroke rehabilitation criteria and indicators impact health service provision?

From a stroke rehabilitation centre perspective, the criteria and indicators of the CoCE serve as an aspirational benchmark to encourage rehabilitation centres to strive for higher-than-standard practice. These indicators challenge the centres to integrate innovation, evidence-based practice, and patient-centred care into their practices, creating an environment where excellence is the norm. In addition to fostering innovation in rehabilitation, being recognised for clinical excellence in stroke rehabilitation could foster a sense of pride and professional satisfaction and be a motivational factor to continually improve care delivery. Ultimately, the CoCE in stroke rehabilitation initiative was designed to redefine the standards for high-quality stroke rehabilitation.

Although clinical centres have processes in place to collect data on patient outcomes and service

outcomes, limited processes are available to collect data on non-clinical aspects of rehabilitation service, such as education, leadership and research. A comprehensive data collection infrastructure wherein data on all indicators can be collected would assist the centres in the future to demonstrate the evidence for clinical excellence. It will also assist in identifying gaps in their service for continual quality improvement and will be discussed in the next section (Section 8.2 Recommendation and Future Directions).

From a clinician's perspective, this research provided insight and potentially shifted the clinicians' view from solely focusing on clinical aspects of rehabilitation to incorporating other aspects of services that promote excellence in their centres. This was apparent during the interview processes, where the participants from all the centres were motivated to share their current practices and explore innovative approaches as a step towards excellence to improve their service. This paradigm shift can enhance patient care and empower clinicians as they contribute to the global advancement of stroke care. It offers opportunities for professional growth and recognition, encouraging clinicians to be innovative and contribute to broader knowledge of excellence in stroke rehabilitation. In turn, this supports the global advancement of stroke care by fostering an interconnected community of practice and emphasises measurable outcomes and data-driven improvements.

In addition to the clinical implications, the insight from this research could guide stroke rehabilitation policymakers in developing a robust framework at regional and national levels. The indicators could promote the type and quality of information required to achieve excellence. This could be integrated into the policies to align with local practices, incorporating international guidelines or plans such as the World Stroke Organisation's Action Plan.¹ With stroke rehabilitation data infrastructure improving consistently, a policy change should strive towards including stroke rehabilitation as part of national-level data collection, where the rehabilitation component of

stroke care can be measured by continual improvement in stroke rehabilitation services.

Additionally, establishing a CoCE in Stroke Recovery and Rehabilitation would encourage increased focus on stroke rehabilitation, which will encourage data collection thereby continually improving the data infrastructure in the future. Finally, the centres can use the outcome of this research to improve their services. The identified unmet indicators during the trial can be used as targets to implement ongoing quality improvement activities.

On a global level, this research aims to improve equity in rehabilitation using the indicators as a benchmark for excellence. By making the criteria and indicators freely available, stroke rehabilitation centres globally can use these indicators as an approach to identify priorities and advocate for resources to improve the quality of care. Additionally, it provides a global benchmark to enable rehabilitation centres to promote excellence-driven goals in their national policies and strategies. This ultimately, reduces the burden of stroke through accessible, high-quality rehabilitation services.

8.1.1 Broader Implication for Global Healthcare

The findings from this research extend well beyond the scope of stroke rehabilitation and have far-reaching implications for broader healthcare areas. Focusing on the development of CoCE and its innovative approaches, this research provides a framework for elevating healthcare standards and promoting excellence across diverse clinical settings. It sets a precedent for other programs aiming to establish CoCE in various healthcare domains. The criteria are adaptable and can serve as a blueprint for integrating tailored measurable indicators to foster clinical excellence, innovation and improved care.

Beyond trialling the criteria and indicators, this research also developed and presented a method for trialling these indicators across different stroke rehabilitation centres. This method provides a robust methodological framework for trialling the indicators by integrating both quantitative and

qualitative perspectives. It offers a comprehensive lens for future studies looking at trialling similar indicators in other healthcare domains. A key strength of this research is its focus on clinicians' perspectives through a bottom-up approach, prioritising insights from professionals who are directly interacting with patients. This contrasts with traditional top-down approaches that often impose frameworks without adequately considering factors that influence from the ground level. This methodology fosters greater engagement and buy-in from clinicians, which is important for the success of future implementation.

8.2 Recommendation: Refinement of the Criteria and Measurable Indicators

Noting the feedback from the participants of this research and as summarised in Section 7.8 (Recommended Revision of Criteria and Indicators), the indicators need further refinement to enhance their ease of use and clinical applicability. The terminology used to describe the indicators should be globally relevant. Some indicators (such as 'culturally safe care provision') were not internationally recognised. This could have been due to the use of the term culturally safe care, which is more prominent in countries with Indigenous populations, where staff are required to complete cultural competency and are aware of culturally safe practices. In this research, the participants from the centres in Australia and Chile recognised that they had systems in place for culturally safe care. The concept of culturally safe communication can be used in three ways. It can be used to describe the communication style (i.e. sensitive and open communication), clinician's beliefs, and values or strategies used when collaborating with patients and family.²⁰⁵ Therefore, the wording of the criteria needs to be clear and easy to understand, especially for use in countries with English as a second language. Moreover, uncertainty in the wording may have caused an indicator to be misinterpreted. Another example was that the indicators 'duration' and 'dose' needed clarification during the interviews due to their ambiguous definitions behind their use. This highlights the importance of rectifying this by either refining the indicators and/or

providing a glossary of terms, defining each indicator and providing examples.

Additionally, there should be no overlap between criteria, yet this was reported by participants. All overlapping criteria need to be examined to determine whether a true overlap exists, or whether the descriptions (and differences between criteria) need to be clarified. The indicators could be further evaluated to reduce the number of indicators to lessen user fatigue (and this also addresses the overlaps). The indicators were also referred to as measurable indicators in the original paper⁸; however, not all the indicators were reported as measurable by the participants. The participants from nearly all the centres suggested that they would like a numerical rating to measure the indicators. Therefore, the indicators should be refined to ensure they are measurable. Additionally, the quantification of the indicators needs to be considered.

8.3 Recommendation: Using the Indicators as a Quality Improvement Activity

One practical application of the indicators is to adopt and integrate them into a structured quality improvement program within the healthcare centres. By focusing on specific criteria at the indicator level, the centres can systematically identify areas for improvement and target the development of evidence to achieve the indicator. A suggested approach is the adoption of a traffic light system for visual representation and monitoring. The indicators could be categorised into three levels:

- **Red:** Indicators requiring immediate attention or improvement.
- **Orange:** Indicators are partially met and require further input.
- **Green:** Indicators that have data collected against them.

This allows centres to track progress over time, collect evidence and allocate resources to move the indicator from red to green. This also would help the clinicians and stakeholders to visualise the improvement and provide a target to meet, thereby demonstrating their commitment to

quality improvement and clinical excellence.

Notably, since the data collection phase in this research, two centres have reported that they are integrating the indicators into their quality improvement activities. This feedback highlights the practical utility of the indicators as a tool for benchmarking and advancing care standards. This has facilitated a focused effort to address gaps in care and to align their service to the CoCE criteria and indicators. Therefore, reinforcing the indicators' value is not only a measurement for excellence but also a tool to improve the quality of services, cultivating a culture of continuous improvement within the healthcare centres.

8.4 Recommendation: Further Prioritising of the Criteria

The criteria and indicators could be categorised into two distinct groups: essential criteria and optional but recommended criteria. This differentiation would allow centres with diverse funding models, socioeconomic contexts and resource constraints to aim to identify as centres of clinical excellence while recognising their unique challenges. The 'Essential Criteria' could represent the core elements that every CoCE must meet, e.g. the top three or four criteria (Optimal Outcomes, Research Culture, Interprofessional Working and Knowledge Exchange). Whereas the 'Optional but Recommended Criteria' aims to enhance a centres' ability to innovate and exceed the essential standards. While not mandatory, these optional criteria provide opportunities for centres to excel further. Recognising that achieving excellence in every criterion may not be feasible for all centres, particularly those in resource-constrained settings, this approach allows centres to be acknowledged as CoCE in specific areas of excellence in stroke rehabilitation. For example, a centre might excel in patient outcomes or research culture but face challenges in leadership due to external factors. This tailored approach ensures that the criteria and indicators encourage centres to focus on achieving the essential areas while working towards meeting the optional criteria over time. This promotes inclusivity and acknowledges that the CoCE is not a one-size-fits-

all solution but is dynamic and adaptable to the local context.

8.5 Recommendation: Collaborating with Other Organisations

The World Stroke Organisation (WSO) published guidelines and action plans (WSO Roadmap to Quality Stroke Care)¹ for every phase of the stroke journey to achieve standardised and consistent evidence-based care that can be used at any level of healthcare. This guideline was split into minimum, essential, or advanced stroke services, each with its own set of quality indicators. In the rehabilitation phase, the guidelines indicated that the minimum services included outcome-specific indicators, while the essential and advanced services included service access, interdisciplinary professionals' involvement, training and education for clinicians and patients, respectively, and data collection strategies.¹ In line with the WSO's Stroke Centre Certification Program³⁷ in the acute stroke phase (highlighted in Chapter 2: Background), the WSO is currently working on a stroke certification process in the rehabilitation phase. The International Stroke Recovery and Rehabilitation (ISRRA) expert group is actively collaborating with the WSO rehabilitation certification working group to identify the aspects that each initiative explores and the processes involved.

The results from this research will be used by ISRRA to guide conversations with other stroke rehabilitation accreditation bodies (e.g., Commission on Accreditation of Rehabilitation Facilities) and stroke organisations (e.g. Australia New Zealand Stroke Organisation) to determine how they can work together toward excellence in stroke rehabilitation in the future.

8.6 Future Research

This research provides a foundation for developing detailed implementation, monitoring and evaluation processes for CoCE. A key finding from the scoping review revealed many existing CoCE do not have structured processes to monitor and evaluate the CoCE once implemented.

Therefore, future research for the criteria and indicators should focus on the following elements:

- **Exploring and describing the implementation process** – to provide support and improve usability, a well-defined implementation process should be developed either in person or over a videoconferencing system.
- **Setting up a monitoring and evaluation processes** – a robust monitoring and evaluation systems will ensure the centres are continuing to meet the indicators. This could be external audits, periodic reviews, or self-assessments.
- **Defining how the indicators are measured** – identifying how the indicators can be measured to retain the term measurable indicators and to improve usability.
- **Creating a data dictionary/ glossary of terms with examples** – a clear definition of each indicator should be established with examples to reduce discrepancies and to enhance the consistency of evidence.
- **Refining the indicators** – the indicators should undergo a refinement process to address any overlap, ambiguity and improve clarity. The expert working group will be using the feedback from this research to refine the indicators prior to implementing them at other stroke rehabilitation centres.
- **Development of user-friendly tools to support implementation:** Once the indicators are finalised, tools will be developed to support local implementation. These tools will be developed in paper-based and electronic formats. The expert working group will liaise with interested stroke rehabilitation centres and provide them with these tools to aid data collection on the criteria and indicators.
- **Engaging staff from different levels of the workforce** – recruiting clinicians and managers during the implementation process to ensure diverse responses and perspectives. It allows for a wider scope of evidence since the indicators are both clinical and non-clinical in

nature.

- **Longitudinal studies to assess long-term outcomes** – Establishing a robust system to monitor and evaluate the outcomes from CoCE. This could involve developing comprehensive frameworks to assess the long-term influence of CoCE on patient care, clinical practices, service outcomes, staff satisfaction and impact on the workforce, and financial implications or economic evaluations of the CoCE criteria and indicators.
- **Tailoring to local context** – As discussed in Section 8.2 (Implication for practice), developing a framework of 'Essential Criteria' and 'Recommended Criteria' to promote flexibility and adaptability of the CoCE criteria and indicators to be tailored to local context.
- **Application of criteria and indicators to other areas** – could explore how these criteria and indicators could be adapted to other areas in healthcare.

In summary, this research made a significant original contribution to knowledge by demonstrating how the design and usability of the indicators, coupled with influences from the healthcare systems at the macro (Outer Setting), meso (Inner Setting), and micro (Individuals) levels, influenced the trialling process across different settings. This was accomplished by exploring which criteria and indicators were easily demonstrated with data, examining how the data collection process for the indicators was influenced by different levels of health systems, and the factors that affected the usability within a healthcare centre. This research provides essential insights into the application of these indicators in diverse healthcare centres, paving a path to achieving excellence in stroke rehabilitation. Furthermore, it synthesises the implications for clinical practice and patient outcomes, proposes recommendations, and identifies key directions for future research. The significance of this research extends beyond theoretical advancements to practical application, providing a foundation for future initiatives aimed at reshaping healthcare services worldwide. By bridging the gap between standard practices and excellence in stroke rehabilitation,

this research offers a comprehensive perspective on advancing healthcare systems and fostering continued innovation in clinical care and patient outcomes.

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APPENDICES

Appendix A: Scoping Review Protocol

Kandasamy T, Hendriks J, Stockley R, Lynch E. Conceptualising Centres of Clinical Excellence: A scoping review protocol. 2023

Conceptualising Centres of Clinical Excellence: A scoping review protocol

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ABSTRACT

Introduction With a growing interest and awareness in providing evidence-based, person-centred healthcare, the concept of clinical excellence in healthcare provision is increasingly used to promote high quality care. Clinical excellence could serve as a concept to promote interdisciplinary collaboration where it may overcome the evidence-practice gap and improve service delivery. There is a lack of consistency in how clinical excellence is defined and measured, which makes it hard to implement clinical excellence into healthcare practice. In recent years, healthcare facilities are defining Centres of Clinical Excellence with the purpose of delivering clinical excellence in healthcare. Therefore, the objectives of this scoping review are to map the available evidence on healthcare facilities that deliver clinical excellence, and to clarify the key definitions of Centres of Clinical Excellence.

Methods and analysis A refined scoping review methodology will be used to evaluate the currently available evidence about Centres of Clinical Excellence. Databases including MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus will be searched to identify relevant published studies. Additionally, grey literature (government reports, policies, protocols, conference proceedings, unpublished studies) will be searched using Google and Google Scholar. Only articles written in English, published in last 20 years that consider Centres of Clinical Excellence will be included. Two reviewers will review the abstracts and full text independently and a third reviewer will be consulted to resolve any disagreement to determine final inclusion into the review. A bespoke data charting form will be developed to capture the methods used to evaluate and monitor Centres of Clinical Excellence. Findings will be presented in a narrative format, and their implications, discussed and reported for future research and practice.

Ethics and dissemination This scoping review does not require human ethics committee approval as only secondary data will be examined. The findings will be disseminated through presentation at conferences and relevant forums. The completed scoping review will be submitted in a peer reviewed journal and will form part of a PhD thesis.

INTRODUCTION

Healthcare is constantly evolving with new disease profiles, treatment discoveries, technological advancement and ever-changing healthcare initiatives. There has been a shift from the traditional medical models of healthcare centred on morbidity and mortality to wellness models that focus on patient satisfaction, patient perceived health status and quality of life.(1, 2) Many governmental and non-governmental agencies around the world are involved in reforming health to improve healthcare, healthcare access and to provide equitable services to improve patient outcome, patient experience and health service efficiency.

There is a growing body of evidence on defining best clinical practice and demonstrating important aspects of care, such as safety, access, affordability, equity, effectiveness and efficiency. However, it is common for there to be significant gaps between the generation of new research evidence and translation into clinical practice.(3) It takes on average 17 years from the time the research is completed to the time it is routinely implemented into clinical practice, demonstrating the disconnect between development and implementation of clinical evidence.(4-6) Healthcare organisations and health agencies are recognising there is a need to reduce the evidence-practice gap by making healthcare organisations more accountable for evidence-based service delivery.

One method to ensure high quality healthcare delivery is through ongoing quality and safety improvement using stringent standards and indicators, many of which incorporate evidence-based recommendations.(7) Most healthcare organisation internationally will have to meet national accreditation standards, which focus on the quality and safety standards, addressing clinical practices, organisational performance, staff efficiency and high-quality care.(8) While this is of key importance to ensuring a basic average standard of care, accreditation does not traditionally consider the best available evidence, nor does it usually include patient reported outcome and experience measure. Recognising this gap, healthcare organisations are increasingly voluntarily initiating self-development with the aim to deliver excellence in evidence-based, patient-oriented clinical care to improve patient outcomes.(8-10)

Recognising the need for excellence in holistic clinical care, the concept of 'clinical excellence' (11), along with similar terms 'research excellence'(3), 'service excellence'(12) and 'operational excellence'(13), are being used increasingly in the international literature to describe different aspects of excellence in healthcare. Focussing specifically on clinical excellence, the concept has been used to describe policy development, engagement with the clinical workforce, health research and promoting excellence in specific areas of healthcare.(14, 15) Some authors have defined the domains of clinical excellence pertaining to different areas of medicine from the perspectives of clinicians.(11, 16, 17) Making sense of the different terms and gaining an understanding of clinical excellence that encompasses the views of not only clinicians, but also those of people who receive healthcare is required.

Beyond defining different facets of excellence, a recent development has been the descriptions of healthcare organisations as Centres of Excellence.(15, 18, 19) Centres of Excellence range in scope, from entire healthcare organisations to single areas of medicine (e.g. departments/wards/clinics). A recently published review(19) summarised evidence pertaining to Centres of Excellence in areas of healthcare, education, research, industry and information technology. This study concluded that there are inconsistencies with the way the centres are coined with the term Centres of Excellence.(19)

Aiming for clinical excellence is important in patientcare as it inspires healthcare professionals to pursue the best clinical care for their patients and encourages the healthcare facility to aspire for the latest evidence-based care for their community. Clinical excellence could serve as a platform to promote interdisciplinary collaboration where it may overcome the evidence-practice gap and improve service delivery. Establishing clinical excellence would encourage healthcare facilitates to strive to provide patient with up-to-date evidence-based high quality healthcare therefore reducing the evidence-practice gap.(20) We are characterising 'clinical excellence' as providing patients with exceptionally high level of effective and efficient evidence-based care while maintaining highest quality and safety standards and promoting excellent clinician engagement. (16-18, 21-29) We are interested in learning what is known about the healthcare facilities and institutions that provide excellent clinical care or are deemed to be Centres of Clinical Excellence. As we are seeking to identify the types of available evidence currently available on Centres of Clinical Excellence, and to clarify the key definitions of these Centres, a scoping review is the most appropriate knowledge synthesis methodology. This paper outlines the protocol for a scoping review to collect evidence on different aspects of Centres of Clinical Excellence, including how these are defined, implemented and monitored.

METHODS/DESIGNS

We will employ the scoping review method developed by Arksey and O'Malley(30) with the refinement of this method outlined by Levac, Colquhoun and O'Brien(31) to evaluate the evidence on Centres of Clinical Excellence. The Arksey and O'Malley(30) framework describes a 5-stage scoping review methodology which we have set out below: identifying the research question, identifying relevant studies, study selection, charting the data and collating, summarising and reporting the results. Additionally, we will use the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) PRISMA Extension for Scoping Reviews (PRISMA – ScR) to guide with retrieval and inclusion of the evidence and to report the scoping review.(32)

Stage 1: Identifying the research question

The first stage covers formulation of the research questions based on the study objectives. We have identified four research questions based on the study objectives discussed above. Levac, Colquhoun and O'Brien(31) recommended a "clearly articulated scope of inquiry" by defining the concept, target population and the health outcomes to aid the formation of research questions.(31) Given the exploratory nature of our research questions, we have no limitation to study populations or interventions.

Our scoping review sets out to answer these research questions:

1. What Centres of Clinical Excellence have been described in the literature?
2. What are the defining characteristics of Centres of Clinical Excellence?
3. How are Centres of Clinical Excellence selected or nominated?
4. What are the monitoring protocols employed to remain as Centres of Clinical Excellence?

Stage 2: Identifying relevant studies

Scoping reviews use an exploratory approach to comprehensively search and systematically map the evidence available on an area of interest.(33) They can address broad research questions using specific parameter to ensure thorough review of the literatures. The parameters are databases used, the search strategy and the eligibility criteria.

Databases

We will conduct a comprehensive search using MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus to identify relevant published studies. We will also search through grey literature (government reports, policies, protocols, conference proceedings, unpublished studies) and search for readily identifiable websites using Google and Google Scholar.

Search strategy

A search strategy was developed with the support of a research librarian to identify potential and alternative keywords that best describe the research subject. The following keywords will be used: "centre of clinical excellence" OR "networks of excellence" OR "best practice" OR "clinical exemplars" OR "integrated healthcare delivery" OR "excellence" OR "clinical protocols" OR "clinical competence" as search terms, subject headings, concepts or keywords. The search will be restricted using the pre-determined inclusion criteria as shown in table 1.

We will also use advanced Google search to identify grey literature and relevant websites (e.g. CORE, MedNar and NICE) using the same keywords. Further searches will be completed using snowballing technique to identify additional studies. The searches will be documented and the references will be imported or added to Endnote X9.(34) For any studies or documents that are not available online, we will contact the lead author of the relevant document to request a copy of the paper.

Inclusion and exclusion criteria

Inclusion and exclusion criteria were developed to set boundaries for the scoping review and will be modified as we grow familiar with the literature. The inclusion criteria that will be used are outlined in table 1. To be included in the study, the literature must be published after 2002 and provide information about Centres of Clinical Excellence that provide clinical care for people with any health condition in any setting (primary care, inpatient, outpatient or community) in any part of the world. Centres of Excellence that do not provide clinical care (such as Centres of Research Excellence) will be excluded.

Table 1 Inclusion and exclusion criteria used to set parameters

Inclusion criteria
<ul style="list-style-type: none"> ➤ Available in English language ➤ Information on Centres of Clinical Excellence ➤ Healthcare organisation or service providing clinical care to people with any healthcare condition ➤ Published from January 2002 ➤ Any geographical location

Stage 3: Study selection

Duplicates will be removed prior to screening titles and abstracts. As recommended by Levac(31), we will have two reviewers (TK and EL) screen titles and abstracts and review full-text documents using the inclusion criteria (see table 1). One reviewer (TK) will conduct the online search for relevant websites (first 20 pages on Google search). The selection of the final documents will be agreed on by two reviewers (TK and EL) and a third researcher (RS or JH) will be consulted if there are any disagreements to reach consensus.

Stage 4: Charting the data

We will develop a data charting form using Microsoft Word in a tabular format to extract data from each study using methods outlined by Arksey and O'Malley(30) and Levac.(31) All reviewers (TK, EL, RS and JH) will complete the pilot charting of three studies to determine if our data charting method is consistent with our research questions. If required, modification will be made to the charting form to ensure its rigour to capture all the required data. Each iteration of the charting form will be reviewed by all authors until consensus has been reached. At this point, the remaining data charting will be completed by a single author (TK), and a second reviewer (EL) will review 10% of the charted data to check for accuracy. The data charting form will include the standard information on author, year of publication, type of publication and a descriptive summary of the key findings relating to Centres of Clinical Excellence as shown in table 2.

Table 2 Data charting form

Data charting form
<ul style="list-style-type: none"> ➤ Author ➤ Year of publication ➤ Type of publication ➤ Setting of Centres of Clinical Excellence (e.g. hospital versus specific health unit, country) ➤ Health Condition ➤ Year Centre of Clinical Excellence was established ➤ Definition of Centre of Clinical Excellence ➤ Process used to nominate Centre of Clinical Excellence ➤ Criteria used to monitor Centre of Clinical Excellence

Stage 5: Collating, summarising and reporting the results

Our assessment will be presented in a narrative format, addressing the research questions. We will use the PRISMA – ScR checklist to guide our data collection and reporting.(32) Finally, the implications from the findings will be synthesised, discussed and reported for future research and practice.

DISCUSSION

Literature identified in this scoping review may differ from most literature included in traditional scoping reviews because very limited information may be available in academic literature. Rather, the authors are anticipating a large amount of evidence will be identified through the grey literature search, with anecdotal reports of the term “Centres of Clinical Excellence” being used to attract clients to fee-for-service healthcare. This review will be the first research work to map the evidence on how Centres of Clinical Excellence are defined and monitored, and how clinical excellence is demonstrated. We anticipate findings from this review will contribute to international efforts to establish Centres of Clinical Excellence using robust, transparent criteria and processes.

Strength and limitations of this study

- This scoping review will systematically and comprehensively search electronic databases and grey literatures to identify the available evidence on Centres of Clinical Excellence.
- We are expecting to find most of our evidence in the grey literature as there might be limited evidence available in the academic literature.
- Searching electronic databases and grey literature will identify information about Centres of Clinical Excellence published by both academic and health service authorship teams for academic, health service and patient/public/community audiences.
- This review will collate all relevant information about Centres of Clinical Excellence, an area of growing interest internationally.

Patient and public involvement

There will be no patient or public involvement in our scoping review.

Ethics and Dissemination

We will review secondary sources and do not require human ethics committee approval. All sources will be adequately referenced. The findings of our scoping review will be disseminated through presentation at conferences and relevant forums. The completed scoping review will be submitted in a peer reviewed journal and will form part of a PhD thesis.

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Appendix B: Scoping Review

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BMJ Open Conceptualising Centres of Clinical Excellence: A Scoping Review

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ABSTRACT

Objectives Centres of clinical excellence (CoCE) are healthcare facilities that provide excellent healthcare. However, despite their increasing prevalence, it is unclear how CoCE are identified and monitored. This paper explores how CoCE has been described in the literature, including its defining characteristics and selection and monitoring processes.

Design We conducted a scoping review following Arksey and O'Malley's framework, enhanced by Levac *et al.* Additionally, we adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines.

Data sources A comprehensive search using MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus was conducted to identify relevant literature from January 2010 to June 2022.

Eligibility criteria for selecting studies We included published studies and grey literature that described how a CoCE was defined, established, monitored or evaluated.

Data extraction and synthesis Two independent reviewers completed the title and abstract screening, reviewed the full texts and extracted data.

Results 50 records describing 45 initiatives were included. More than half were published in the USA ($n=25$, 56%). All but one initiative focused on one clinical condition/population, most commonly cardiovascular disease ($n=8$, 17%), spinal surgeries ($n=4$, 9%) and pituitary tumours ($n=4$, 9%). Most initiatives ($n=30$, 67%) described a structured process to establish CoCE. The definitions of CoCE were not uniform. Common defining features included the volume of patients treated, medical expertise, a highly skilled multidisciplinary team, high-quality care and excellent patient outcomes. Identification as a CoCE varied from self-identification with no explicit criteria to application and assessment by an approval panel.

Conclusion Despite a growing prevalence of CoCE, there are inconsistencies in how CoCE are established, identified, monitored and evaluated. Common (but not uniform) features of CoCE are highly skilled staff, high-quality care delivery and optimal patient outcomes.

INTRODUCTION

Healthcare facilities worldwide have a shared goal to continually improve healthcare delivery, often using stringent standards and indicators.^{1 2} Improvements in healthcare delivery can take the form of defining best

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The study used inclusive search strategies (peer-reviewed journals and grey literature) and a stringent review process using two independent reviewers throughout the process.
- ⇒ The study used Arksey and O'Malley's framework with enhancement from Levac *et al.* and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines.
- ⇒ We may have missed established centres of clinical excellence that have not published any studies or reports or published in non-indexed sources.

clinical practice or demonstrating important aspects of care, such as safety, access, affordability, equity, effectiveness and efficiency.

Most healthcare organisations must meet national quality and safety standards to address clinical practice and organisational performance.¹ Accreditation is instrumental in achieving a baseline standard of care; however, it is not usually designed to recognise excellent care or to optimise patient-reported outcomes and experience. Recognising this gap between care that meets accreditation standards and 'excellent' care, some healthcare facilities are taking proactive steps to engage in self-improvement and seek recognition for delivering exceptional care.

Excellence within healthcare is often labelled 'clinical excellence',³ and organisations that deliver exceptional patient care have been called centres of excellence or centres of clinical excellence (CoCE).⁴⁻⁶ Other dimensions of excellence that have been described in healthcare include 'research excellence',⁷ 'service excellence'⁸ and 'operational excellence'.⁹ A recently published review⁶ summarised evidence pertaining to centres of excellence in healthcare, education, research, industry and information technology. The authors of this review concluded that there are inconsistencies in how healthcare facilities are designated as centres of excellence and ambiguity between

centres of excellence and regular healthcare facilities, with limited information on how these centres were evaluated. Similarly, research excellence has been reviewed from education and clinical research perspectives, and frameworks are frequently not comprehensive,⁶ with unclear methods used to determine excellence.

Attaining recognition as a CoCE could be a source of inspiration to facilities that are recognised as leads in healthcare provision.¹⁰ Health professionals within the facilities can be inspired to pursue and maintain the best clinical care for their patients by promoting high-quality, up-to-date, evidence-based care to their community.¹⁰ Additionally, CoCE can work with accreditation bodies to set higher benchmarks that encourage innovative patient-centred care. Accreditation bodies can adopt and maintain advanced standards of care over time, helping healthcare centres to continually raise the standards of patient outcomes.¹¹

Despite the increasing use of the term CoCE, there is a lack of clarity about how this term is defined, how sites are nominated and selected as CoCE and how CoCE are evaluated and monitored. Therefore, the primary aim of this scoping review was to map evidence on CoCE in healthcare. We sought to explore and answer the following questions systematically:

1. What CoCE have been described in the literature?
2. What are the defining characteristics of CoCE?
3. How are CoCE selected or nominated?
4. What monitoring processes are employed to remain as CoCE?

Through conducting this review, we planned to explore the multifaceted dimensions of CoCE.

METHOD

Protocol and registration

We registered the scoping review protocol on Open Science Framework. We employed the scoping review framework proposed by Arksey and O'Malley¹² with the refinement outlined by Levac *et al.*¹³ to evaluate the evidence on CoCE. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews.¹⁴

Identifying relevant studies

We developed a search strategy with the support of a research librarian (online supplemental file 1). We searched MEDLINE Ovid, PubMed, Web of Science, CINAHL and Scopus to identify published records between January 2010 and June 2022. We also searched for grey literature (government reports, policies, protocols, conference proceedings and unpublished studies) and relevant websites using Google and Google Scholar. We also searched the reference lists of included records to check for further relevant records.

Inclusion and exclusion criteria are presented in box 1. We included records that discussed CoCE that provided clinical care for people with any health condition in any

Box 1 Eligibility criteria for article selection

Inclusion criteria

- ⇒ Available in the English language.
- ⇒ Information on CoCE.
- ⇒ Healthcare organisations or services providing clinical care to people with any healthcare condition.
- ⇒ Published from January 2010.
- ⇒ Any geographical location.
- ⇒ Studies describing the development/defining/monitoring/evaluation/frameworks of CoCE.

Exclusion criteria

- ⇒ Records that describe a study conducted at CoCE (eg, using participants from CoCE).
- ⇒ Centres that do not provide clinical care (eg, Centres of Research Excellence or Centres of Leadership Excellence).
- ⇒ Conference abstracts/papers, letters, NICE guidelines, JBI guidelines.
- ⇒ Only looking at costs associated with one CoCE (no comparator).
- ⇒ Only looking at clinical outcomes for people receiving care at CoCE (no comparator).
- ⇒ Using the term 'CoCE' without outlining the criteria.

CoCE, centres of clinical excellence; JBI, Joanna Briggs Institute; NICE, National Institute for Health and Care Excellence.

setting (primary care, inpatient, outpatient or community). To be included, records had to describe how a CoCE was defined, established, monitored or evaluated. We excluded records that used the term 'CoCE' without outlining any criteria. Centres of excellence that were not designed to provide clinical care (such as centres of research excellence) were excluded. Given the exploratory nature of the research questions, there was no limitation to study populations or interventions.

Study selection

The search results were imported into Covidence, and duplicates were removed. As recommended by Levac *et al.*,¹³ two reviewers independently screened titles and abstracts and reviewed full-text documents using the inclusion criteria (see box 1). One reviewer (TK) conducted the online search for relevant websites (first 20 pages on Google search) and two reviewers (TK and LNB) independently completed the screening and review of the grey literature. The inclusion and exclusion criteria were reviewed periodically throughout the title and abstract screening process to ensure the criteria facilitated the identification and inclusion of relevant studies.

Charting the data

A data extraction form was developed for the study (online supplemental tables 1 and 2). We pilot-tested the extraction form with the first 15 eligible records to ensure consistent data collection. Two reviewers (TK and EAL) independently extracted data on all included studies using the extraction form on Covidence. The quality of individual records was not assessed due to the descriptive nature of the review aims.

Collating, summarising and reporting the results

We synthesised the research findings according to the research questions and presented data from all included studies in tables. Study characteristics were presented descriptively, and the research questions were presented narratively. Henceforth, the CoCE will be identified as initiatives and the search results will be defined as records. Each initiative will be described either as a theoretical centre (describing aspirational criteria/frameworks to develop a CoCE) or a physical centre where clinical care is provided. Initiatives that described a framework were classified as ‘creating’ a framework, ‘using’ or ‘adapting’ a pre-existing framework.

Patient and public involvement

Patients were not involved in the design or completion of this study.

RESULTS

Selection of sources of evidence

Overall, 9077 records were identified from a database search, and 36 records were identified through a grey literature search. A further three records were identified by reviewing reference lists of included records. 50 records describing 45 CoCE initiatives were included in the analysis (figure 1). The complete search results and strategies are available in online supplemental file 1. Among the records excluded at full-text review, 25 (n=28%) records described or labelled a centre as a CoCE but did not provide any selection criteria or any details about how the centres were nominated or monitored.

Characteristics of sources of evidence

Most records (n=43, 86%) were published in or after 2015. Nearly all the included records (n=44, 88%) were published in peer-reviewed journals, but only 15 (30%) were research articles, the remaining 28 (56%) records

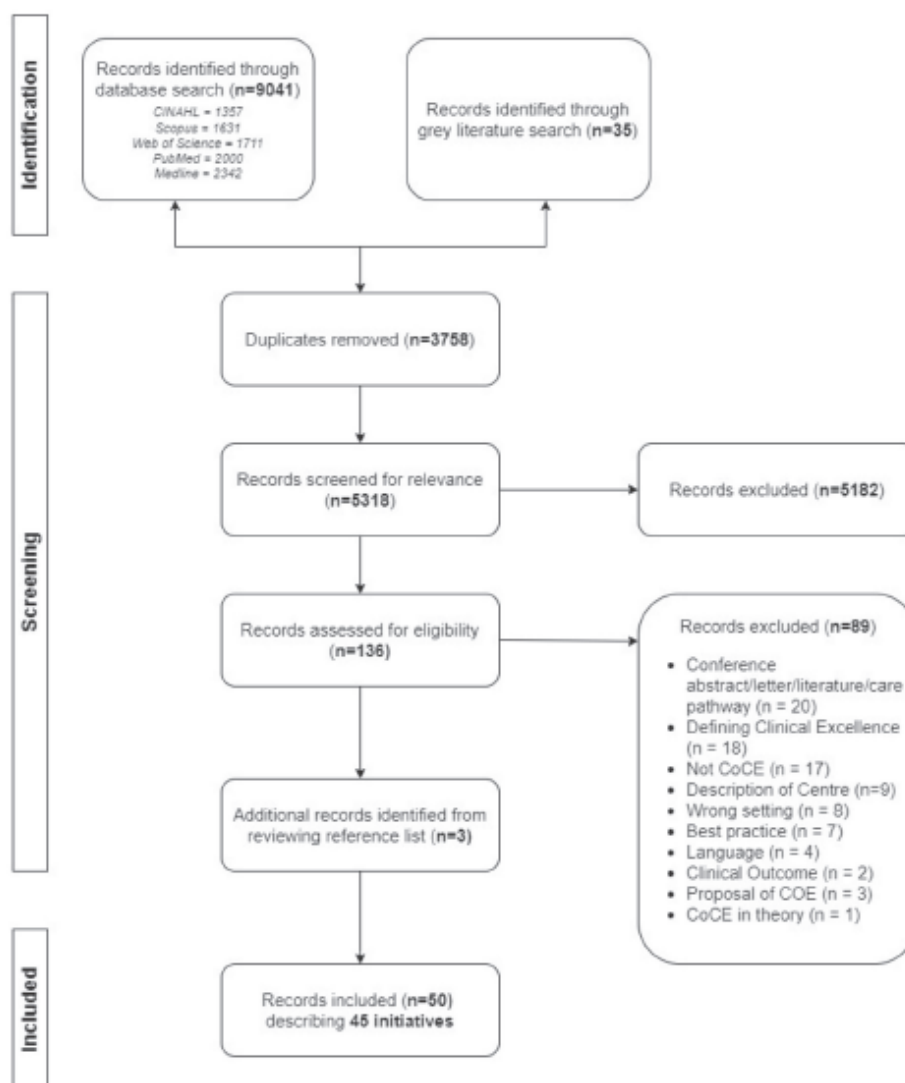


Figure 1 PRISMA flow diagram. CoCE, centres of clinical excellence; COE, centre of excellence; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Table 1 Characteristics of included records

	N (%)
Types of literature from included records (n=50)	
Research articles	15 (30)
Others (editorial, reports, case reports) from peer-reviewed journals	28 (56)
Book chapters	3 (6)
Websites	2 (4)
Systematic review	1 (2)
Government report	1 (2)
Country of Centre or initiatives described (n=45)	
USA	25 (56)
Others	20 (44)
Clinical conditions from initiatives described (n=45)	
Cardiovascular disease	8 (18)
Spinal surgery	4 (9)
Pituitary tumours	4 (9)
Diabetes	3 (7)
Pregnancy related	2 (4)
Others	24 (53)

were other article types such as editorials or case reports. Two websites were identified as additional records for initiatives identified through the literature search (see tables 1 and 2).

Synthesis of results

Less than half (n=20, 47%) of the identified initiatives were physical CoCE. With the exception of one CoCE which provided care for people with diabetes and cardiovascular disease,¹⁵ all identified CoCE treated a single clinical condition or population. The most commonly described conditions were cardiovascular disease¹⁶⁻²⁹ (n=8, 17%), spinal surgeries³⁴⁻³⁷ (n=4, 9%), pituitary tumours³⁸⁻⁴¹ (n=4, 9%), diabetes^{15 32 33} (n=3, 6%) and obstetrics^{34 35} (n=2, 4%).

Some CoCE (n=6, 13%) were located across several countries,^{17 21 25 28 36 37} whereas the majority were described as stand-alone clinical centres, such as wards, surgical centres or clinics. Eight CoCE (18%) were located in low-income and middle-income countries.^{20 32 38-43} More than half of the included CoCE were located in the USA (n=25, 53%). CoCE established in high-income countries were typically described in terms of high quality of care delivery, such as standardised care and optimal outcome (n=12, 27%),^{19 21-23 25 33 35 38 39 44-46} comprehensive multidisciplinary care (n=8, 18%)^{16 28 31 32 40 47-49} or accessible patient-centred care (n=7, 16%).^{4 15 29 36 42 50-52}

More than half of the initiatives (n=30, 67%) described a structured process to establish a CoCE. While many initiatives reported that the CoCE was established using a framework or series of developmental stages, details regarding the developmental stages were rarely available.

Five initiatives were reported using published frameworks (Elrod and Fortenberry,^{29 37 45} Christmas⁵³ and National Cancer Institute²⁹) to guide their process to establish the CoCE (see table 2 for further details).

Defining characteristics of CoCE

Less than half (n=19, 42%) of the initiatives explicitly defined the characteristics of the CoCE. Seven (16%) initiatives^{20 24 26 29 37 45 54} used the definition from Elrod and Fortenberry⁴: 'a programme within a healthcare institution which is assembled to supply an exceptionally high concentration of expertise and related resource centred on a particular area of medicine, delivering associated care in a comprehensive, interdisciplinary fashion to afford the best patient outcomes possible' (p.16).⁴

High volumes of patients treated or numbers of procedures performed, staffing, infrastructure, high quality of care and above-average patient outcomes were the most commonly described defining features of CoCE. Staffing components included medical expertise, highly skilled multidisciplinary teams and staff-to-patient ratios. Other resources that were described as part of the CoCEs were infrastructure (n=15, 33%), such as building space and examination rooms and specialised equipment (n=9, 20%). High quality of care delivery was described in terms of standardised care and optimal outcome (n=12, 27%),^{19 21-23 25 33 35 38 39 44-46} comprehensive multidisciplinary care (n=8, 18%)^{16 28 31 32 40 47-49} or accessible patient-centred care (n=7, 16%).^{4 15 29 36 42 50 51} The availability of treatment protocols was described as an important feature in seven initiatives (15%) (see table 2 for details).

There were differences noted in the defining characteristics of CoCE in low-income, middle-income and high-income countries. Universally, most CoCE had common features regarding staff expertise, equipment and patient outcomes. However, CoCE in low-income and middle-income countries tended to provide a healthcare service that otherwise was not available in the region, for instance, neurosurgery in Peru³⁹ and comprehensive dental care in Guwahati, India.³⁸

Selection or nomination process of CoCE

No details were available about how sites were selected as CoCE in half (n=24, 53%) of the included initiatives. While 21 initiatives reported that there was a selection or nomination process to be recognised as a CoCE, the details of the selection or nomination process were inconsistently reported. When reported, processes used to select centres as CoCE were varied and included application and assessment by an approval panel (n=9, 45%),^{4 8 23 34 43 45 54-56} self-identification as a CoCE with no explicit criteria or external assessment (n=6, 30%)^{15 16 19 29 41 50} and site visit by funding body to assess suitability (n=1, 5%).¹⁸ Only four (20%)^{36 46 48 57} initiatives presented the process used to select the CoCE in its entirety, which are presented in table 3. The bodies

Table 2 Characteristics of CoCE initiatives

First author of main record describing initiative	Theoretical centre (T) or physical centre (P)	Resources			Processes used or suggested for CoCE		
		Framework adapted/created	Personnel	Infrastructure	Equipment	Criteria described	Processes to establish a CoCE to monitor a CoCE
Bitzer <i>et al</i> ⁴⁷	T	X	X	X		X	X
Burkett <i>et al</i> ²⁴	T		X			X	X
Campbell <i>et al</i> ²⁵	P	X	X	X		X	X
Carvalho and Jil ²⁴	T	X	X		X	X	X
Casanueva <i>et al</i> ²⁸ & Tritos ³¹	T	X	X			X	X
Chang <i>et al</i> ⁴⁸ & Lymphatic Education & Research Network ²⁹	P	X	X			X	X
Choque-Velasquez <i>et al</i> ²⁹	P		X		X		X
Coon <i>et al</i> ²⁹	P	X	X			X	
Creehan <i>et al</i> ⁷⁰	T	X	X			X	
Daming <i>et al</i> ⁹	P	X	X	X		X	X
Deshmukh <i>et al</i> ⁴⁰	P	X	X			X	X
Dietz <i>et al</i> ⁴⁴	T	X	X		X	X	
Distiller and Brown ³²	P		X			X	X
Draznin <i>et al</i> ²³	T	X	X	X		X	
El-Eshmawi <i>et al</i> ¹⁸	P	X	X	X		X	X
Elrod and Fortenberry ⁴	P	X	X	X		X	X
Ferguson and Froehlich ⁵⁰	P		X			X	X
Frara <i>et al</i> ²⁹	T	X	X	X		X	X
Geetha <i>et al</i> ²³	P	X				X	
Haider <i>et al</i> ²⁷	T	X	X			X	X
King, Jamieson and Berg ⁴⁵	P	X				X	X
Kullar <i>et al</i> ⁵⁴	P	X	X			X	X
Lancellotti <i>et al</i> ¹⁷ & Chambers <i>et al</i> ¹⁸	T		X	X		X	X
Li <i>et al</i> ⁵⁵	T					X	
Marinoff and Heiberger ⁴¹	P		X	X		X	
Martin <i>et al</i> ²⁵	T	X				X	
McLaughlin <i>et al</i> ²⁰	T		X		X	X	X
Nakov <i>et al</i> ²⁰							
Piccini <i>et al</i> ¹	T	X	X	X		X	

Continued

Table 2 Continued

First author of main record describing initiative	Theoretical centre (T) or physical centre (P)	Resources				Processes used or suggested for CoCE		
		Framework adapted/created	Personnel	Infrastructure	Equipment	Criteria described	Processes to establish a CoCE	Processes to monitor a CoCE
Pronovost <i>et al</i> ⁴⁸	T	X				X		X
Safer Care Victoria ⁵¹	T	X				X		
Sandhu <i>et al</i> ⁵²	T	X	X					
Santos-Moreno <i>et al</i> ^{38 71 72}	P	X	X	X	X	X	X	X
Sheha and Iyer ²⁶	T		X			X		X
Shikora <i>et al</i> ⁵⁷	P	X	X	X	X	X	X	X
Shommu <i>et al</i> ⁷³	T					X		
Silver <i>et al</i> ³⁵	T		X	X		X		
Steiner <i>et al</i> ⁵⁸	T		X			X	X	
Tapela <i>et al</i> ⁴²	P		X	X	X	X		
Thomas <i>et al</i> ¹⁵	P		X				X	X
Vivian <i>et al</i> ⁴⁶	P	X	X	X	X	X	X	
Williams ²³	T	X	X		X	X	X	
Wirth <i>et al</i> ⁵²	T	X	X			X	X	X
Wu <i>et al</i> ⁶⁷	T	X				X		X
Yao and Zhou ⁴³	P	X	X				X	X
Total	21 (P) 24 (T)	30	37	15	9	39	20	24
CoCE, centres of clinical excellence.								

Table 3 Outline of selection/nomination process of CoCE

First author	Steps outlined
Chang <i>et al</i> ⁴⁸ & Lymphatic Education & Research Network ⁶⁸	<ol style="list-style-type: none"> 1. Applications will be reviewed by the LE&RN Global Oversight Committee (GOC). All applications will be scored, using the following three individual criteria: <ol style="list-style-type: none"> 1. The quality of the overall application/services. 2. Unique offerings or particular characteristics that add to the lymphatic disease clinic. 3. Miscellaneous (eg, lymphatic disease community citizenship, research).
Santos-Moreno <i>et al</i> ³⁶	<ol style="list-style-type: none"> 1. Implementing an attention model for the patients diagnosed with rheumatoid arthritis, in accordance with the requirements of each type of centre of excellence. 2. Filling the self-assessment form of each type of centre of excellence and implementing improvement actions. 3. Requesting and preparing for a verification visit. 4. Receiving a verification visit from REAL-PANLAR. 5. Official notice of the results of the assistance and verification visit.
Shikora, Delegge and Van Way III ⁵⁷	<ol style="list-style-type: none"> 1. Online application completed by surgeon or facility. 2. Successful application results in provisional status. 3. Within 2 years must seek full approval and pass on-site inspection and indicates has an excellent outcome. 4. Mandatory submission of all patient data to a database.
Vivian <i>et al</i> ⁴⁶	<ol style="list-style-type: none"> 1. Establishing the foundation (leadership structure and purpose). 2. Formalising the centre of excellence programme (clinical education training, multidisciplinary team involvement). 3. Solidifying the centre of excellence status (certification/accreditation by external institute).

CoCE, centres of clinical excellence.

providing oversight of the nomination or selection of the CoCE were professional bodies,^{28 26 34 36 48 54} insurers^{45 55} and organisations.^{4 38 46}

Monitoring protocols to remain a designated centre of clinical excellence

Only 24 (53%) of the included initiatives reported a monitoring process for the CoCE. Monitoring was mandatory for 6 (25%)^{34 36 48 52 54 57} initiatives through recertification process. Other initiatives reported the importance of monitoring outcomes such as productivity (n=5, 21%),^{17 19 99 43 50} patient outcomes (n=9, 36%),^{15 16 27 29 30 32 45 47 49} quality metrics (n=3, 13%)^{24 26 37} and cost-effectiveness of the programme (n=1, 4%),⁴⁰ but there was no evidence that this monitoring process was routinely performed or overseen by any parties.

DISCUSSION

Summary of evidence

To our knowledge, this is the first scoping review to summarise what is known about CoCE in healthcare.

Despite identifying numerous CoCE initiatives, we were unable to identify selection processes used in more than half of the included initiatives. When selection processes were documented, they varied between initiatives. Further, there were inconsistencies in monitoring CoCE performance. Without consensus on what defines a CoCE, and

without a recognised body to monitor the performance within each CoCE, there is no guarantee that care being delivered by sites claiming to be CoCE are delivering excellent (or even better-than-usual) healthcare.

The most common defining feature of CoCE included in this review was resource availability, specifically personnel, infrastructure and equipment. These findings are not surprising; it is well established that there are associations between staffing levels, skill mix, infrastructure and patient outcomes.^{58–62} For example, higher nursing staffing levels and employment of more skilled staff are associated with better patient outcomes such as reduced rates of pressure injuries, mortality and falls.^{58 60} Features such as infrastructure and specialised expertise are also key factors in centres of excellence in other industries.⁸ The inclusion of these features within CoCE reinforces that the included CoCE were designed to align with what is known about healthcare delivery that leads to improved patient outcomes.

While frameworks or processes used to establish or describe CoCE may be valuable to guide others in the field, they may have limitations if these processes were developed for a specific healthcare facility, stakeholder cohort or disease group. For example, the Willis-Knighton Health System is a not-for-profit healthcare network in Louisiana, USA, that operates 11 self-nominated centres of excellence. The framework used to establish these

centres of excellence was described by Elrod and Fortenberry and cited by authors of 8 initiatives in our review to describe or establish their centres. Consideration should be given as to whether this framework is fit for purpose beyond the state of Louisiana and in countries with different healthcare models from the USA. Additionally, it is unclear whether this framework meets a universally agreed definition of excellence in healthcare. Empirical research to define 'excellent care' from the perspectives of patients, healthcare facilities or funders could increase the validity of the frameworks and, subsequently, the CoCE. A recent study (published after our review was completed) has identified defining criteria of 'aspirational' (vs pragmatic, feasible or cost-effective) CoCE in stroke recovery and rehabilitation from the perspective of healthcare providers, survivors and caregivers and researchers. These criteria and the underpinning indicators could be used by facilities seeking recognition as CoCE in stroke healthcare provision.⁶⁸

Selection procedures for CoCE were inconsistently reported and were unavailable for nearly half the included initiatives. The description of excellent care provided by the CoCE varied, seemingly depending on the agency responsible for defining it. Descriptions of excellence encompassed patient-centric outcomes (eg, optimising clinical outcomes and quality of life), service-centric outcomes (eg, staff skill development, resource availability and meeting quality and safety accreditation) and economic outcomes (eg, cost of treatment and length of stay). The concept of excellence was sometimes conflated with high volume of patients who received care at the centre. Excellence for some centres from low-income and middle-income countries was defined (either by self-nomination or by the government or collaborating international institutions) in providing a particular healthcare service when none was previously available in the region. Many of these aspects of excellence reflect commonly measured quality indicators of healthcare in high-income countries, namely effectiveness, access, safety and efficiency.⁶⁴ However, cost is not included as a quality metric in countries such as Australia, Canada or the UK, but it is included as a measure of quality in the US Commonwealth Fund framework.⁶⁴ The difference between healthcare systems that generate income and those that do not is likely to influence many aspects of excellence. The inclusion of cost as a feature of some CoCE could be reflective of the different funding models (eg, fee-for-service vs universal healthcare) or healthcare priorities within the centres or by the bodies determining a site's excellence. While cost is considered in universal healthcare funding models, it is rarely highlighted beyond ensuring that healthcare providers function within their budget, which markedly differs from financial models that seek to produce profit in fee-for-service healthcare systems. Indeed, the centres that reported economic outcomes as a measure of clinical excellence were predominantly located in the USA and were nominated by healthcare funders suggesting that cost and cost efficiency is overtly

considered as an important facet of excellence in fee-for-service centres.^{65 66}

Benchmarking is a well-recognised process that identifies the best-performing healthcare facilities in terms of patient outcomes and system performance.⁶⁷ However, while there is an implicit assumption that CoCE will deliver care that is superior to another (non-excellent) centre, most of the included initiatives in our review did not benchmark with other services. Benchmarking allows tracking of performance over time while comparing performance against other facilities, thereby demonstrating what is feasible to achieve in terms of quality of care.⁶⁷ For the initiatives included in this review, without comparison to other healthcare facilities and without a standardised set of explicit, evidence-based and measurable criteria, it raises disparity and challenges on how these centres can claim to be legitimate CoCE.

It is recognised that healthcare performance can be variable,⁶⁷ so healthcare facilities should monitor and evaluate their programmes to ensure continued excellence. This process needs to be feasible within the time and resource constraints. Just over half the initiatives included in this review reported monitoring their service and described various processes including measuring patient outcomes, service productivity and quality metrics to maintain the designation of CoCE. Only six initiatives reported a structured process, where their ongoing performance was reviewed and assessed by an overseeing body to maintain their status as CoCE. Clearly, more attention should be paid to demonstrate the sustainability of excellence initiatives.

Conclusion

Although CoCE are increasingly reported in the literature, there are inconsistencies in how these CoCE are established, monitored and evaluated. Processes used range from self-designation with no explicit criteria to using external evaluation and periodic recertifications. Features of CoCE centred around skilled medical and multidisciplinary teams and other resources such as infrastructure and equipment. More work is required to develop transparent systems and processes to ensure that centres claiming to be 'excellent' can demonstrate that they are delivering the highest quality care.

Implication for practice and future research

This review highlights the need for clear criteria healthcare facilities can use to identify or establish a CoCE. The processes used also need to be transparent so they are easily available for certification or auditing purposes. The concept of a healthcare centre promoting 'excellence' can also vary depending on different perspectives: patient, systems or funding. There needs to be clear guidelines that highlight the impact of 'excellence' from these perspectives to ensure transparency on why a centre was nominated as a CoCE, and the monitoring processes used. It is recognised that staff well-being and retention contribute to more consistent healthcare delivery and

better patient outcomes, so including staff well-being in a CoCE framework may be of value. The findings from this review will contribute to international efforts to establish CoCE using robust, transparent criteria and key performance indicators.

Strengths and limitations

The strengths of our scoping review include the inclusive search strategies (peer-reviewed journals and grey literature) and stringent review process using two independent reviewers throughout the process. There is a potential that there may be established CoCE that have not published any studies or reports, which we then have not identified. While we sought assistance from an academic librarian to ensure the search strategies were clear and comprehensive, centres that describe excellence using different terms and relevant information published in non-indexed sources may have been missed. This is a particular challenge of this focus of work which straddles healthcare organisation, clinical practice and academic research.

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Contributors All authors were involved in the screening of records and data extractions. TK was the main author of this work and was responsible for the study design and coordination of the team. TK and EAL were responsible for drafting the manuscript and all authors helped with the critical review of the manuscript. TK is the guarantor.

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Appendix C: Data Extraction Part 1

(part of the published manuscript as supplemental material)¹

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Bitzer et al ²	Describing the framework and characteristics of an "ideal" CoE of Sexual Medicine and Sexual Therapy	Other [#]	Centre of Excellence for Sexual Medicine (Not reported)	Created by authors	Diagnosis and treatment of Sexual dysfunction. Aim to <ul style="list-style-type: none"> • To provide a frame for patient-centred and relationship-based care • To provide multidisciplinary diagnostic assessment, individualised therapeutic options, documentation and follow-up of patients • Provide training for medical students, residents and fellows 	Personnel <ul style="list-style-type: none"> • Multi-disciplinary team Infrastructure <ul style="list-style-type: none"> • A room for counselling/therapy • Examination room
Burkett et al ³	To present the concept of "centres of excellence" and how they are applied	Book chapter	Spine Centre of Excellence	Not reported	<ul style="list-style-type: none"> • To achieve exceptional quality of spine care at lower cost. 	Personnel <ul style="list-style-type: none"> • Specialties involved may include neurosurgery,

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	to spine care. Provided an overview of spinal CoE.		(Not reported)		<ul style="list-style-type: none"> • To establish a regional presence and a robust patient population. • To demonstrate that the organisation meets high performance standards. • To stand out among other area institutions. 	orthopaedic surgery, rehabilitation, occupational therapy and physical therapy, pain management, specialised nursing, radiology, behaviour medicine, and psychiatry
Campbell et al ⁴	Examines the evolution of a Centre of excellence as an innovative model for sustainable cleft care in the developing world	Research article*	Operation Smile Guwahati Comprehensive Cleft Care Center (2019)	Created by authors and collaborators from Operation Smile	To provide standardized and comprehensive cleft care at one institution, with vision of making Assam a cleft-free state.	Personnel <ul style="list-style-type: none"> • Healthcare professionals in multiple disciplines Infrastructure <ul style="list-style-type: none"> • Modern surgical suite and clinical space • Modern integrated operating suite, advanced surgical equipment, sophisticated anaesthesia and monitoring capabilities
Carvalho and Jill ⁵	To describe designation process of Centres of Excellence in obstetric	Other [#] & Website	CoE for Anaesthesia Care of	The criteria for Centres of Excellence	CoE designation process is designed to recognize institutions and programs	Personnel <ul style="list-style-type: none"> • Obstetric anaesthesiologist

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
	ant		Obstetric Patients (2018)	designation, which covers all aspects of obstetric anaesthesia care, were generated by expert consensus and incorporate evidence-based recommendations.	that demonstrate excellence in obstetric anaesthesia care, to set a benchmark level of expected care to improve the standards nationally, and to provide a broad surrogate quality metric of institutions providing obstetric anaesthesia card.	<ul style="list-style-type: none"> • 24/7 coverage of obstetric patients by at least 1 anaesthesiologist Equipment <ul style="list-style-type: none"> • Includes access to blood transfusion equipment and supplies, access to resuscitation and intubation equipment and supplies
Casanueva et al ⁶ & Tritos ⁷	To describe the criteria for developing Pituitary Tumors CoE	Other [#] & Website	Pituitary Tumor Centers of Excellence (Criteria disseminated 2017)	Expert working group drafted framework. The draft was modified and approved by the Board of Directors of the Pituitary Society. The document was presented to international groups, modified and endorsed.	<ul style="list-style-type: none"> • Provide the best multidisciplinary care for patients with pituitary tumours and related pathologies. • Advance pituitary science • Provide adequate patient education and community outreach. • Act as a training centre for residents in the treatment of pituitary • Pathologies 	Personnel <ul style="list-style-type: none"> • Medical specialists • Multidisciplinary supports • Basic requirements for surgical training and endocrinologist training listed.

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
					<ul style="list-style-type: none"> • Advise health administrators and authorities on specific problems. 	
Chang et al ⁸ & Lymphatic Education & Research Network ⁹	<p>To describe the steps taken to establish standards for Centres of Excellence for Lymphatic Disease</p> <p>Described 5 categories of Centres of Excellence:</p> <ul style="list-style-type: none"> • Comprehensive Centre of Excellence • Network of Excellence • Referral Network of Excellence • Lymphatic Disease Surgery Centre of Excellence • Lymphatic Disease Conservative Care Centre of Excellence. 	Research article*, website	Lymphatic Education and research network CoE (Criteria published 2021)	Lymphatic Education and Research Network initiated a Centres of Excellence program to designate institutions that provide services for lymphatic disease patients	<ul style="list-style-type: none"> • Provide multidisciplinary clinical care • Provide professional and lay education • Involvement in clinical research <p>Work with local and international CoCEs to continually improve the lives of people with LD and their families.</p>	<p>Personnel</p> <ul style="list-style-type: none"> • Multi-disciplinary input • Suggested expertise requirements listed in detail <p>Resources</p> <ul style="list-style-type: none"> • Assessment tools listed

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Choque-Velasquez et al ¹⁰	To describe the development of Neurosurgical Centre of Excellence in Peru	Research article*	Specialized Neurosurgical Centre of Excellence (2016)	Not specified what process used	To improve the treatment of neurosurgical diseases in the region, thus optimising their outcomes and decreasing transfers to the neurosurgical departments in the capital district	Personnel <ul style="list-style-type: none"> • Staff training by neurosurgeons and nurses from Finland Equipment <ul style="list-style-type: none"> • Equipment provided/repared Other <ul style="list-style-type: none"> • Neurosurgical protocols developed
Coon et al ¹¹	Introduced key aspects of coordinated care for patients with MSA and their caregivers, discuss various outcome measures, and share experiences from two centers with multidisciplinary clinics.	Other [#]	Multiple System Atrophy CoE (Multiple Centres discussed. Established between 2015 - 2019.)	Created by authors but process not described	Not reported	Personnel <ul style="list-style-type: none"> • Multi-disciplinary team
Creehan et al ¹²	Describe the development of a framework for Centres of	Research article*	Centers for Pressure Ulcer	Framework developed using Donabedian	Inspirational centre - to develop a framework. Aim to achieve and sustain	Personnel <ul style="list-style-type: none"> • Frontline staff engagement and hospital

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
	Pressure Ulcer Prevention Excellence		Prevention Excellence (developed in 2014)	model. Systematic literature reviews, analysis of exemplars, and nominal group process techniques were used to create the framework, based on 4 Magnet Model domains.	reductions in avoidable hospital-acquired pressure ulcers	<ul style="list-style-type: none"> • Administrator • Leadership
Daming et al ¹³	A guide for creating a center of excellence for prenatal care for women with cardiovascular disease.	Other [#]	Maternal Cardiac CoE (2014)	Developed a 3 staged framework (vision-> design and development - > implement, monitor and review).	To manage pregnant women consistently and systematically with heart disease.	Personnel <ul style="list-style-type: none"> • Program coordinator • Multi-disciplinary team (recommendation provided for speciality) Infrastructure: <ul style="list-style-type: none"> • Dedicated outpatient clinic
Deshmukh et al ¹⁴	To evaluate the impact of the Centre of Excellence at Vidya Shikshan Prasarak Mandal Dental College and Research	Research article*	Centre of Excellence at Vidya Shikshan Prasarak	The present CoE model was planned and executed with consensus building for 12 months	<ul style="list-style-type: none"> • To provide comprehensive oral healthcare for economically 	Personnel <ul style="list-style-type: none"> • Academic faculty, consultants and post-graduate students

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
	Centre		Mandal Dental College and Research Centre (2016)	using several methods to involve stakeholder groups (staff, students and patients)	disadvantaged groups in rural India. <ul style="list-style-type: none"> • To foster organisational development through an integrated approach. • To stand out as a pioneer in Central Indian region in the fields of maxillofacial rehabilitation and oral implantology. 	
Dietz et al ¹⁵	Summary of best practices for the prevention and treatment of PJI within the context of a CoE.	Case report^	Centers of Excellence in Addressing Periprosthetic Joint Infection (Not reported)	Creating a basis for framework within the literature, based on work on musculoskeletal infection symposium	Centers of Excellence provide better overall outcomes and lower financial, physical, and emotional costs to the patient, thus providing a greater value by decreasing variability in treatment pathways and incorporating best practices based on evidence.	Personnel <ul style="list-style-type: none"> • Multi-disciplinary teams Equipment <ul style="list-style-type: none"> • Electronic medical records Others <ul style="list-style-type: none"> • Protocols for pre-operative screening and evaluation • Risk reduction protocols and processes

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Distiller and Brown ¹⁶	Not reported	Book Chapter	Centres for Diabetes Excellence (1994)	Not reported	To improve diabetes management and provide “one-stop shop” for patients. With all services in one place, and a well-managed appointment system, patients experienced minimal waiting and optimal consultation times.	Personnel <ul style="list-style-type: none"> • Trained medical staff (specialists, GPs or physicians) Other <ul style="list-style-type: none"> • every centre must provide a direct 24-h emergency telephone number (“Hotline”)
Draznin et al ¹⁷	Proposing a framework to guide advancement for clinical CoE	Other [#]	Diabetes Center of Excellence (Not reported)	6 domains or pillars to serve as guiding principles	To improve population health, patient care experience (including quality and satisfaction) and reducing healthcare costs. Diagnosis and management of diabetes.	Personnel <ul style="list-style-type: none"> • Adequate in terms of number, skills, experience • Multi-disciplinary professional teams guided by clinician diabetologists experienced in managing complex, high-risk individuals Infrastructure

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
						<ul style="list-style-type: none"> • appropriate to qualify as a centre and technologies
El-Eshmawi et al ¹⁸	To define the structure of a mitral center of excellence and to review current clinical outcomes	Other [#]	Mitral Valve Center of Excellence (Not reported)	Description of functioning of self-nominated Centre of Excellence	Provides a structure for a multidisciplinary heart team to provide state of the art care for patients with degenerative mitral valve disease	Personnel <ul style="list-style-type: none"> • Crucial - surgeons trained in mitral valve repair; anaesthesia team, intensive care team, interventional cardiologist Infrastructure <ul style="list-style-type: none"> • Mitral valve clinic; access to advanced cardiac imaging; data monitoring team
Elrod and Fortenberry ¹⁹	To guide healthcare establishments to replicate noted processes to realize their own CoE	Other [#]	Willis-Knighton Health System CoE -has 11 CoE in different clinical areas (1980's)	Based on information and insights gleaned from 1 healthcare provider's (Willis-Knighton Health System) experience assembling and operating Centers of Excellence.	To deliver innovative, high-quality healthcare that would attract increasing number of patents	Personnel <ul style="list-style-type: none"> • Skilled and experienced personnel Infrastructure <ul style="list-style-type: none"> • Appropriate accommodation necessary to deliver continuum of care

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Ferguson and Froehlich ²⁰	Describe the development of the program, its guiding principles, challenges and early results	Case report [^]	The Total Joint Centre (2010)	Not reported. Intuitive quality improvement process with assistance from external consultant	To provide state-of-the-art, high quality, patient-centric, efficient healthcare	Personnel <ul style="list-style-type: none"> • Multi-disciplinary team • Patient navigators employed
Frara et al ²¹	Not reported. Discussion paper	Case report [^]	Pituitary tumors centers of excellence (Not reported)	Adapted from Elrod and Fortenberry	To provide a high-level care for pituitary patients, to advance pituitary science.	Personnel <ul style="list-style-type: none"> • Specialist medical staffing and nursing Infrastructure <ul style="list-style-type: none"> • Physical place availability
Geetha et al ²²	Apply the definition of clinical excellence to nephrology	Other [#]	Miller-Coulson Academy of Clinical Excellence (2015)	Adapted clinical excellence framework from Christmas	Not reported	Not reported
Haider et al ²³	<ul style="list-style-type: none"> • To explore the role of international urologic organisations in developing CoE in patient care, training 	Case report [^]	Not reported (Not reported)	Used Elrod and Fortenberry	To contribute to health system strengthening through international partnerships	Personnel <ul style="list-style-type: none"> • Staff with depth and breadth of knowledge and qualifications

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
	<p>and dissemination of knowledge.</p> <ul style="list-style-type: none"> • To explore strategies used to improve the standard of care and outcomes of urologic conditions in LMIC. • To provide a roadmap on how similar international surgical organizations can contribute to developing CoE in LMIC through health system strengthening. 					
King, Jamieson and Berg ²⁴	To use the example of transplant programs (with extensive national-level data) as examples of the strategic planning required to accomplish comprehensive. Interdisciplinary care affording the best possible outcomes, and	Other [#]	Presents 9 Centres of Excellence designations within solid-organ transplantation (Not reported)	Elrod and Fortenberry	Providing best outcomes possible to people undergoing organ transplantation	Not reported

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
	rightfully claim to serve as centres of Excellence.					
Kullar et al ²⁵	<ul style="list-style-type: none"> • To describe the process and purpose of designating institutions as Antimicrobial Stewardship Centres of Excellence CoEs. • To provide awareness to clinicians on opportunities available through Infectious Diseases Society of America with this CoE designation 	Research article*	Antimicrobial Stewardship Centres of Excellence (program) (2017)	Built on core elements of Centers for Disease Control and Prevention. Added aspects of meaningful differentiation by workgroup of infectious diseases physicians and pharmacists	Effectively implement of antimicrobial stewardship programs	Personnel <ul style="list-style-type: none"> • Clinical expertise
Lancellotti, Dulgheru and Sakalihasan ²⁶ & Chambers et al ²⁷	Chambers: to discuss Standards for mitral and aortic valve multidisciplinary team practice within a 'Heart Valve Center of Excellence'.	Other [#] & Research article*	Heart Valve Centre of Excellence (Not reported)	Not reported	To perform durable mitral valve repair at close to zero risk in patients with asymptomatic severe mitral regurgitation caused by prolapse. The intention was that invasive valve interventions should not occur outside Heart Valve	Personnel <ul style="list-style-type: none"> • Multi-disciplinary team (medical and nursing) proficient in diagnosing and treating all cardiac valve syndromes and disorders Infrastructure

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
					Centres of Excellence	<ul style="list-style-type: none"> • Facilities to treat and refer patients for valvular surgery/intervention. • Access to expert imaging
Li et al ²⁸	To evaluate the current status of defining and using CoE designation	Research article*	Not reported (Not reported)	Not reported	Not reported	Not reported
Marinoff and Heiberger ²⁹	To share accomplishments and limitations from creating a Centre of Excellence in Low Vision rehabilitation in China	Case report^	Center of Excellence in Low Vision and Vision Rehabilitation (2010)	Not reported	Treatment of people with low vision	<p>Personnel</p> <ul style="list-style-type: none"> • Trained doctors and nurses <p>Infrastructure</p> <ul style="list-style-type: none"> • Occupies 6,240 square feet and is equipped with four low vision examination rooms, a special testing room, an assistive technology room, a dispensing area, and a classroom, access to multiple low vision devices
Martin et	Utilize available literature	Systematic	Spine CoE	The COE's	Standardisation of	Not reported

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
al ³⁰	to better characterize the features of a spine COE at a tertiary care center and determine the impact of CoEs on patient satisfaction and outcomes.	Review & Case report [^]	(2021)	(Midwest academic tertiary care) mission entails three primary emphases: value, quality, and accountability.	protocols for the works up of suspected spinal cord compression across the regional hospital system to improve time to diagnosis, transport and intervention.	
McLaughlin et al ³¹	Review the literature supporting the establishment of pituitary CoEs, suggest criteria for COE recognition, consider the development of standards of care, and discuss potential pitfalls.	Other [#]	Pituitary Centre of excellence (Not Reported)	Not reported for pituitary tumour, however provided examples of other models e.g., bariatric	Treatment of pituitary tumour and described primary missions and criteria for verification	Personnel <ul style="list-style-type: none"> • Multi-disciplinary approach related to pituitary tumours and hormonal disorders. • At least 1 neurosurgeon with transsphenoidal surgical experience • Training for team Equipment <ul style="list-style-type: none"> • Equipment and instrumentation for endonasal cranial base surgery including endoscopic equipment Others

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
						<ul style="list-style-type: none"> • Clinical pathways and standard operating procedures
Nakov et al ³²	Focus on the importance of performing the most appropriate testing strategies for ATTR amyloidosis and establishing a CoE for this rare disease. Highlights experience in establishing a CoE in Sofia, Bulgaria and define the fundamental steps needed to successfully launch a program.	Other [#]	CoE for ATTR amyloidosis (2016)	Not reported	Treatment for Amyloidosis	Personnel <ul style="list-style-type: none"> • Dedicated team of experts specialized in the range of medical fields required to diagnose the patients effectively and education/training for staff
Piccini et al ³³	HRS hopes to accelerate this evolution by reviewing the rationale for AF CoEs, the available evidence for integrated and multidisciplinary care, and future challenges and opportunities. The	Other [#]	Atrial Fibrillation CoE (Not reported)	Fundamentals of team-based integrated care models in atrial fibrillation	To improve outcomes by providing a better patient experience and delivering high-quality, guideline-recommended, state of the art care	Personnel <ul style="list-style-type: none"> • Multi- disciplinary team Infrastructure <ul style="list-style-type: none"> • Dedicated lab with fluoroscopy • Electrophysiology recording system • Emergency equipment

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
	document also defines the key priorities to be used as a guide for HRS and its diverse stakeholders to build consensus on defining the core components of an AF CoE.					Others <ul style="list-style-type: none"> • Complication standard operating procedure
Pronovost et al ³⁴	Defines explicit criteria for provider-based CoEs and how to apply them within a healthcare organization	Case report [^]	General description of CoE (Not reported)	Reported used a framework based on University Hospital, USA and listed the criteria used to establish CoE as a framework.	Have access to multi-D team and seek to improve patient experience and outcomes and reduce costs	Not reported specifically. Used examples from other CoE
Safer Care Victoria ³⁵	Discuss approaches to engaging clinicians and consumers to improve the quality and safety of health care in Vitoria. Spells out the purpose, role and structure of the CoCE.	Website – grey literature	Safer Care Victoria Centres of Clinical Excellence (2021)	Aligns with Safe Care Victoria Strategic Plan 2020-2023.	Contribute to the key strategic domains of leadership, partnership and planning, monitoring and improvement with the aim of improving healthcare across Victoria, so it is safe, more effective and person-centred.	Not reported

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Sandhu et al ³⁶	To gain a better understanding from key stakeholder groups on current practices needs and potential barriers to implementing optimal integrated AF care.	Other [#]	Atrial Fibrillation CoE (2022)	AF CoE task force provides recommendations on defining, developing, implementing and evaluating an AF CoE	To standardise the care of AF patients based on guideline directed care to achieve best outcomes.	Personnel <ul style="list-style-type: none"> Identified the need for multi-disciplinary team
Santos-Moreno et al ³⁷⁻³⁹	<ul style="list-style-type: none"> To define the minimum standard of care. To describe the history and current context of the CoE in comprehensive care in patients with RA with suggestions on how to create CoE in RA Proposed a systematic and progressive methodology that will help all the institutions to develop successful models without faltering in the process 	Research article* & Other [#]	Centre of Excellence in Rheumatoid Arthritis (Not reported)	<p>Created own framework and integrated healthcare models and endorsed by REAL-PANLAR</p> <p>Based on 3 pillars</p> <ul style="list-style-type: none"> - the volume of patients with a specific condition or entity - continuous improvement - the quality of healthcare 	<p>The ultimate goal of the CoE is to define a model of comprehensive care that meets the needs of the region in order to improve the accessibility, quality, and timeliness of care, and access to appropriate diagnosis and treatment. This is to facilitate access to better quality treatment, achieve disease remission, improve their quality of life and reduce long-term disability risk to RA patients.</p>	<p>Three CoE Modes were presented and each model (standard CoE, Optimal CoE, Model CoE) had different requirements of staff, equipment and infrastructure</p> <p>Personnel (at minimum)</p> <ul style="list-style-type: none"> Multi-disciplinary team led by rheumatologist <p>Infrastructure</p> <ul style="list-style-type: none"> Access to radiology Access to pathology <p>Equipment</p> <ul style="list-style-type: none"> Standardised tools

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Sheha and Iyer ⁴⁰	General description of CoE and applying general principles of healthcare CoE to spine surgery	Other [#]	Spine CoE (Multiple centres that was previously established was discussed in the study)	Not reported	An opportunity to accurately evaluate the true value of outpatient spine surgery	Personnel <ul style="list-style-type: none"> • Multi-disciplinary team • Education
Shikora, Delegge and Van Way III ⁴¹	Describes the creation, implementation, and benefits of the BSCoE (Bariatric Surgery COE) and the benefits of creating an NSCOE (Nutritional Support CoE). Description of the CoE in Bariatric Surgery and how this can be adapted to Nutritional Support. The report contains description of resources, how it was created the certification process and benefits of BSCoE	Case report [^]	Nutrition Support Center of Excellence (2003 - creation of the Surgical Review Corporation)	Consideration for adaption of BSCoE to NSCoE The SRC <ul style="list-style-type: none"> • Formulate and establish guidelines and criteria for assessing bariatric surgical practices. • Evaluate and investigate applicants to ensure that they 	Not reported	Specified BSCoE and how this can be adapted to NSCoE Personnel <ul style="list-style-type: none"> • Surgeons specific criteria for BSCoE Infrastructure <ul style="list-style-type: none"> • Specific to BSCoE Equipment <ul style="list-style-type: none"> • Not specifically outlined

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
				met the established standards to become a BSCOE. • Creating a national bariatric surgical database to collect, analyse, and disseminate data collected from the BSCOE		
Shommu et al ⁴²	To develop a multi-disciplinary consensus of nutrition care priorities for implementation in an IBD nutrition CoE	Research article*	Inflammatory Bowel Disease Nutrition CoE (2019)	Not reported	To provide excellent clinical care, conduct original research	Raised as a concern/barrier • Lack of infrastructure • Lack of staffing
Silver et al ⁴³	To outline criteria for centers of excellence and suggested indications for referral in cases of suspected placenta accreta.	Other [#]	Accreta CoE (Not reported)	Not reported	Optimal management of patients with placenta accreta	Personnel • Multi-disciplinary team with specialised staff for placenta accreta Infrastructure • Intensive Care unit and facilities

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Steiner et al ⁴⁴	To suggest criteria that the headache centres might be recognised as centres of excellence in the headache community. Set out recommendations for 10 suggested role and performance-defining standards.	Other [#]	Specialized headache centre (Not reported)	Not reported	Providing specialist care to patients with primary or secondary headache disorders that are difficult to diagnose or treat, refractory or rare, or for other reasons require specialist intervention	Personnel <ul style="list-style-type: none"> • Multi-disciplinary care
Tapela et al ⁴⁵	Report program level description of implementing Butaro Cancer CoE, its preliminary impact and challenges faced in order to share lessons and inform service delivery in similar setting	Research article*	Butaro Cancer CoE (2012)	Not reported	To deliver accessible cancer services in a resource-constrained setting histology-based diagnosis, imaging, surgical, pall care and socioeconomic supports	<p>Provided by Rwanda Ministry of Health.</p> Personnel <ul style="list-style-type: none"> • Doctors and nurses received training Infrastructure <ul style="list-style-type: none"> • To support surgical procedures and palliative care Equipment <ul style="list-style-type: none"> • X-ray and ultrasounds imaging

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
						Others <ul style="list-style-type: none"> • Treatment protocol • Finance • Partnership with other services from USA
Thomas et al ⁴⁶	Establishing Cardiometabolic CoE for secondary prevention in patients with T2D and CVD	Other [#]	Cardiometabolic Center of Excellence (2018)	Not reported	To deliver patient-centred collaborative model of care focused on aggressive and comprehensive secondary cardiovascular risk reduction in patients with T2D and CVD	Personnel <ul style="list-style-type: none"> • Nurse navigator • Cardiometabolic Center Advisory Committee • Training
Vivian et al ⁴⁷	To outline the framework for a Pancreas CoE	Research article*	Pancreas CoE (2013)	Outlined framework using 3 developmental domains. <ul style="list-style-type: none"> • Establishing the foundation • Formalising the program • Solidifying the CoE status 	To improve the care and outcomes of patients and families affected by pancreatic disease using a multidisciplinary team approach to deliver exceptional and compassionate care	Personnel <ul style="list-style-type: none"> • Management – leadership support • Surgeons trained in robotic surgical approach • Multi-disciplinary staff trained • Specific – nurse navigator and dietician Infrastructure

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
						<ul style="list-style-type: none"> • To establish and maintain robotic surgical approach <p>Equipment</p> <ul style="list-style-type: none"> • Minimally invasive technology (robotic) • Advanced endoscopic technology • Clinical Information Systems - dashboards. <p>Others</p> <ul style="list-style-type: none"> • Certification
Williams ⁴⁸	To discuss the evolution of the concept of Centers of Excellence and the components of an HCM center	Book Chapter	Hypertrophic Cardiomyopathy Centre (1971 for the first 15 centers)	Adapted model from National Cancer Institute	Network of referral centres established for adult and paediatric HCM patients' regional centres encourage consistency of treatment algorithms and outcomes access to world-class clinical care within driving distance, as well as collaborative research between institutions. Also a resource and offer	<p>Personnel</p> <ul style="list-style-type: none"> • Multi-disciplinary team that includes specialists in adult and paediatric cardiology, electrophysiology, interventional cardiology, cardiac surgery and genetic counselling, all with particular expertise in treating the patient with HCM.

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
					second opinions for providers and patients.	Equipment <ul style="list-style-type: none"> • Cardiac imaging (echocardiography and cardiac magnetic resonance imaging) • Electrophysiology
Wirth et al ⁴⁹	To develop the concept of the European Prostate Cancer Centers of Excellence with the specific aim to identifying European Centers characterised by high-quality care, research and education	Research article*	European Prostate Cancer Centres of Excellence (Criteria agreed upon in 2019)	Created by authors	To enable high-quality management of prostate cancer in the fields of clinics, research, and education	Resources requirements are outlined in detail in the study and specific requirement Personnel <ul style="list-style-type: none"> • Core team, associated services and multi-disciplinary approach
Wu et al ⁵⁰	To evaluate <ul style="list-style-type: none"> • Patient outcomes at nominated CoE • Whether the revamped designation criteria would result in improved patient outcomes. 	Research article*	Blue Distinction Plus Centres (2016)	Value framework	Not reported	Not reported

Author(s)	Aim of publication	Type of publication	Description of CoCE			
			Name of CoCE (Year established)	Framework	Function of CoCE	Resources
Yao and Zhou ⁵¹	To describe the impact of the introduction of a mentor-based CoE program	Research article*	Peritoneal Dialysis CoE (2003)	Created using mentor-mentee system	To become a best demonstrated practice unit	Personnel <ul style="list-style-type: none"> • Physicians from mentor sites Other <ul style="list-style-type: none"> • Standardized teaching materials to deliver lectures, lead PD case discussions and ward rounds, suggest key performance indicators, and initiate a continuous quality improvement program.

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Appendix D: Consolidated Framework for Implementation Research Domains and Constructs

Damschroder LJ, Reardon CM, Widerquist MAO, Lowery J. The updated Consolidated Framework for Implementation Research based on user feedback. *Implement Sci* 2022; 17 (1): 75. 20221029. DOI: 10.1186/s13012-022-01245-0.

Framework Guidance:

The CFIR is intended to be used to collect data from individuals who have power and/or influence over implementation outcomes. See the CFIR Outcomes Addendum for guidance on identifying these individuals and selecting outcomes.

The CFIR must be fully operationalized prior to use in a project:

- 1) Define the subject of each domain for the project (see guidance for each domain below).
- 2) Replace broad construct language with project-specific language if needed.
- 3) Add constructs to capture salient themes not included in the updated CFIR.

I. INNOVATION DOMAIN	
Construct Name	Construct Definition <i>The degree to which:</i>
A. Innovation Source	The group that developed and/or visibly sponsored use of the innovation is reputable, credible, and/or trustable.
B. Innovation Evidence-Base	The innovation has robust evidence supporting its effectiveness.
C. Innovation Relative Advantage	The innovation is better than other available innovations or current practice.
D. Innovation Adaptability	The innovation can be modified, tailored, or refined to fit local context or needs.
E. Innovation Trialability	The innovation can be tested or piloted on a small scale and undone.
F. Innovation Complexity	The innovation is complicated, which may be reflected by its scope and/or the nature and number of connections and steps.
G. Innovation Design	The innovation is well designed and packaged, including how it is assembled, bundled, and presented.
H. Innovation Cost	The innovation purchase and operating costs are affordable.
II. OUTER SETTING DOMAIN	
Construct Name	Construct Definition <i>The degree to which:</i>
A. Critical Incidents	Large-scale and/or unanticipated events disrupt implementation and/or delivery of the innovation.
B. Local Attitudes	Sociocultural values (e.g., shared responsibility in helping recipients) and beliefs (e.g., convictions about the worthiness of recipients) encourage the Outer Setting to support implementation and/or delivery of the innovation.
C. Local Conditions	Economic, environmental, political, and/or technological conditions enable the Outer Setting to support implementation and/or delivery of the innovation.
D. Partnerships & Connections	The Inner Setting is networked with external entities, including referral networks, academic affiliations, and professional organization networks.
E. Policies & Laws	Legislation, regulations, professional group guidelines and recommendations, or accreditation standards support implementation and/or delivery of the innovation.
F. Financing	Funding from external entities (e.g., grants, reimbursement) is available to implement and/or deliver the innovation.
G. External Pressure	External pressures drive implementation and/or delivery of the innovation. Note: Use this construct to capture themes related to External Pressures that are not included in the subconstructs below.
1. Societal Pressure	Mass media campaigns, advocacy groups, or social movements or protests drive implementation and/or delivery of the innovation.
2. Market Pressure	Competing with and/or imitating peer entities drives implementation and/or delivery of the innovation.
3. Performance-Measurement Pressure	Quality or benchmarking metrics or established service goals drive implementation and/or delivery of the innovation.
III. INNER SETTING DOMAIN	
Construct Name	Construct Definition <i>The degree to which:</i>
<i>Note:</i>	<i>Constructs A – D exist in the Inner Setting regardless of implementation and/or delivery of the innovation, i.e., they are persistent general characteristics of the Inner Setting.</i>
A. Structural Characteristics	Infrastructure components support functional performance of the Inner Setting. Note: Use this construct to capture themes related to Structural Characteristics that are not included in the subconstructs below.
1. Physical Infrastructure	Layout and configuration of space and other tangible material features support functional performance of the Inner Setting.
2. Information Technology Infrastructure	Technological systems for tele-communication, electronic documentation, and data storage, management, reporting, and analysis support functional performance of the Inner Setting.
3. Work Infrastructure	Organization of tasks and responsibilities within and between individuals and teams, and general staffing levels, support functional performance of the Inner Setting.

B. Relational Connections	There are high quality formal and informal relationships, networks, and teams within and across Inner Setting boundaries (e.g., structural, professional).
C. Communications	There are high quality formal and informal information sharing practices within and across Inner Setting boundaries (e.g., structural, professional).
D. Culture	There are shared values, beliefs, and norms across the Inner Setting. Note: Use this construct to capture themes related to Culture that are not included in the subconstructs below.
1. Human Equality-Centeredness	There are shared values, beliefs, and norms about the inherent equal worth and value of all human beings.
2. Recipient-Centeredness	There are shared values, beliefs, and norms around caring, supporting, and addressing the needs and welfare of recipients.
3. Deliverer-Centeredness	There are shared values, beliefs, and norms around caring, supporting, and addressing the needs and welfare of deliverers.
4. Learning-Centeredness	There are shared values, beliefs, and norms around psychological safety, continual improvement, and using data to inform practice.
<i>Note:</i>	<i>Constructs E – K are specific to the implementation and/or delivery of the innovation.</i>
E. Tension for Change	The current situation is intolerable and needs to change.
F. Compatibility	The innovation fits with workflows, systems, and processes.
G. Relative Priority	Implementing and delivering the innovation is important compared to other initiatives.
H. Incentive Systems	Tangible and/or intangible incentives and rewards and/or disincentives and punishments support implementation and delivery of the innovation.
I. Mission Alignment	Implementing and delivering the innovation is in line with the overarching commitment, purpose, or goals in the Inner Setting.
J. Available Resources	Resources are available to implement and deliver the innovation. Note: Use this construct to capture themes related to Available Resources that are not included in the subconstructs below.
1. Funding	Funding is available to implement and deliver the innovation.
2. Space	Physical space is available to implement and deliver the innovation.
3. Materials & Equipment	Supplies are available to implement and deliver the innovation.
K. Access to Knowledge & Information	Guidance and/or training is accessible to implement and deliver the innovation.
IV. INDIVIDUALS DOMAIN	
ROLES SUBDOMAIN	
Construct Name	Construct Definition
A. High-level Leaders	Individuals with a high level of authority, including key decision-makers, executive leaders, or directors.
B. Mid-level Leaders	Individuals with a moderate level of authority, including leaders supervised by a high-level leader and who supervise others.
C. Opinion Leaders	Individuals with informal influence on the attitudes and behaviors of others.
D. Implementation Facilitators	Individuals with subject matter expertise who assist, coach, or support implementation.
E. Implementation Leads	Individuals who lead efforts to implement the innovation.
F. Implementation Team Members	Individuals who collaborate with and support the Implementation Leads to implement the innovation, ideally including Innovation Deliverers and Recipients.
G. Other Implementation Support	Individuals who support the Implementation Leads and/or Implementation Team Members to implement the innovation.
H. Innovation Deliverers	Individuals who are directly or indirectly delivering the innovation.
I. Innovation Recipients	Individuals who are directly or indirectly receiving the innovation.
CHARACTERISTICS SUBDOMAIN	
Construct Name	Construct Definition:
	<i>The degree to which:</i>
A. Need	The individual(s) has deficits related to survival, well-being, or personal fulfillment, which will be addressed by implementation and/or delivery of the innovation.
B. Capability	The individual(s) has interpersonal competence, knowledge, and skills to fulfill Role.
C. Opportunity	The individual(s) has availability, scope, and power to fulfill Role.
D. Motivation	The individual(s) is committed to fulfilling Role.

V. IMPLEMENTATION PROCESS DOMAIN	
Construct Name	Construct Definition
	<i>The degree to which individuals:</i>
A. Teaming	Join together, intentionally coordinating and collaborating on interdependent tasks, to implement the innovation.
B. Assessing Needs	Collect information about priorities, preferences, and needs of people. Note: Use this construct to capture themes related to Assessing Needs that are not included in the subconstructs below.
1. Innovation Deliverers	Collect information about the priorities, preferences, and needs of deliverers to guide implementation and delivery of the innovation.
2. Innovation Recipients	Collect information about the priorities, preferences, and needs of recipients to guide implementation and delivery of the innovation.
C. Assessing Context	Collect information to identify and appraise barriers and facilitators to implementation and delivery of the innovation.
D. Planning	Identify roles and responsibilities, outline specific steps and milestones, and define goals and measures for implementation success in advance.
E. Tailoring Strategies	Choose and operationalize implementation strategies to address barriers, leverage facilitators, and fit context.
F. Engaging	Attract and encourage participation in implementation and/or the innovation. Note: Use this construct to capture themes related to Engaging that are not included in the subconstructs below.
1. Innovation Deliverers	Attract and encourage deliverers to serve on the implementation team and/or to deliver the innovation.
2. Innovation Recipients	Attract and encourage recipients to serve on the implementation team and/or participate in the innovation.
G. Doing	Implement in small steps, tests, or cycles of change to trial and cumulatively optimize delivery of the innovation.
H. Reflecting & Evaluating	Collect and discuss quantitative and qualitative information about the success of implementation. Note: Use this construct to capture themes related to Reflecting & Evaluating that are not included in the subconstructs below.
1. Implementation	Collect and discuss quantitative and qualitative information about the success of implementation.
2. Innovation	Collect and discuss quantitative and qualitative information about the success of the innovation.
I. Adapting	Modify the innovation and/or the Inner Setting for optimal fit and integration into work processes.
CFIR OUTCOMES ADDENDUM	
I. ANTECEDENT ASSESSMENTS	
Name	Definition
A. Acceptability	The extent to which an innovation is perceived as “agreeable, palatable, or satisfactory” (Proctor, 2009).
B. Appropriateness	The “perceived fit, relevance, or compatibility of the innovation [...] for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem” (Proctor, 2009).
C. Feasibility	The extent to which an innovation “can be successfully used or carried out within a given agency or setting” (Proctor, 2009).
D. Implementation Climate	The extent to which the Inner Setting has an implementation climate.
E. Implementation Readiness	The extent to which the Inner Setting is ready for implementation.
II. IMPLEMENTATION OUTCOMES	
Name	Definition
A. Anticipated Implementation Outcomes	Outcomes based on perceptions or measures of the likelihood of future implementation success or failure, i.e., implementation outcomes that have not yet occurred. These outcomes are forward-looking; constellations of CFIR determinants across domains predict these outcomes.
1. Adoptability	The likelihood key decision-makers will decide to put the innovation in place/innovation deliverers will decide to deliver the innovation.
2. Implementability	The likelihood the innovation will be put in place or delivered.
3. Sustainability	The likelihood the innovation will be put in place or delivered over the long-term.
B. Actual Implementation Outcomes	Outcomes based on perceptions or measures of current (or past) implementation success or failure, i.e., implementation outcomes that have occurred. These outcomes are backward-looking; constellations of CFIR determinants across domains explain these outcomes.
1. Adoption	The extent key decision-makers decide to put the innovation in place/innovation deliverers decide to deliver the innovation.
2. Implementation	The extent the innovation is in place or being delivered.
3. Sustainment	The extent the innovation is in place or being delivered over the long-term.

III. INNOVATION OUTCOMES	
Outcomes that capture the success or failure of the innovation, based on the impact of the innovation on three important constituents: Innovation Recipients, Innovation Deliverers, and Key Decision-Makers. Impact is defined by: Reach ("The absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative, intervention, or program") x Innovation Effectiveness ("The impact of an intervention on important outcomes, including potential negative effects, quality of life, and economic outcomes" (Glasgow et al. 2019)).	
Name	Definition
A. Innovation Recipient Impact	Recipient Reach x Innovation Effectiveness
B. Innovation Deliverer Impact	Deliverer Reach x Innovation Effectiveness
C. Key-Decision Maker (or System) Impact	Key-Decision Maker Reach x Innovation Effectiveness

Appendix E: Co-Authored Publication Relevant to this Thesis

Stockley RC, Walker MF, Alt Murphy M, et al. Criteria and indicators for centers of clinical excellence in stroke recovery and rehabilitation: A global consensus facilitated by ISRRRA. *Neurorehabilitation and neural repair* 2024; 38: 87-98.

Criteria and Indicators for Centers of Clinical Excellence in Stroke Recovery and Rehabilitation: A Global Consensus Facilitated by ISRRA

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Abstract

Background. The aim of the International Stroke Recovery and Rehabilitation Alliance is to create a world where worldwide collaboration brings major breakthroughs for the millions of people living with stroke. A key pillar of this work is to define globally relevant criteria for centers that aspire to deliver excellent clinical rehabilitation and generate exceptional outcomes for patients. **Objectives.** This paper presents consensus work conducted with an international group of expert stroke recovery and rehabilitation researchers, clinicians, and people living with stroke to identify and define criteria and measurable indicators for Centers of Clinical Excellence (CoCE) in stroke recovery and rehabilitation. These were intentionally developed to be ambitious and internationally relevant, regardless of a country's development or income status, to drive global improvement in stroke services. **Methods.** Criteria and specific measurable indicators for CoCE were collaboratively developed by an international panel of stroke recovery and rehabilitation experts from 10 countries and consumer groups from 5 countries. **Results.** The criteria and associated indicators, ranked in order of importance, focused upon (i) optimal outcome, (ii) research culture, (iii) working collaboratively with people living with stroke, (iv) knowledge exchange, (v) leadership, (vi) education, and (vii) advocacy. Work is currently underway to user-test the criteria and indicators in 14 rehabilitation centers in 10 different countries. **Conclusions.** We anticipate that use of the criteria and indicators could support individual organizations to further develop their services and, more widely, provide a mechanism by which clinical excellence can be articulated and shared to generate global improvements in stroke care.

Keywords

consensus, leadership, stroke, rehabilitation, organizational culture, delivery of healthcare

Introduction

The Stroke Recovery and Rehabilitation Roundtables provided a collaborative forum for preclinical and clinical stroke researchers to work alongside methodologists, consumer groups, statisticians, and funders to accelerate identification and implementation of effective treatments to improve stroke recovery and rehabilitation.¹ Building on this work, the International Stroke Recovery and Rehabilitation Alliance (ISRRA) was established to create a world where global collaboration brings major breakthroughs for people living with stroke. Specifically, ISRRA seeks to be a “go-to” place for researchers

interested in recovery and rehabilitation, to identify new targets for consensus building and funding priorities for research.²

In a facilitated meeting attended by 60 world leading stroke experts and members of ISRRA in 2018,² one of the key pillars of work identified to advance the field of stroke recovery and rehabilitation was to generate globally applicable criteria for Centers of Clinical Excellence (CoCE). It was envisaged that defining clinical excellence in stroke recovery and rehabilitation could guide service development, focus research priorities, and facilitate global networks to transform the standard of stroke care across the world.

In wider literature, centers of excellence are characterized by the use of innovative methods, a collaborative approach, and high-quality service³⁻⁶ that produce exceptional outcomes and significant scientific, political, economic, or societal impacts.⁴ It is widely agreed that CoCE should demonstrate expertise in a specific area to enable delivery of comprehensive interdisciplinary care that optimizes patients' outcomes.⁵ In stroke, many models, standards, and measures have been developed to reduce variability in care and demonstrate clinical effectiveness. These include identification of optimal models of acute stroke care in high income countries,⁷ key metrics of clinical performance,^{8,9} and evidence-based national guidelines.^{10,11} These outputs typically articulate the interventions that should be provided, by when and by whom^{9,10,12} and are clearly valuable to improve clinical practice. However, they focus upon the *products* of excellent care and do not articulate the vital *processes* necessary to embed excellence in stroke care.^{5,6} These processes are much less clear and there are no globally applicable criteria that consider the key features of clinical centers that deliver excellent stroke rehabilitation. This means that stroke services cannot identify the properties, approaches, and culture that are likely to be necessary to provide excellent care in their setting.

Despite a proliferation of organizations that apply clinical excellence monikers to their services^{3,5,6} there is not a recognized process by which CoCE can be identified,

developed, or measured. The aim of this work was to develop globally-relevant criteria to define CoCE in stroke recovery and rehabilitation and to generate measurable indicators for each criterion that can be used by centers to assess the quality of their current services. These criteria and indicators must be sufficiently broad to enable tailoring for different resource and geographical settings, but appropriately specific to ensure clarity, transparency, and usability. This work constitutes an important first step in realizing an ambitious vision to drive up the quality of global stroke care. Used in concert with metrics of clinical performance and national guidelines, these criteria and indicators of CoCE could identify the components that are likely to engender excellence and, by judging performance, recognize excellence that can be shared with other centers through ISRRRA and others' global networks.

Methods

An international multi-disciplinary expert working group was convened in 2020. ISRRRA members self-nominated or were purposively invited to join the CoCE working group so there was representation from diverse geographic and socioeconomic areas, career stage, and professional backgrounds (including clinical and methodological expertise). Working group members were selected based upon their knowledge and extensive track record of contribution to

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Supplementary material for this article is available on the *Neurorehabilitation & Neural Repair* website along with the online version of this article.

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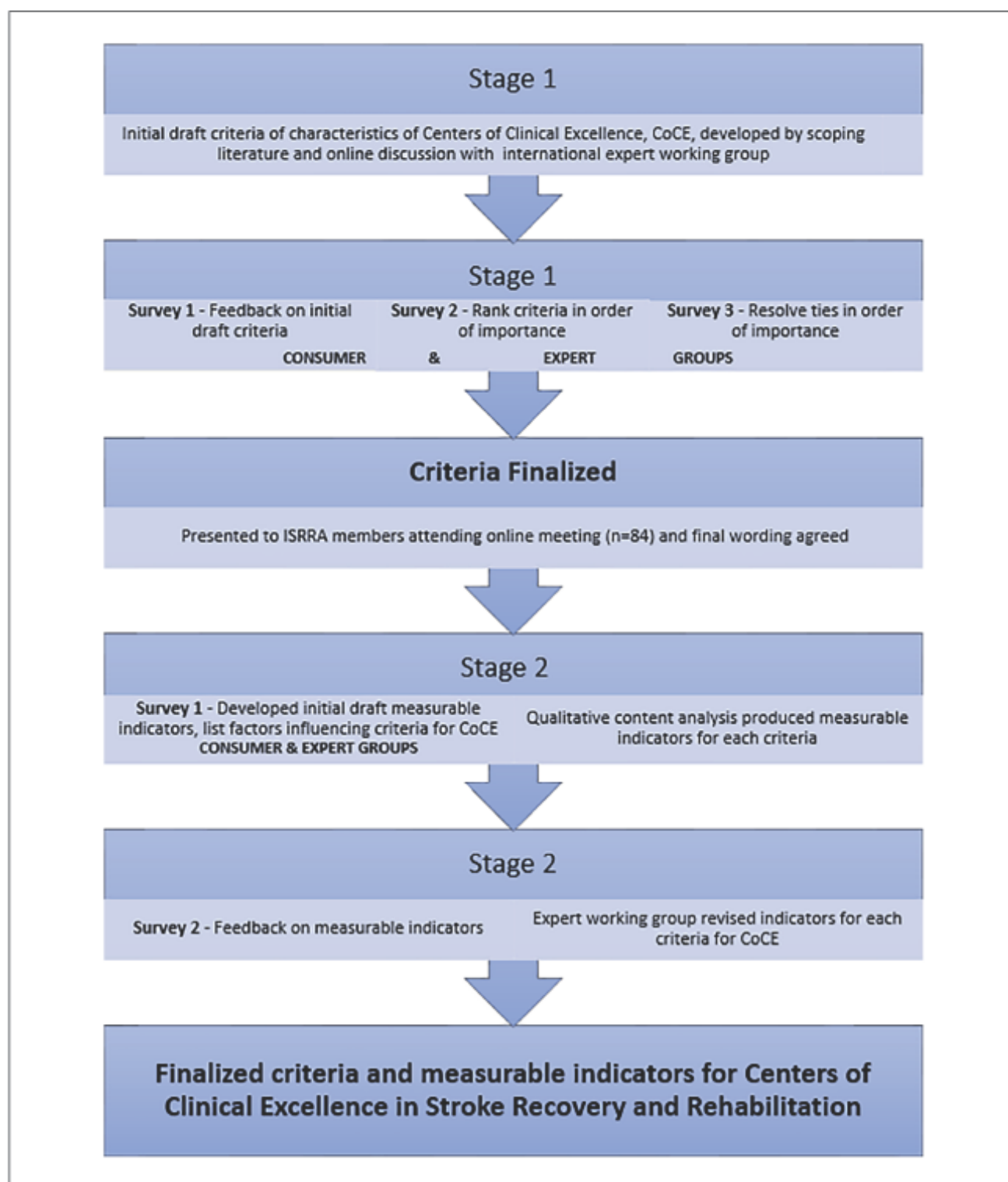


Figure 1. Stages in development of criteria and measurable indicators for CoCE.

stroke recovery and rehabilitation, experience of different global settings, and enthusiasm for international stroke

service development. A structured multi-step procedure (shown in Figure 1) to identify and prioritize criteria and

measurable indicators for CoCE was developed incorporating Keeney's Value Focused Thinking methodology,¹³ which has been used successfully in previous international stroke consensus projects.¹⁴ People living with stroke (survivors and carers) were consulted at each stage through seeking feedback from consumer groups. These were purposively selected for consultation as they were longstanding, established well-functioning groups of many years standing with a diverse membership. They represented people from low-, middle-, and high-income settings with different healthcare models, and were identified by members of the expert working group as having extensive previous experience of providing critical and constructive feedback to stroke research. Within each group there was an open call for inclusiveness and representativeness to participate with this work.

Stage 1: Developing and Defining the Criteria of CoCE

The expert working group met online to discuss factors that could contribute to clinical excellence in stroke recovery and rehabilitation and scoping of relevant literature was undertaken to identify definitions of clinical excellence in other health conditions. Through a series of online meetings, the expert group identified key areas that were perceived to influence excellence in stroke recovery and rehabilitation and began to refine and draft initial criteria for each, merging similar areas together where possible. These criteria were deliberately aspirational, aligning to ISRRA's goal to bring about major breakthroughs for people living with stroke.

Three surveys (see Supplemental 1) were sent to all expert working group members. Survey 1 included open-ended questions about the purpose of identifying CoCE to gain knowledge from other clinical areas and feedback on the initial draft criteria. Survey 2 asked respondents to rank the relative importance of each criterion of clinical excellence. A structured process¹⁵ using a graph theory-based voting system was used to aggregate these rank-ordered lists wherein a directed graph, called the preference graph, was used to represent the patterns of ranking responses. Vertices of the graph represented the criteria ranked by the respondents, and directed edges corresponded to preferences between these criteria. This method of combining preference scores avoids inappropriate use of averaging. This approach was used in preference to other, more well-known approaches such as Delphi, to allow inclusion of a wide variety of items while also accounting for potential differences in the perceived importance of these items to different respondents.¹³ A third survey was required because, after Survey 2, 3 criteria were perceived to be equally important; Survey 3 asked respondents to rank the importance of these 3 criteria relative to each other.

Four consumer groups comprising people after stroke and their carers based in the UK, India, Malaysia, and Australia provided feedback on the initial and evolving criteria and participated in ranking the criteria in order of importance. Whilst surveys were in English, in areas where English was not the first language some members of the consumer groups spoke English and were able to assist in translation and interpretation of the groups' responses. The groups' facilitators were also able to help with culturally appropriate translations of particular words and phrases. Final wording of the criteria was collectively edited by the expert working group and these draft criteria for CoCE were presented to the consumer groups and to 84 ISRRA members in October 2020 for feedback, which was incorporated into the final criteria.

Stage 2: Identification of Measurable Indicators

A second round of online discussions was held with the expert working group to identify measurable indicators for each criterion, followed by 2 surveys (Surveys 4 and 5). Survey 4 consisted of 3 open-ended questions for each criterion in which respondents were asked to generate the elements that defined the criterion and nominate barriers and enablers to realizing excellence in the criterion (21 questions in total, Supplemental 1). The survey was sent to members of the expert working group and an aphasia-friendly version of the survey was sent to consumer groups in the USA, Australia, UK, and Malaysia.

Responses to Survey 4 were analyzed using qualitative content analysis by 3 authors (RCS, EL, and TK), using inductive coding to identify the common keywords and concepts. Responses regarding barriers and enablers were checked for additional elements that could be included to define the criteria. Data were further refined into measurable indicators, then checked for ambiguity, redundancy, and duplication. Survey 5 containing the draft list of indicators for each criterion was circulated to the expert working group and consumer groups. Feedback about whether all relevant concepts were presented and the clarity of the indicators (particularly from people for whom English was not their first language) was sought. This was used to refine and finalize measurable indicators for each of the criteria of CoCE in stroke recovery and rehabilitation.

Results

The expert working group comprised 20 recovery and rehabilitation experts from 10 countries (Australia, Canada, Chile, China, Denmark, Ghana, India, Malaysia, Sweden, USA, and the UK). Members' professions spanned acute neurology (n=1) family medicine (n=1), nursing (n=2), methodological expertise (n=2), occupational therapy (n=2), physical therapy (n=6), rehabilitation medicine

(n=4), and speech and language therapy (n=2). Five consumer groups were included: the Australian Stroke Foundation's Consumer Council; Nottingham Stroke Research Partnership, UK; National Stroke Association Malaysia; the community outreach program of Centre for Comprehensive Stroke Rehabilitation and Research, MAHE, Manipal India; and Snyder Center for Aphasia Life Enhancement, Maryland, USA.

Criteria of CoCE

The expert working group defined a CoCE as comprising a network of linked services across the stroke pathway. A CoCE may or may not be at a single geographical site or discrete building and, in stroke services, may include both acute and follow-on community services. Inclusive, equitable principles, and the experiences of people living with stroke and carers were embedded within all criteria to ensure that CoCE serve diverse and multi-cultural communities.

Seven criteria were agreed and were ranked in order of importance (Figure 2 and Table 1).

Each criterion and the measurable indicators are summarized below in order of perceived importance and presented in detail in Table 1. Each criterion is accompanied by a short rationale and examples of practical application.

1. *CoCE in Stroke Rehabilitation and Recovery deliver outstanding rehabilitation to ensure optimal outcomes (health, social, and wellbeing) for people living with stroke.*

Optimal outcome recognizes that recovery and wellbeing are influenced by a range of factors alongside physical and mental improvement after stroke, including emotional and social issues. Measurable indicators were grouped to define optimal outcomes (patient, carer, and service), and the delivery of outstanding rehabilitation (assessment, rehabilitation interventions, and coordinated ongoing care and support). Excellent clinical services should utilize robust processes to measure and understand their impact upon both health and holistic wellbeing and ensure that the voices of people living with stroke, where cognition allows, and their carers are central to their evaluations.

2. *CoCE in Stroke Rehabilitation and Recovery have a strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice.*

A developed research culture encompasses a range of activities such as proactive research collaborations, local research activity and implementation of research evidence into practice. Groups of measurable indicators to

demonstrate a positive research culture included overt recognition of research in organizational processes and systems, formalized links with external, research active agencies and staff research expertise and culture.

The expert working group noted that, in practice, this is likely to require generic skills at the level of the organization, for instance in change management and knowledge translation, as well as supporting participation in, and undertaking, ethically-sound research.

3. *CoCE in Stroke Rehabilitation and Recovery ensure inter-professional working and person-centered rehabilitation where colleagues, persons with stroke and carers work together toward a common goal.*

It was recognized that clinical excellence is likely to be achieved when people living with stroke and their carers, work as equal partners with clinicians and other stakeholders toward a common goal. This requires robust processes that ensure people with stroke (if cognitively able) and their carers are actively and fully included in goal setting and decision-making. Measurable indicators were grouped to reflect the need for organization's processes that proactively support the patient and their family to be involved in the rehabilitation journey and systems that enable coordinated inter-professional teamwork. Achieving clinical excellence was also likely to be dependent upon teams within health settings working together with others (eg, technology developers, engineers, charities, and leisure providers) and communicating effectively to deliver efficient, person-centered rehabilitation with seamless transitions in care.

4. *CoCE in Stroke Rehabilitation and Recovery exchange new knowledge and actively promote mentorship with National/International colleagues and people living with stroke to advance best practice.*

The importance of knowledge exchange to facilitate the sharing of best practice and learning to ensure high quality clinical practice that delivers optimal outcome after stroke was acknowledged. Measurable indicators centered on 2 areas: knowledge exchange with policy-makers, practice bodies and industry, nationally and internationally; and mentorship both between individuals (people living with stroke who are contributing to service improvement initiatives as well as clinicians) and clinical centers.

5. *CoCE in Stroke Rehabilitation and Recovery have a shared strong ethical and value-based leadership, that inspires, motivates, and drives forward successful rehabilitation.*

Leadership grounded in ethics and linked to organizational values was recognized to promote the delivery of clinical

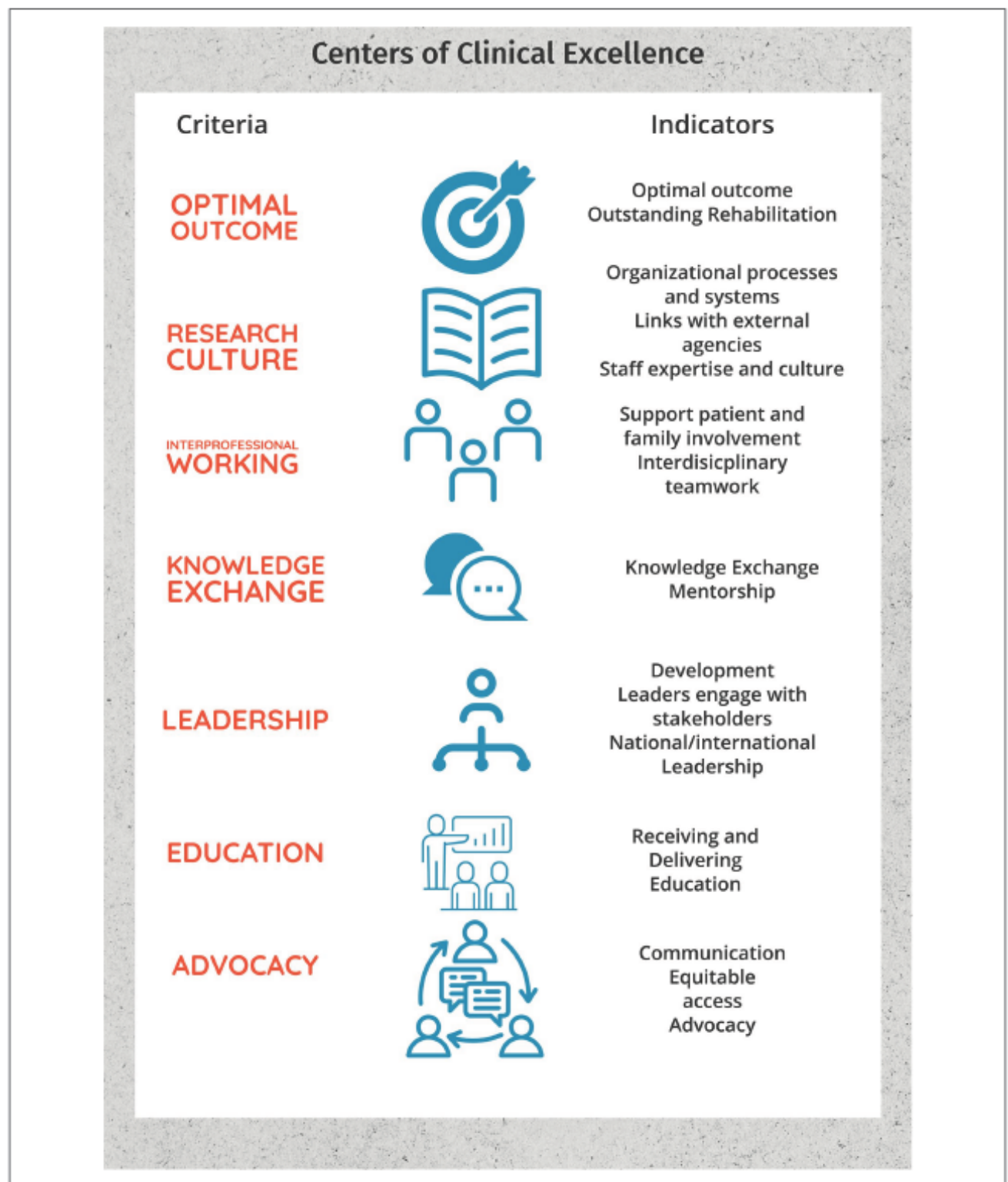


Figure 2. The 7 criteria and summary of measurable indicators for CoCE in stroke recovery and rehabilitation, ranked in order of importance.

excellence. It was recognized that staff should be supported to consider how they work together and how they could

improve team working. Whilst local leadership impacts the day-to-day activities of teams and individuals, higher-level

Table 1. Table of Criteria and Measurable Indicators for Centers of Clinical Excellence (CoCE) in Stroke Recovery and Rehabilitation.

Criteria		Measurable Indicators	
CoCE in stroke and recovery and rehabilitation	Category	Indicator groups	Indicator sub-groups (where required)
1. Deliver outstanding rehabilitation to ensure optimal outcome (health, social, and wellbeing) for people living with stroke.	Optimal outcomes	Patient outcomes	Clinical/physiological measures Patient reported outcomes Patient reported experience Self-management skills
		Carer outcomes	Carer reported outcomes Carer reported experience Carer self-management skills
	Deliver outstanding rehabilitation	Service outcomes Assessment of rehabilitation requirements Rehabilitation interventions	Comprehensive holistic assessment Ongoing assessment at regular time points Evidence-based 1. Time after stroke when rehabilitation started 2. Duration 3. Dose 4. Procedures/methods Addresses patient's goals (tailored rehabilitation) Integrated delivery (minimize duplication between professionals/services)
2. Have a strongly developed research culture, demonstrated by proactive national and international research collaborations, and translation of research into best clinical practice.	Organizational processes and systems	Coordinated ongoing care and support Research elements in all job descriptions and role profiles Organized initiatives to support positive research culture	Regular research activities for all staff, for example, journal clubs, training, or attending conferences Embedded quality improvement program Regular collection of outcome data Allocated research time Systems to support high quality data collection
	Formalized links with external agencies	Infrastructure and resources to support research activity A recognized pathway or strategy to implement research into practice Links with universities	
	Staff expertise and culture	Research collaborations with other national and international centers Leading research, applying for and winning research funding Research leadership from multiple professional groups	
3. Ensure inter-professional working and person-centered rehabilitation where colleagues, persons with stroke, and carers work together toward a common goal.	Organizations and systems to proactively support patient and family involvement in rehabilitation journey	Broad methodological research knowledge across staff base (or access to skills/knowledge) Information provided routinely to patient and family about rehabilitation process and rehabilitation team Collaborative goal setting process (goals agreed upon by team, patient, and family) Regular opportunities between team, patient and family for 2-way information exchange Shared decision-making between rehabilitation team, patients, and carers Virtual communication available when indicated (e.g. lockdowns and supporting remote services) Processes to identify all key stakeholders in stroke rehabilitation within and beyond the center Culturally safe care provision	
	Systems to support coordinated inter-professional teamwork	Regular opportunities for rehabilitation team to collaboratively review patient goals, progress, and plans Input from each team member is respected and valued	

(continues)

Table 1. (continued)

Criteria		Measurable Indicators	
CoCE in stroke and recovery and rehabilitation:		Indicator groups	Indicator sub-groups (where required)
4. Exchange new knowledge and actively promote mentorship with National/international colleagues and people living with stroke to advance best practice.	Knowledge exchange	Collaborations with external organizations to exchange knowledge about best practice, for example, clinical practice groups and national and international rehabilitation groups	
		Protected time allocated for knowledge exchange activities, for example, networking opportunities for staff to participate in training using different modalities for knowledge exchange activities, for example, TED talk, social media, radio, and TV	
5. Have a shared strong ethical and value-based leadership, that inspires, motivates, and drives forward successful rehabilitation.	Mentorship	Formal interdisciplinary mentorship program (eg, allocated mentors and mentees) for individual clinicians and people living with stroke	
		Formal mentorship program for clinical centers	
6. Use their specialist knowledge to provide continuous high-quality education to people with stroke, carers, staff, and the general public (Formal education such as In-house training, Masters Courses, Conference Presentations, and Public Lectures).	Development	Investment in mentorship training for mentors	
		Protected time for mentoring	
7. Advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research	Rehabilitation workforce development	Rehabilitation workforce development	Commitment to recruitment of the "best" staff (based on competency and experience)
		Leadership development	Processes to promote professional growth and development of staff
8. Engage with patients and carers to ensure that rehabilitation services are patient and carer centered.			Mechanisms to gain feedback to/about leaders and assess leadership, for example, 360° feedback, formal appraisals, and open door policies
			Investment in training and time to grow leaders (who are open minded, adaptive, inclusive, team focused, and knowledgeable)
9. Engage with the public to ensure that rehabilitation services are public focused.			Systems to support staff to take up global leadership roles (eg, editorial boards and committees)
10. Engage with the public to ensure that rehabilitation services are public focused.	Leaders engaging with key stakeholders	Engagement of leadership with patients and carers	
		Leadership actively promotes delivery of successful rehabilitation	
11. Engage with the public to ensure that rehabilitation services are public focused.	National Inter-national leadership	Representation on influential national/international groups and professional bodies	
		Receiving education	Pathways for staff to gain higher-degree qualifications including Master's and PhD
12. Engage with the public to ensure that rehabilitation services are public focused.	Delivering education	Onsite educational opportunities, for example, inhouse training	Support for off-site education, for example, sponsored workplace visits, conference scholarships, sabbaticals to other centers
			Support for conference presentations and in-services to health professionals
13. Engage with the public to ensure that rehabilitation services are public focused.		Delivering conference presentations and in-services to health professionals	
		Providing education to stroke survivors and carers, and the public	
14. Engage with the public to ensure that rehabilitation services are public focused.	Processes that facilitate ongoing communication with key stakeholders	—	
		Equitable access of stroke rehabilitation	Systems to promote equitable access
15. Engage with the public to ensure that rehabilitation services are public focused.			Processes to monitor access
			Processes to improve access if problems identified
16. Engage with the public to ensure that rehabilitation services are public focused.	Regular advocacy and outreach activities	For access to stroke rehabilitation services	
		For innovative research	

leadership was deemed vital to ensure that the services are configured to support clinical excellence and can respond flexibly to changes in demand and direction in clinical practice. Measurable indicators for this criterion measured development of the workforce and leadership, engagement between stakeholders and leaders locally, nationally, and internationally.

6. *CoCE in Stroke Rehabilitation and Recovery use their specialist knowledge to provide continuous high-quality education to people with stroke, carers, staff, and the general public.*

Whilst education of the clinical team is recognized as key element to promote clinical excellence, it was noted that education initiatives should extend to people living with stroke, their carers, industries, and the wider public. Measurable indicators focused on staff opportunities to engage with education to improve their skills and knowledge and the delivery of education by the center (eg, public engagement, to stroke survivors and carers, and professional fora).

7. *CoCE in Stroke Rehabilitation and Recovery advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research.*

A CoCE should actively support people living with stroke by working to ensure equitable access to acute stroke care and early rehabilitation, and by promoting innovative, cross-disciplinary research. Three groups of measurable indicators were developed: ongoing communication with key stakeholders, equitable access to stroke rehabilitation and advocacy and outreach services. It was acknowledged that these should empower all people interested in stroke services, including people with stroke and their carers, to shape current services, and generate the next breakthroughs in clinical care and stroke rehabilitation research.

Discussion

To the best of our knowledge, our work is the first to define the key criteria and measurable indicators of CoCE in stroke recovery and rehabilitation and so constitutes an important first step in realizing ISRRA's vision to improve global stroke care. Our criteria extend what is already available by reaching beyond what is expected toward what is ideal, to optimize holistic stroke recovery, and so have the potential to advance the field of stroke rehabilitation. The criteria and indicators were developed collaboratively and explicitly recognize that clinical excellence in stroke recovery and rehabilitation is likely to be a multi-faceted, emergent property of the systemic interactions between staff, people living with stroke, carers, industry partners, and organizational

factors. Unlike previous work that has described excellence as a product,⁴ our criteria clearly recognize that a culture that fosters and supports excellence is vital and that clinical excellence is likely to require an iterative process of continuous improvement.

Use of the criteria and associated indicators provides a mechanism by which clinical excellence can be identified, described, and shared to generate global improvements in stroke care, organizational development and shape the culture required to deliver excellence.^{4,5} The criteria and indicators presented here have the potential to support organizations that aspire toward excellence to develop or refine their services, staff, and activities. Work is currently underway to user-test the criteria and indicators in 14 centers in 10 countries: Australia, Chile, China, Denmark, Ghana, India, Malaysia, Singapore, Sweden, and the UK. This will identify the data that could be collected to demonstrate performance for each of the criteria and enable us to characterize, and define, how excellence will be judged for each criterion. We anticipate that these indicators will complement but may overlap other metrics of quality stroke care,⁹⁻¹² particularly clinical practice guidelines which form part (but not all) of the most important criterion identified (Criterion 1 "Deliver outstanding rehabilitation"). To address any overlap and following user-testing, we will map the data required to demonstrate achievement of excellence in the criteria against existing routine data collection processes to assess duplication. Inefficiencies in data collection will be minimized by aligning the finalized criteria and indicators with routinely collected data when this is appropriate, to reduce data collection burden.

Once finalized, ISRRA will ensure global dissemination of the criteria and indicators through its membership (which currently exceeds 500 global members), academic, and professional networks (eg, the World Stroke Organization, WSO and World Rehabilitation Alliance). We are currently exploring ways we can partner with others who seek to improve stroke care and rehabilitation to ensure this work has maximum reach and impact (eg, discussions are underway with the WSO). In keeping with the philosophy of ISRRA, the primary intent of this work is for global centers to use the criteria and indicators to guide their development toward excellence. However, we recognize that some centers may be incentivized to undertake assessment to gain formal recognition of their services. The process for recognition will be informed by the current user-testing being undertaken in 10 countries over 5 continents and will draw upon and align with existing initiatives for accreditation of stroke and rehabilitation services, such as the WSO's stroke center accreditation, Canada's Stroke Distinction programme, and the Commission on Accreditation of Rehabilitation Facilities (CARF). Critically, the implementation of the criteria for CoCE will support improvements in processes that can engender excellence and so will largely complement and enhance,

rather than replicate, existing initiatives which typically target specific elements of clinical care^{7,8} or service delivery¹⁸. Any redundancies identified between these initiatives and our work in the current user testing will be minimized by aligning with, and signposting to, other programs that promote excellence.

We will continue to work closely with stakeholders including patient groups and representatives from clinical centers to finalize a process for accreditation. Accreditation could comprise centers initially self-evaluating, submitting evidence for each criterion and assessment by a team of objective reviewers who visit the center. This could be undertaken by global ISRRA members or alongside national and international groups who already provide accreditation such as the WSO and CARF. Similarly to the WSO accreditation process, the threshold for a rating of overall excellence is likely to necessitate a minimum level of achievement across all indicators but also recognize excellence in individual criterion. Crucially, any formal assessment would provide detailed developmental feedback for each criterion and facilitate partnerships with other global centers to share expertise. The frequency of assessment of CoCE could be linked to performance with outstanding centers being assessed less frequently than developing centers, as exemplified by CARF.

A strength of this work is that a CoCE is considered as a network of linked services across the stroke pathway, rather than being a discrete service offered at 1 site or by 1 organization. This novel approach places the patient's "journey" through stroke services at the center of these criteria and indicators, and differs from other methods of describing stroke centers by the services delivered at specific sites.¹⁹ However, we recognize that not all CoCE will have access to the same range of interventions and services as others and this should be explicitly reflected in the application of the criteria and indicators.

The centrality of key stakeholders, including staff, patients, and their carers, in the development of both criteria and indicators is a key element of our work. This provides a more holistic mechanism to reflect and engender excellence than other definitions which typically examine single indicators of clinical services such as staff expertise, care processes, or patient satisfaction.^{5,7,20} Whilst these individual constructs are important and implicitly included in our criteria and indicators, their presence alone is unlikely to ensure excellence; in contrast, by articulating the *processes* that could facilitate clinical excellence, our work demonstrates clear and tangible ideals that centers can aspire to meet. Despite the diversity of the stakeholders included in the work presented here, it is recognized that not all groups were represented, including managers and administrators of healthcare facilities, policy makers, and other clinicians who are involved in stroke rehabilitation, such as neuropsychologists.

Perhaps unsurprisingly, the criterion ranked as most important to clinical excellence was related to providing optimal outcome for patients. Whilst this is often the focus of clinical guidelines, this criterion demonstrated a novel, holistic approach by considering the patient's and carer's wellbeing and their perception of their experiences, rather than solely relying on functional outcomes. Our work recognizes the importance of seeking the views of carers which is particularly prescient when communication or cognition deficits after stroke prevents patients articulating their needs. Other criteria, including research culture and leadership were also recognized to be important, yet rarely feature in guidelines or service standards of practice for stroke rehabilitation, attesting to the novelty and value of our work. Recognition of these broader features is important as they influence the standard of clinical care, and so are likely to significantly influence patient experience and outcomes.²¹

The criteria and indicators produced here embody the ethos of ISRRA and complements the vision of the WSO¹⁶ as they were intentionally developed to be ambitious and globally applicable, regardless of a country's development or income status, in contrast to other consensus studies in stroke care.⁷ This global focus, gained from using the views of international, clinically focused experts in stroke rehabilitation and several consumer groups, adds to the strength of this work. The authors explicitly recognize that centers will not have the same resources, infrastructure, and workforce as others so they will begin their journey to clinical excellence from different standpoints and follow a different development trajectory. Whilst countries representing over 3.4 billion of the world's population were included, a limitation of this work is that countries from Central America, Eastern Europe, and parts of Asia, were not represented. This may mean that the resources, practice of healthcare professionals, and the values of patients from these areas, are not fully reflected by the criteria and indicators. Further work could address this by testing the developed criteria and indicators in these areas to examine their suitability and potentially further refine them for these settings. Nonetheless, the global focus of this work ensured that criteria for CoCE were, though ambitious, broadly applicable to high-, middle-, and low-income countries whilst explicitly acknowledging global differences in the provision of stroke services.²² This enables the indicators to be used to transform world-wide stroke care by supporting the stepwise development of clinically excellent stroke centers, sharing learning and facilitating formation of important global partnerships between centers and individuals.

Conclusions

This work presents the development of criteria and measurable indicators for CoCE in stroke recovery and rehabilitation. It provides an important contribution to

understanding how excellence in clinical centers can be defined and articulated. This will enable centers, irrespective of their location or resources, to benchmark and develop their services to improve stroke recovery and rehabilitation. We understand that there are already different quality certifications for stroke services but believe that our criteria and indicators for CoCE provide a novel, complementary, and comprehensive vision of the healthcare process for patients who survive stroke and those that care for them, as well as the processes of the clinical team and the leadership of the organization necessary to achieve the best outcomes.

It is recognized that until the indicators are utilized by stroke centers, their practical capacity to support organizations to become clinically excellent remains unproven. Further work is already underway to understand how the indicators can be implemented by 14 international centers. Whilst ranking centers on their performance was not the primary focus of this work, the possibility of being recognized as providing clinically excellent services after stroke is likely to attract clinical centers that wish to establish themselves as leaders in the field, as well as those who wish to develop their services. This encourages the national and international collaborations explicitly included in our criteria for CoCE and facilitates global centers to work together to improve services. If implemented globally, these criteria may herald a new dawn in the delivery of clinically excellent stroke recovery and rehabilitation, realizing ISRRRA's ambition to bring about major breakthroughs for people living with stroke.

Acknowledgments

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Author Contributions

Rachel C. Stockley: Conceptualization; Methodology; Project administration; and Writing—original draft; Marion F. Walker: Conceptualization; Formal analysis; Funding acquisition; Methodology; Project administration; Supervision; Writing—original draft; and Writing—review & editing; Margit Alt Murphy: Conceptualization; Methodology; and Writing—review & editing; Noor Azah Abd Aziz: Conceptualization; Investigation; Methodology; and Writing—review & editing; Philemon Amooba: Conceptualization; Methodology; and Writing—review & editing; Leonid Churliov: Conceptualization; Formal analysis; Methodology; and Writing—review & editing; Amanda Farrin: Conceptualization; Methodology; and Writing—review & editing; Natalie A. Fini: Conceptualization; Methodology; and Writing—review & editing; Emma Ghaziani: Conceptualization; Methodology; and Writing—review & editing; Erin Godecke: Conceptualization; Methodology; and Writing—review & editing; Tania Gutierrez-Panchana: Conceptualization; Methodology;

and Writing—review & editing; Jie Jia: Conceptualization; Methodology; and Writing—review & editing. Thoshenthri Kandasamy: Conceptualization; Formal analysis; Methodology; and Writing—review & editing; Patrice Lindsay: Conceptualization; Methodology; and Writing—review & editing; John Solomon: Conceptualization; Investigation; Methodology; and Writing—review & editing. Vincent Thijs: Methodology and Writing—review & editing; Tierney Tindall: Conceptualization; Methodology; Project administration; and Writing—review & editing; Donna C. Tippet: Conceptualization; Investigation; Methodology; and Writing—review & editing; Caroline Watkins: Conceptualization; Methodology; and Writing—review & editing; Elizabeth Lynch: Conceptualization; Formal analysis; Investigation; Methodology; Writing—original draft; and Writing—review & editing.

Data Availability Statement

There are no data associated with this paper.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Appendix F: Survey Questions Distributed using Qualtrics

30/12/2024, 21:00

Qualtrics Survey Software



Default Question Block

Centres of Clinical Excellence in Stroke Rehabilitation and Recovery

Information and Consent

Thank you for your interest in this research. Before you decide whether to take part, we would like you to understand why the research is being done and what it will involve. Please read the following information carefully, and feel free to contact the research team if there is anything that is not clear, or if you would like more information.

What is the purpose of the study?

This study aims to implement and evaluate Key Performance Indicators for aspirational Centres of Clinical Excellence in Stroke Recovery and Rehabilitation.

Who will be taking part in the study?

We are inviting leading international rehabilitation healthcare facilities that are funded by different healthcare models (fee-for-service vs. universal healthcare vs. mixed model), from countries from different geographic regions and different socioeconomic levels (low-, middle- and high-income countries). Your site has been invited to participate in this survey based on recommendations from the leading researchers in your country that are a part of the global expert group in stroke rehabilitation.

Is the response anonymous?

In any publication, the sites will be only identified by the country, not by the facility name. All the information you provide during the survey will be kept strictly confidential as per the Privacy Act.

Can I withdraw my consent at any time?

You are free to withdraw from the study and not complete this survey without giving a reason. You will be given the option of withdrawing your data prior to analysis.

What will happen to the results?

The data will be analysed, and the results will be included in the researcher's dissertation and in academic publications and presentations. A summary of the results will be sent to the Ethics Committee and to the participating sites.

How long will the data be stored?

The data will be stored for 5 years in a password-protected secure university server and the study data will be destroyed safely in accordance with legislation so the data cannot be reused in an unauthorised manner.

Who has reviewed the study?

This study has been granted ethical approval by Flinders University Human Research Ethics Committee Low-Risk Panel (Project number 5776 - Research Development and Support: human.researchethics@flinders.edu.au). For further clarification, please contact Elizabeth Lynch: elizabeth.lynch@flinders.edu.au.

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If you would like further information about the study, please contact

Thoshen Kandasamy: kand0060@flinders.edu.au

Dr. Elizabeth Lynch: elizabeth.lynch@flinders.edu.au

Dr. Rachel Stockley: rstockley1@uclan.ac.uk

Prof. Jeroen Hendriks: jeroen.hendriks@flinders.edu.au

Thank you
Thoshen Kandasamy

Acknowledgement

1. I have read the information above and agree to participate in the study.
2. I understand that I am free to withdraw from the survey at any time.

☐ Accept

Background

Name of Healthcare Facility:

Country:

Where is your stroke rehabilitation unit based?

- ☐ Metropolitan - Capital cities
- ☐ Regional and Rural Centre (<100 000 population)
- ☐ Remote Centre (<5 000 population)

What type of stroke services do you provide?

- ☐ Inpatient rehabilitation program
- ☐ Ambulatory/ Outpatient stroke rehabilitation program/ Day rehabilitation
- ☐ Rehabilitation in the home program
- ☐ Telehealth services/ Virtual rehabilitation
- ☐ Others

For in-patient rehabilitation services

What outcome measure(s) do you use? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures)

What auditing/accreditation process(es) that are currently in place?

For ambulatory/outpatient/rehabilitation in the home/telehealth services

What outcome measure(s) do you use? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures)

What auditing/accreditation process(es) that are currently in place?

Please select relevant disciplines involved in patient care in your rehabilitation services.

- ☐ Rehabilitation Consultant
- ☐ Neurologist
- ☐ General Practitioner
- ☐ Physiotherapist/Physical Therapist
- ☐ Occupational Therapist
- ☐ Speech Pathologist/Speech Language Therapist
- ☐ Registered Nurse
- ☐ Dietitian/Nutritionist
- ☐ Social Worker
- ☐ Psychologist
- ☐ Exercise Physiologist
- ☐ Others. Please specify

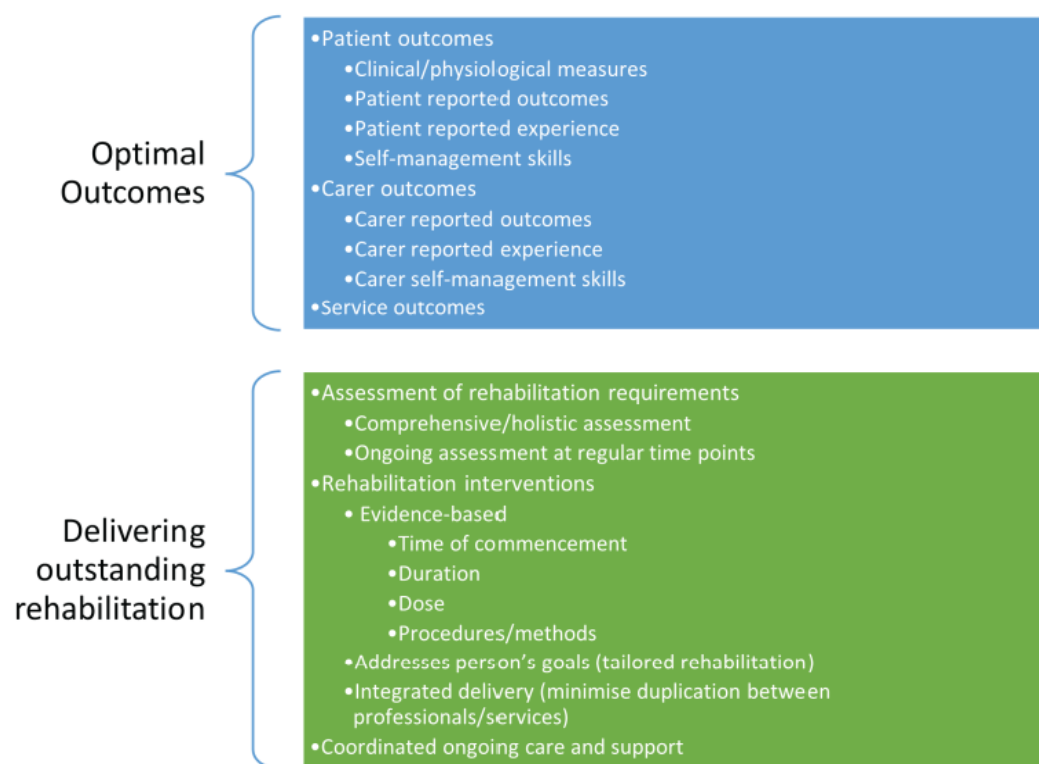
How is your stroke rehabilitation program(s) currently funded?

- ☐ Universal Health Care
- ☐ Employer Funded
- ☐ Mixed method funding
- ☐ National Health Insurance
- ☐ Out of Pocket Funding
- ☐ Others. Please Specify.

Criteria

The 7 aspirational criteria for Centres of Clinical Excellence in Stroke Recovery and Rehabilitation each comprise several Key Performance Indicators (KPI). Each criterion is listed below with the key performance indicator that is relevant for that criterion. Please read each criterion and the KPI listed before answering the questions.

Criterion 1: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery **deliver outstanding rehabilitation to ensure optimal outcomes** (health, social and well-being) for people living with stroke. For each question below, please indicate if you/your organisation routinely collect information against the KPI.



Optimal Outcomes

Do you routinely collect information on

Patient outcomes

- Clinical/physiological measures
- Patient-reported outcomes
- Patient-reported experience
- Self-management skills

☐ Yes

☐ No

If yes, what information do you routinely collect

Clinical/physiological measures

Patient reported outcomes

Patient reported experience

Self-management skills

Do you routinely collect information on

Carer outcomes

- Carer reported outcomes
- Carer reported experience
- Carer self-management skills

☐ Yes

☐ No

If yes, what information do you routinely collect

Do you routinely collect information on

Service outcomes (e.g. Length of stay)

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Deliver Outstanding Rehabilitation

Do you routinely collect information on

Rehabilitation requirements

- Comprehensive/holistic assessment
- Ongoing assessment at regular time points

- ☐ Yes
☐ No

If yes, what information do you routinely collect



Do you routinely collect information on


Rehabilitation interventions

- Evidence-based
 - Time of commencement
 - Duration
 - Dose
 - Procedures/methods
- Addresses person's goals (tailored rehabilitation)
- Integrated delivery (minimise duplication between professionals/services)

☐ Yes

☐ No

If yes, what information do you routinely collect



Do you routinely collect information on

Coordinated ongoing care and support

☐ Yes

☐ No

If yes, what information do you routinely collect

Are there other indicators reflecting the **delivery of outstanding rehabilitation and optimal outcomes** that you think should be included for your site/health services?

Are there any KPIs listed above that you think should not be included when measuring the delivery of **outstanding rehabilitation and optimal outcomes**?

Criterion 2: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a **strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice**. For each question below, please indicate if you/your organisation routinely collect information against the KPI.



Organisational processes and systems

Are you able to identify

Research elements in all job descriptions and role profiles

- ☐ Yes
- ☐ No

Do you routinely collect information on

Organised initiatives to support positive research culture

- Regular research activities for all staff e.g. journal clubs, training or attending conferences
- Embedded quality improvement program
 - Regular collection of outcome data (for Criterion 1)

☐ Yes

☐ No

If yes, what information do you routinely collect

Do you routinely identify and collect information on

Infrastructure and resources to support research activity

- Allocated research time
- Systems to support high quality data collection

☐ Yes

☐ No

If yes, what information do you routinely collect

Do you have

A recognized pathway or strategy to implement research into practice

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Formalised links with external agencies

Do you routinely collect information to show

Links with universities

Research collaborations with other national and international centres

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Staff expertise and culture

Do you routinely collect information on

Leading research, applying for and winning research funding

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Do you routinely collect information on

Research leadership from multiple professional groups, not just medical

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Do you routinely collect information on

Broad methodological research knowledge across staff base (or access to skills/knowledge)

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Are there other indicators reflecting **strongly developed research culture** that you think should be included for your site/health services?

Are there any KPIs listed above that you think should not be included when measuring **strongly developed research culture**?

Criterion 3: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery **ensure inter-professional working and person-centred rehabilitation** where colleagues, persons with stroke and carers work together towards a common goal. For each question below, please indicate if you/your organisation routinely collect information against the KPI.

Organisations
and systems to
proactively
support patient
and family
involvement in
rehabilitation
journey

- Information provided routinely to patient and family about rehabilitation process and rehabilitation team
- Collaborative goal setting process
- Regular opportunities between team, patient and family for 2-way information exchange
- Shared decision-making between rehabilitation team, patients and carers
- Virtual communication available when indicated
- Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre
- Culturally safe care provision

Systems to
support
coordinated
inter-
professional
teamwork

- Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans
- Input from each team member is respected and valued

Organisations and systems to proactively support patient and family involvement in rehabilitation journey

Do you routinely collect information on

Information that is provided routinely to patients and family about the rehabilitation process and the rehabilitation team

- ☐ Yes
- ☐ No

If yes, what information do you routinely collect

Do you routinely collect information on

Collaborative goal-setting process (goals agreed upon by team, patient, family)

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Do you routinely collect information on

Regular opportunities between team, patient and family for 2-way information exchange

- ☐ Yes
☐ No

If yes, what information do you routinely collect



Do you routinely collect information on

Shared decision-making between the rehabilitation team, patients and carers

- ☐ Yes
☐ No

If yes, what information do you routinely collect



Do you routinely collect information on

Virtual communication and its availability to use when indicated (e.g. lockdowns, supporting remote services)

- ☐ Yes
☐ No

If yes, what information do you routinely collect



Do you routinely collect information on

Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre

- ☐ Yes
☐ No

If yes, what information do you routinely collect



Do you routinely collect information on

Culturally safe care provision

- ☐ Yes
☐ No

If yes, what information do you routinely collect



Systems to support coordinated inter-professional teamwork

Do you routinely collect information on

Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans

and show that the

Input from each team member is respected and valued

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Are there other indicators reflecting **inter-professional working and person-centred rehabilitation** that you think should be included for your site/health services?

Are there any KPIs listed above that you think should not be included when measuring **inter-professional working and person-centred rehabilitation**?

Criterion 4: Centres of Clinical Excellence in Stroke Rehabilitation

Recovery **exchange new knowledge and actively promote mentorship** with National/International colleagues and people living with stroke to advance best practices. For each question below, please indicate if you/your organisation routinely collect information against the KPI.



Knowledge exchange

Do you routinely collect information on

*Collaborations with external organisations to exchange knowledge about best practice
e.g. clinical practice groups, national and international rehabilitation groups*

Protected time allocated for knowledge exchange activities e.g. networking

*Opportunities for staff to participate in training using different modalities for knowledge
exchange activities e.g TED talk, social media, radio, TV*

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Mentorship

Do you routinely collect information on

*Formal interdisciplinary mentorship program (i.e. allocated mentors and mentees) for
individual clinicians*

A formal mentorship program for clinical centres

Investment in mentorship training for mentors

Protected time for mentoring

- ☐ Yes

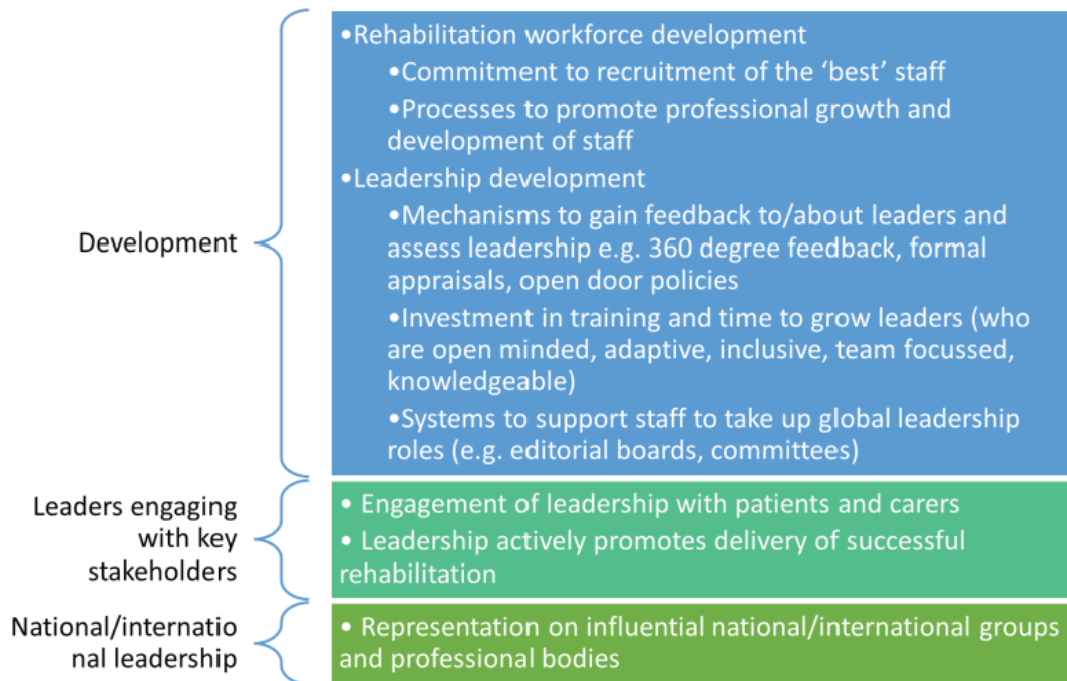
☐ No

If yes, what information do you routinely collect

Are there other indicators reflecting **inter-professional working and person-centred rehabilitation** that you think should be included for your site/health services?

Are there any KPIs listed above that you think should not be included when measuring **inter-professional working and person-centred rehabilitation**?

Criterion 5: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a shared **strong ethical and value-based leadership**, that inspires, motivates and drives forward successful rehabilitation. For each question below, please indicate if you/your organisation routinely collect information against the KPI.



Development

Do you routinely collect information on

Rehabilitation workforce development

- Commitment to the recruitment of the 'best' staff
- Processes to promote professional growth and development of staff

☐ Yes

☐ No

If yes, what information do you routinely collect



Do you routinely collect information on

Leadership development

- Mechanisms to gain feedback to/about leaders and assess leadership e.g. 360 degree feedback, formal appraisals, open door policies
- Investment in training and time to grow leaders (who are open minded, adaptive, inclusive, team focussed, knowledgeable)
- Systems to support staff to take up global leadership roles (e.g. editorial boards, committees)

☐ Yes

☐ No

If yes, what information do you routinely collect



Do you routinely collect information on

Leaders engaging with key stakeholders

Engagement of leadership with patients and carers

Leadership actively promotes the delivery of successful rehabilitation

National/international leadership

Representation of influential national/international groups and professional bodies

- ☐ Yes
☐ No

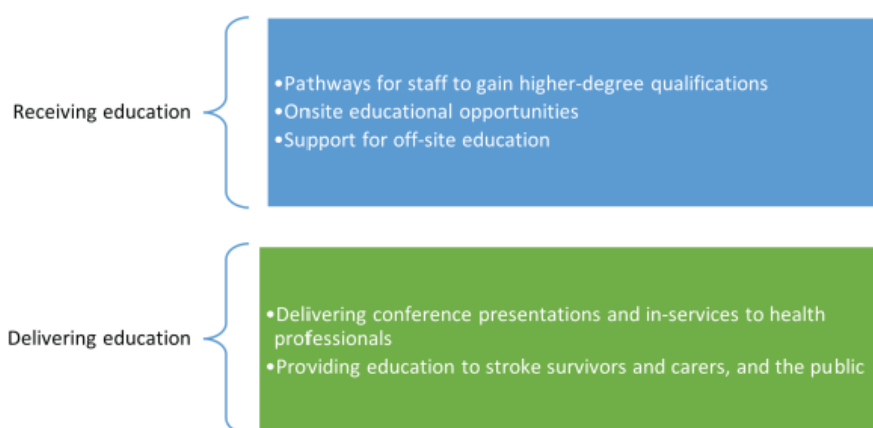
If yes, what information do you routinely collect

Are there other indicators reflecting **strong ethical and value-based leadership** that you think should be included for your site/health services?

Are there any KPIs listed above that you think should not be included when measuring **strong ethical and value-based leadership**?

Criterion 6: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery use their specialist knowledge to provide **continuous high-quality education** to people with stroke, carers, staff and the general

public (Formal education such as In-house training, Masters Courses, Conference Presentations, Public Lectures etc). For each question below, please indicate if you/your organisation routinely collect information against the KPI.



Receiving education

Do you routinely collect information on

Pathways for staff to gain higher-degree qualifications including Master's and PhD

Onsite educational opportunities e.g. in-house training

Support for off-site education e.g. sponsored workplace visits, conference scholarships, sabbaticals to other centres

- ☐ Yes
☐ No

If yes, what information do you routinely collect



Delivering education

Do you routinely collect information on

Delivering conference presentations and in-services to health professionals

Providing education to stroke survivors and carers, and the public

- ☐ Yes
- ☐ No

If yes, what information do you routinely collect



Are there other indicators that reflects **continuous high-quality education** that you think should be included for your site/health services?

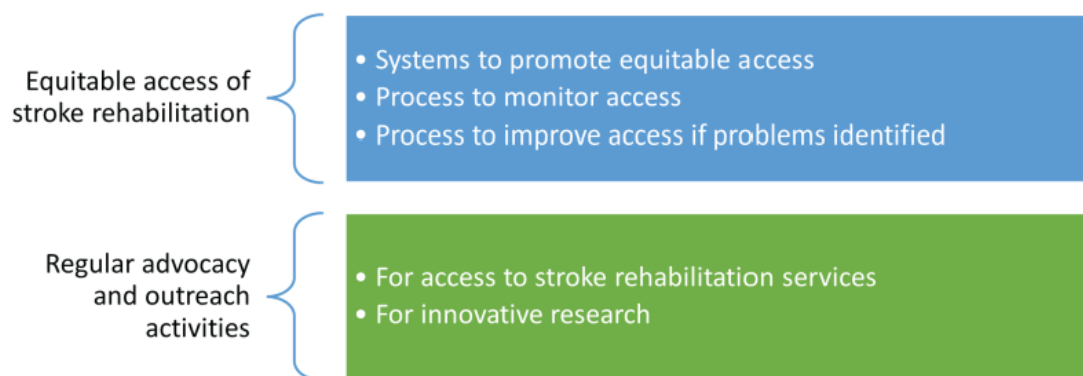


Are there any KPIs listed above that you think should not be included when

measuring **continuous high-quality education**?

Criterion 7: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery **advocate and promote equitable access and optimal delivery** of stroke rehabilitation services and funding for innovative research. For each question below, please indicate if you/your organisation routinely collect information against the KPI.

Processes that facilitate ongoing communication with key stakeholders



Do you collect information on

Processes that facilitate ongoing communication with key stakeholders

Equitable access to stroke rehabilitation

Systems to promote equitable access

The process to monitor access

The process to improve access if problems identified

Regular advocacy and outreach activities

For access to stroke rehabilitation services

For innovative research

- ☐ Yes
☐ No

If yes, what information do you routinely collect

Are there other indicators that reflects **advocacy and promote equitable access** that you think should be included for your site/health services?

Are there any KPIs listed above that you think should not be included when measuring **advocacy and promote equitable access**?

Block 3

Would you like to add any other comments on any of the criterion and key performance indicators?

A large, empty rectangular box with a thin black border, intended for users to enter their comments. It occupies a significant portion of the page below the question.

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Appendix G: Ethics Approval Letter

5 January 2023



HUMAN ETHICS LOW RISK PANEL APPROVAL NOTICE

Dear Ms Thoshenthri Kandasamy,

The below proposed project has been **approved** on the basis of the information contained in the application and its attachments.

Project No: 5776
Project Title: Centre of Clinical Excellence in Stroke Recovery and Rehabilitation
Chief Investigator: Ms Thoshenthri Kandasamy
Approval Date: 05/01/2023
Expiry Date: 22/11/2024
Supervisory Panel: Dr. Elizabeth Lynch, Prof. Jeroen Hendriks, Dr. Rachel Stockley
Conditions of Approval: None

Please note: Due to COVID-19, researchers should try to avoid face-to-face testing where possible and consider undertaking alternative distance/online data or interview collection means. For further information, please go to <https://staff.flinders.edu.au/coronavirus-information>.

Please note: For all research projects wishing to recruit Flinders University students as participants, approval needs to be sought from the Office to the Deputy Vice-Chancellor (Students). To seek approval, please provide a copy of the Ethics approval for the project and a copy of the project application (including Participant Information and Consent Forms, advertising materials and questionnaires etc.) to the Office of the Deputy Vice-Chancellor (Students) via dvcoffice@dl.flinders.edu.au.

RESPONSIBILITIES OF RESEARCHERS AND SUPERVISORS

1. Participant Documentation

Please note that it is the responsibility of researchers and supervisors, in the case of student projects, to ensure that:

- all participant documents are checked for spelling, grammatical, numbering and formatting errors. The Committee does not accept any responsibility for the above mentioned errors.
- the Flinders University logo is included on all participant documentation (e.g., letters of Introduction, information Sheets, consent forms, debriefing information and questionnaires – with the exception of purchased research tools) and the current Flinders University letterhead is included in the header of all letters of introduction. The Flinders University international logo/letterhead should be used and documentation should contain international dialing codes for all telephone and fax numbers listed for all research to be conducted overseas.

2. Annual Progress / Final Reports

In order to comply with the monitoring requirements of the *National Statement on Ethical Conduct in Human Research 2007 (updated 2018)* an annual progress report must be submitted each year on the approval anniversary date for the duration of the ethics approval using the HREC Annual/Final Report Form available online via the ResearchNow Ethics & Biosafety system.

Please note that no data collection can be undertaken after the ethics approval expiry date listed at the top of this notice. If data is collected after expiry, it will not be covered in terms of ethics. It is the responsibility of the researcher to ensure that annual progress reports are submitted on time; and that no data is collected after ethics has expired.

If the project is completed *before* ethics approval has expired please ensure a final report is submitted immediately. If ethics approval for your project expires please either submit (1) a final report; or (2) an extension of time request (using the HREC Modification Form).

For student projects, the Low Risk Panel recommends that current ethics approval is maintained until a student's thesis has been submitted, assessed and finalised. This is to protect the student in the event that reviewers recommend that additional data be collected from participants.

3. Modifications to Project

Modifications to the project must not proceed until approval has been obtained from the Ethics Committee. Such proposed changes / modifications include:

- change of project title;
- change to research team (e.g., additions, removals, researchers and supervisors)
- changes to research objectives;
- changes to research protocol;
- changes to participant recruitment methods;
- changes / additions to source(s) of participants;
- changes of procedures used to seek informed consent;
- changes to reimbursements provided to participants;
- changes to information / documents to be given to potential participants;
- changes to research tools (e.g., survey, interview questions, focus group questions etc);
- extensions of time (i.e. to extend the period of ethics approval past current expiry date).

To notify the Committee of any proposed modifications to the project please submit a Modification Request Form available online via the ResearchNow Ethics & Biosafety system. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

4. Adverse Events and/or Complaints

Researchers should advise the Executive Officer of the Human Research Ethics Committee on at human.researchethics@flinders.edu.au immediately if:

- any complaints regarding the research are received;
- a serious or unexpected adverse event occurs that effects participants;
- an unforeseen event occurs that may affect the ethical acceptability of the project.

Yours sincerely,

Hendryk Flaegel

on behalf of

Human Ethics Low Risk Panel
Research Development and Support
human.researchethics@flinders.edu.au

Flinders University
Sturt Road, Bedford Park, South Australia, 5042
GPO Box 2100, Adelaide, South Australia, 5001

http://www.flinders.edu.au/research/researcher-support/eh/human-ethics/human-ethics_home.htm

ResearchNow
Ethics & Biosafety

Appendix H: Participant Information Sheet and Consent Form



PARTICIPANT INFORMATION SHEET AND CONSENT FORM

Centres of Clinical Excellence in Stroke Recovery and Rehabilitation

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Description of the study

This project will trial and evaluate the Key Performance Indicators that were developed by the International Stroke Recovery and Rehabilitation Alliance (ISSRA) expert group to develop aspirational Centres of Clinical Excellence in Stroke Recovery and Rehabilitation. This project is supported by Flinders University, College of Nursing and Health Sciences.

inspiring
achievement

Purpose of the study

This project aims to apply the Key Performance Indicators (KPI) developed as part of establishing Centres of Clinical Excellence in Stroke Recovery and Rehabilitation. The KPIs will be implemented at 4-6 international healthcare facilities that provide stroke rehabilitation services for in-depth analysis and a light-touch survey will be disseminated to other selected healthcare sites for global and inclusive analysis.

Benefits of the study

This research will contribute to original work in stroke recovery and rehabilitation to improve the quality of services provided to stroke survivors globally, equity in receiving rehabilitation and setting a benchmark to aim for excellence in stroke rehabilitation.

Participant involvement and potential risks

Please see attached sheet for further information on the types of questions that will be asked, the time commitment required, the requirement criteria to participate in the study and the study flow.

Participation is entirely voluntary.

If risks are anticipated, they should be listed in this section. Participants must be aware of all risks and burdens, no matter how minor.

The researchers do not expect the questions to cause any harm or discomfort to you. However, if you experience feelings of distress as a result of participation in this study, please let the research team know immediately.

Withdrawal Rights

You may, without any penalty, decline to take part in this research study. If you decide to take part and later change your mind, you may, without any penalty, withdraw at any time without providing an explanation. To withdraw, please contact the Chief Investigator or you may just refuse to answer any questions / close the internet browser and leave the online survey at any time.

Confidentiality and Privacy

Only researchers listed on this form have access to the individual information provided by you. Privacy and confidentiality will be assured at all times. The research outcomes may be presented at conferences, written up for publication or used for other research purposes as described in this information form. However, the privacy and confidentiality of individuals will be protected at all times. You will not be named, and your individual information will not be identifiable in any research products without your explicit consent. No data, including identifiable, non-identifiable and de-identified datasets, will be shared or used in future research projects without your explicit consent. The healthcare sites will be identified in the country they are based, not by name.

Data Storage

The information collected may be stored securely on a password-protected computer and/or Flinders University server throughout the study. Any identifiable data will be de-identified for data storage purposes unless indicated otherwise. All data will be securely transferred to and stored at Flinders University for five years after the publication of the

results. Following the required data storage period, all data will be securely destroyed according to university protocols.

How will I receive feedback?

On project completion, a summary of the outcomes will be provided to all participants via email or published on Flinders University's website.

Ethics Committee Approval

The project has been approved by Flinders University's Human Research Ethics Committee (insert project number here).

Queries and Concerns

Queries or concerns regarding the research can be directed to the research team. If you have any complaints or reservations about the ethical conduct of this study, you may contact the Flinders University's Research Ethics & Compliance Office team via telephone 08 8201 2543 or email human.researchethics@flinders.edu.au.

Thank you for taking the time to read this information sheet which is yours to keep. If you accept our invitation to be involved, please sign the enclosed Consent Form.

CONSENT FORM

Consent Statement

- ☐ I have read and understood the information about the research, and I understand I am being asked to provide informed consent to participate in this research study. I understand that I can contact the research team if I have further questions about this research study.
- ☐ I am not aware of any condition that would prevent my participation, and I agree to participate in this project.
- ☐ I understand that I am free to withdraw at any time during the study.
- ☐ I understand that I can contact Flinders University's Research Ethics & Compliance Office if I have any complaints or reservations about the ethical conduct of this study.
- ☐ I understand that my involvement is confidential and that the information collected may be published. I understand that I will not be identified in any research products.

I further consent to: *delete/add boxes as required*

- ☐ completing a questionnaire
- ☐ participating in an interview
- ☐ having my information recorded
- ☐ sharing my de-identified data with research team

Signed:

Name:

Date:

Appendix I: Transcribed Responses from Semi-Structured Interviews

Metropolitan Australia

Background Questions

Name of Healthcare Facility:

Country: Metropolitan, Australia

Where is your stroke rehabilitation unit based?

- ☒ Metropolitan - Capital cities
- ☐ Regional and Rural Centre
- ☐ Remote Centre

What type of stroke services do you provide?

- ☒ Inpatient stroke rehabilitation program
- ☒ Ambulatory/Outpatient stroke rehabilitation program/Day rehabilitation
- ☒ Rehabilitation in the home program (Early supported discharge program)
- ☒ Telehealth services (or virtual rehab) to rural sites
- ☐ Other

For inpatient rehabilitation services

- **What outcome measure(s) do you use, collect and where does it go – is it used for benchmarking?**
 - ☐ Functional Independent Measure (collected within 72 hours), Length of stay
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ Hospital specific accreditation
 - ☐ National Stroke Foundation – Audit
 - ☐ Service level audit
 - ☐ Discipline-specific document audit for allied health

For ambulatory/outpatient

- **What outcome measure(s) do you use? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures)**
 - ☐ None, that is specific for rehab
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ None in place

Please select relevant disciplines involved in patient care in your rehabilitation services.

- ☐ Rehabilitation Consultant
- ☐ Neurologist
- ☐ General Practitioner

- X Physiotherapist/Physical Therapist
- X Occupational Therapist
- X Speech Pathologist/Speech Language Therapist
- X Registered Nurse
- X Dietitian/Nutritionist
- X Social Worker
- X Psychologist (Clinical Psychologist and Neuro Psychologist)
 - Exercise Physiologist
- X Others. **Please specify:** Allied Health Assistant (PT and OT), Pharmacist and Geriatric Medicine

How is your stroke rehabilitation program(s) currently funded?

- X Universal Health Care
 - Employer Funded
 - Mixed method funding
 - National Health Insurance
 - Out of Pocket Funding
 - Others. Please Specify.

Criterion 1: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery deliver outstanding rehabilitation to ensure optimal outcomes (health, social and well-being) for people living with stroke.

1. Optimal outcomes

a. Patient outcomes

i. Clinical/physiological measures

- Whole team: Age, Functional Independence Measure (admission and discharge), and Modified Renkin Scale, Falls, Pressure injury, aspiration pneumonia.
- Medical: ischaemic vs haemorrhagic stroke, Deep vein thrombosis risk.
- OT: Cognitive (Montreal Cognitive Assessment, Oxford Cognitive Screen, Rowland Universal Dementia Assessment Scale, Cognistat, Rivermead memory, Multiple Errands Test-Revised); Upper Limb (Upper limb Motor Assessment Scale, box and block, 9 hole peg test, Jamar grip strength); Perceptual (Occupational Therapy Adult Perceptual Screening Test, Rivermead perceptual, Scheinberg line dissection); Activities of Daily Living (Modified Barthel Index).
- Nursing: Observation and Response Chart, Sepsis Pathway form, medical escalation and Senior Nurse review Sticker.
- Physio: Fulg Meyer Upper extremities/Lower extremities, Berg Balance, 10 meter walk test, Modified Ranking Scale, 4 point pusher score, Ritchie Articular Index, Physiotherapy ambulation status, Physiotherapy ambulation level, Tardieu Scale, Modified Ashworth Scale.
- Psych: Generalised Anxiety Disorder 2, Patient Health Questionnaire 2
- SP: Western Aphasia Battery - Revised, Fiberoptic endoscopic evaluation of swallowing, Dynamic Imaging Grade of Swallowing Toxicity, Royal Brisbane Hospital Outcome Measure for Swallowing.
- SW: Qualitative information gathered in an audit.

ii. Patient-reported outcomes

- TEAM: pain scale.
- Nursing: What Matter to you Chart in patient Room, which has their aim, Estimated Discharge Date, Goals, Likes and plans, pain scales.
- OT: self-reported rating on task performance, eg kitchen task.
- Psych: Geriatric Depression Scale, Geriatric anxiety scale, self-rated confidence.
- Speech: Self-reported scale and goal review.

iii. Patient-reported experience

- Quality improvement evaluation projects (satisfaction surveys)– breakfast group evaluation, Upper Limb group evaluation, Funky Group, Physio Cardiovascular Ground.
- MySay – National survey (sent out after 3 weeks post discharge).
- Ward feedback form.

iv. Self-management skills

- Nursing: Self Medication Checks, intake and output chart, Bowel and Bladder management.
- Team: TACAS (taking charge after stroke), self-administering medication trials, Blood sugar level check, PEG (percutaneous endoscopic gastrostomy) feeding.
- Post-stroke checklist – trialled a few years ago, poor uptake therefore stopped.
- Goal specific skills and observation prior to discharge.

b. Carer outcomes

i. Carer reported outcomes

- OT: Carer training checklist for equipment use and safety (hoists) agreement with signature
- SW: Previously we have done Carer Stress Index. Stopped due to poor user experience.

ii. Carer reported experience

- Nursing: Aishwarya Care call.
- SW: carer report on grief/loss, satisfaction on ward experience, experience on education (done anytime based on individual needs).

iii. Carer self-management skills

- Carer training, including coping strategy, emotional regulation group sessions. Provision of the Living with Aphasia: A Guide for Carers.

c. Service outcomes

- Number of episodes per year.
- Mortality rate.
- Days between stroke onset and starting rehab episode, rehab Length of stay.
- Functional Independence Measure change and Functional Independence Measure efficiency.
- Discharge destination %: home vs Residential Aged Care Facilities.
- Hospital acquired complication rate.
- Re-admission rate.

2. Deliver outstanding rehabilitation

a. Assessment of rehabilitation requirements

i. Comprehensive/holistic assessment

- Multidisc team: medical, nursing, physio, OT, SW, Speech, pharmacy, dietician, neuropsychologist, clinical psychologist. Varying referral blanket referral (e.g. PT, OT) versus specific referral (SP, psychologist).
- Close linkage with discharge coordinator, palliative care, Aged care assessment team, National disability insurance scheme, State head injury unit.

ii. Ongoing assessment at regular time points

- Medical: daily medical review (except Sunday) including 2x /week consultant input, weekly MDT.
- Regular delirium screening, pressure screens, falls reviews.
- Nursing: Pressure injury Check / Skin checks within 8 hrs, Mini Nutrition Screen. when condition changes, or episode of care change to Acute, or ward to ward transfer or interhospital transfers.
- OT: seen within 24 hrs (not Sunday). Then daily Mon-Sat (OT team: either OT, OT assistant or group).
- SW: seen within 7 days (blanket referral – often seen earlier than 7 days).
- Psychology: on referral. Screen within 7 days. once referred – seen based on priority.
- SP: Seen within 24 hours (swallowing or set up emergency alternative forms of communication) seen within 48 hours (communication). Needs to be referred from team or acute hospital. Patients not routinely screened.

b. Rehabilitation interventions

i. Evidence-based

• Time of commencement

- Nursing: Multifactorial Risk assessment which covers falls, Activities of daily living, continence, Cognitive, polypharmacy review
- OT: Upper limb Interventions (functional E stim – daily, dose dependent on goals, task specific upper limb training, mirror box therapy, mental imagery, sensory training); Cognitive Interventions (errorless learning, strategy training, meta-cognitive training); Perceptual Interventions (visual scanning retraining); Activities of daily living task specific training,
- Medical: review for rehabilitation within 48 hrs of acute stroke.
- Speech: evidence of early input for aphasia.

• Duration

- PT/OT/Speech: 45 mins
- psych: 45 mins

• Dose

- OT: once a day.
- SP: min 5 days a week for receptive language skills, 3 days a week (45 min) for aphasia therapy, emerging evidence of 5 days a week for apraxia therapy. Swallow therapy – Expiratory muscle strength training 5 days a week (12 weeks), Chin tuck against resistance 3 x a day 7 days a week

• Procedures/methods

- See above. Procedures depending on need.

ii. Addresses person's goals (tailored rehabilitation)

- Yes we do.

- Individual discipline addresses with patient/carer; also, whole team address goals with patient/carer. Patient directed vs clinician directed vs mix – depending on patient/carer ability to participate.
- Documented.

iii. Integrated delivery (minimise duplication between professionals/services)

- Acute hospital – acute-in-reach – rehab-inpatient – Early supported discharge – stroke clinic – continuum of care with overlapped workforce to ensure minimisation of duplication.
- Weekly MDT and co-location of staff.

c. Coordinated ongoing care and support

- weekly MDT to coordinate ongoing care and support, and to ensure smooth transition.

How well these indicators are integrated into practice?

- Embedded well into practice. “I think it's embedded into our practice in a lot of the disciplines. So we've got discipline-specific outcome measures, procedures, protocol that is the expectation of staff to do when they're rotated, it's including orientations for most disciplines and we've only told you about things that we are using regularly. We haven't just throwing stuff out there to make us look good. We're just talking about day to day.”
- Especially Patient reported outcome measures and self-management

Any barriers to collecting this data?

- No barriers identified in collecting this data as the team was able to answer the questions

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- QI and research
- Knowledge Translation “We think it's important and more probably the knowledge translations are being able to use research in practice rather than just participate in research, probably using relevant research team”
- Look at how to improve gap in service to improve service
- Staff experience working in stroke services and knowledge
- “I think we do relatively well in this is, pursuing benchmarking with other sites.
So we always try to look at other sites and outcomes and then try and learn from other sites where we are fairly collaborative and we love sharing. So, you know all of our AROC outcomes are shared with other sites. And the other thing, I think it's important that we. Haven't done a lot of that. I think we did more of this previously. Is that connection with the Community and, you know, being out there in, you know, stroke week promoting stroke, you know, stroke prevention promoting stroke messages is something that I think a centre of excellence should be involved with and we used to do a bit of that but as hospital becomes a much more busier beast and the demand has gone skyrocketed it's become difficult to concentrate on those things you know when you're trying to survive within the hospital. Another thing I think we should capture is and participation in things like conferences. I think and units that encourages staff member to or have a process that allows staff member to go and conferences to get educated, to get go to courses, you know, other ones that do well.”
- “Stroke excellence is also to provide education. We used to do it externally to others to come in to showcase what we're doing as a stroke unit.

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Length of Stay

General comments

- Would prefer examples for each KPI
- Some KPIs are vague
 - Clinical measures are fine.
 - Patient-reported outcomes – vague and not a priority. “It's vague more because I think in general when not good at patient-reported outcome, you know, I'm sure there are centres that concentrate a lot on patient-reported outcome that would know exactly what this is about. So I think that's more of a reflection on us as a unit rather than it shouldn't be measured.”
 - Patient-reported experience – more valuable than outcomes. “And if you were to reformat this document to try to differentiate and maybe give example to differentiate between patient reported outcome versus patient reported experience.” “We probably don't have too many patient reported outcomes outcome measures, all things, but the experience seems a bit more valuable, I suppose rather than a number put towards that sort of.”
 - Carer outcomes – reported worth collecting, however not currently collecting
 - Carer outcomes and self-management skills – not documented and no formalised tools used, however part of therapy sessions.
 - Service outcomes – vaguely worded. Unsure how to answer – however is required in the KPI.
 - Assessment of rehab requirements should be captured.

Criterion 2: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice.

1. Organisational processes and systems

a. Research elements in all job descriptions and role profiles

- OT: P3 job description includes research participation, P1/2 participation in QI. P3 in OT (PHD) on research at.
- PT: job description P3/P2 includes initiation/participation of QI and research. P1 – participates in approved QI and research projects.
- Medical: Consultants gave full-time equivalent (20% of total FTE) for non-clinical work, including audit/QI/research. The registrar was given 4hrs a week, and the Registered medical officer given an hour a week protected non-clinical time.
- SW: P2 Social Workers are expected to complete QI's on their speciality ward and is included in job description. presently has 1.6 FTE SW. Current full time SW is implementing one at present. 70%/30% split
- SP: P1/P2 Speech required to do QI or research. Advanced competencies assistance from P3 however largely for swallowing. P3 in research (PHD – P3 - 0.2)
- Organisational: AH research coordinator across [hospital]. Recruiting staff and consumers into forums to determine research priorities within [hospital] to formalise process with stakeholder involvement.

b. Organised initiatives to support positive research culture

i. Regular research activities for all staff e.g. journal clubs, training or attending conferences

- We regularly attend conferences, and often as a team with aim to present in conference. All conference attendees bring learnings back and share to wider team. (paused during Covid time)
- Research grant opportunities regularly discussed and senior assistance provided with grant application
- Research translation course done with most disciplines this year.
- Hospital and University share monthly interdisciplinary education sessions on stroke specific topics, which is statewide. This includes latest research; community supports and new initiatives
- Used to have multi-D journal club – now using lecture/teaching (didactic) format on stroke specific topic (could vary from research to clinical, predominately research)
- Embedded within work for PD – for study leave/to attend the conference with funding

ii. Embedded quality improvement program

1. Regular collection of outcome data (for Criterion 1)

- Yes, QI done regularly from database however no set program just strongly encouraged by seniors.
- AROC collected for all patients (able to access data through AROC)
- QI database – monitored by head of Allied Health, ensure quality (All staff) - varied in size. Even published evidence will go through QI database. Frequent reminders on when projects are due, led by the system, reviewed progress with supervisors
- research governance
- Collects ESD outcomes
- Stroke database – physio centric, some social and speech input. New database coming next year, so no improvements scheduled at this time.
- QI opportunities regularly published
- Partner with honour students (SP, OT, PT)

c. Infrastructure and resources to support research activity

i. Allocated research time

- As above
- For AH this is to be negotiated with their P3 (SW, OT, SP, PT & Nursing)

ii. Systems to support high-quality data collection

- Database set up.
- Large percentage of staff Functional Independence Measure trained, and upskilling completed for AROC completion.
- Stroke foundation audits (every 2 years)
- Redcap – research data collection and protected

d. A recognised pathway or strategy to implement research into practice

- Strategic meeting looking at best practice and decision on what to implement.
- Monitor in seniors meeting – with projects and research
- Need to look at this further – pathway for staff to enter into research projects.
- The key clinicians on the rehab unit have completed a research translation course. This has enabled a clear pathway and strategy for these staff members (approx. 10)

2. Formalised links with external agencies

a. Links with universities:

- Stroke Unit link with university
- Stroke Foundation
- SRU has positive relationships with rural hospitals through our outreach support.
- Allied Health Research Director joint position with university
- Close working relationships with community providers such as Neurological Council, Stroke Foundation, NDIS providers, Aged Care Providers and RACF – all to promote safe discharges and appropriate ongoing care
- Partnering with honours students for research

b. Research collaborations with other national and international centres

- Yes, but through university

3. Staff expertise and culture

a. Leading research, applying for and winning research funding

- Building expertise in translational research. Multiple stroke unit staff have been successful in multiple research grants available through department of research. Support for this from the hospital Director AH Research.
- [] foundation for grants – all staff – not stroke specific

b. Research leadership from multiple professional groups, not just medical

- Yes.
- Focus on post-grad training/masters
- Some staff with PhD

c. Broad methodological research knowledge across staff base (or access to skills/knowledge)

- Yes. Access to allied health research staff and research staff within our departments

How well these indicators are integrated into practice?

- “We're doing a lot of it like I think our examples, I think I think definitely that we're doing an active now.”
- “I think we talked about just not having that like very, very structured clear pathway as much.”
- “So it for it to be ongoing, we'd probably need to make a bit more of a formalized process.”

Any barriers to collecting this data?

- No particular barriers

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Nothing else

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Nothing else

General comments

- Allocated time described as part of job description
- Need to explore research translation
- Formalised links – need to look at less formal links as well “as it is important”
- Unwritten rule about the needing to do research and QI in the ward
- “Strong emphasis to do post-graduate studies”

Criteria 3: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery ensure inter-professional working and person-centred rehabilitation where colleagues, persons with stroke and carers work together towards a common goal.

1. Organisations and systems to proactively support patient and family involvement in rehabilitation journey

a. Information provided routinely to patient and family about rehabilitation process and rehabilitation team

- Welcome video and brochure.
- Family meeting/goal setting meeting
- Individual discipline discussion. This starts in the acute setting and continues throughout the journey. Family always invited to therapy sessions, encouraged to attend. Provided with discipline specific handouts
- MDT meeting minutes – prompt to ensure stroke education provided (My Stroke Journey)
- Rehab process and rehab education starts early

b. Collaborative goal setting process (goals agreed upon by team, patient, family)

- Individual discipline and team
- Family meeting with patient/carer and whole team, going through goals.

c. Regular opportunities between team, patient and family for 2-way information exchange

- During individual discipline sessions and formal family meeting
- Family meeting information sheet encourages 2-way exchange
- Welcome “meet and greet” encourages 2-way exchange.

d. Shared decision-making between rehabilitation team, patients and carers

- Standard practice – documentation as individual discipline or as family meeting. In the MDT form – from team point of view and from family and patient perspectives
- New processes involve documentation given to families and making the goals process aphasia friendly

e. Virtual communication available when indicated (eg lockdowns, supporting remote services)

- Yes.
- [place] telestroke program evidence of supporting regional Therapists links with [hospital] stroke therapists provide education to stroke clinicians. Telehealth available for all outpatient clinics.

f. Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre

- Yes, through family meeting.
- External stakeholders through SW (HCP/NDIS)

g. Culturally safe care provision

- Access to interpreter and ALO.
- Mandatory culturally safe training
- Assessments available such KICA for cognitive screening
- Printing documents into different languages
- Preference for male versus female staff
- SW role – to explore cultural heritage then guide the team with culturally appropriate service

2. Systems to support coordinated inter-professional teamwork

a. Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans

- Informally between discipline and formally in multidisc team meeting
- Working towards joint assessment forms.
- Stroke seniors meeting
- Working in the same workspace to share information

b. Input from each team member is respected and valued

- In multidisc meeting, every discipline given dedicated turn to talk.
- “I feel everyone’s role is respected”
- “Knowing the role of another clinicians and incorporating within your own treatment is important as well”
- “So in the past in when we do our in our team meeting and you know we everyone takes turn to do their bit and we notice that social work and speech often get left out in, in the conversation, you know, because you know, there's just so much to talk about and usually we run out of time and just to make sure that you know, speech and social work done left out of the conversation we reordered guess who gets to go first to get.”

How well these indicators are integrated into practice?

- Frequently and “good at this one”

Any barriers to collecting this data?

- No barriers – have these documented (e.g. accreditation process)
- “Vague” cultural evidence as it is more in practice than documentation. “I've never worked in such a like good workplace for that, but that's quite vague to really some of that valued and respected and that culture stuff is harder to just, like provide evidence for because it's just we just know we do it and it's just in the environment you know it's a bit, it's a bit harder.”

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Nothing else

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Nothing else

General comments

- Collaborative goal setting – covered in the first criteria
- KPIs are straightforward

Criteria 4: Centres of Clinical Excellence exchange new knowledge and actively promote mentorship with National/International colleagues and people living with stroke to advance best practice.

1. Knowledge exchange

a. Collaborations with external organisations to exchange knowledge about best practice e.g. clinical practice groups, national and international rehabilitation groups

- Stroke Community of Practice: 2 x staff members co-owners from [hospital] (used to be a lot more vibrant than now as they have lost funding – less frequent content now). Has x6 stroke centres
- [2 hospitals] share monthly interdisciplinary education sessions on stroke-specific topics, which is extended to Stroke services statewide. This includes latest research; community supports and new initiatives. Most [hospital] site dials into this meeting.
- [hospital] provides clinical support and guidance to [regional hospital] (virtually). Formal meetings once a week and informal guidance is available PRN.
- Sharing of AROC result between [other hospitals].
- AROC hosts rehab outcome sessions every year – Stroke specific deep dive happens most years
- Discipline specific interest groups (neuro inclusive of stroke)

b. Protected time allocated for knowledge exchange activities e.g. networking

- Attendance of community of care practice and [hospital] education forms opportunities for networking.
- Clinicians have previously visited other stroke units for networking and benchmarking
- Full-time SSW self-allocates time for goal-setting QI and oversea patient projects (2hrs per month)
- Encouraged to go to PD sessions for networking

c. Opportunities for staff to participate in training using different modalities for knowledge exchange activities e.g TED talk, social media, radio, TV

- Staff are encouraged to attend and present stroke conferences and presentations at the health round table (hospital-specific)
- Not well backfilled – not a priority

2. Mentorship

a. Formal interdisciplinary mentorship program (i.e. allocated mentors and mentees) for individual clinicians and people living with stroke

- Physio: Mentorship program within physio, resources used from dept of health to guide program.

- OT: No formal mentorship program, however, have completed informal mentorship with WACHS (country health) clinicians (signed contracts etc) however no time set aside for this so on a minimal level as time restraints,
- Medical: formal mentorship exists for junior doctors to have consultant mentors. However, not interdisciplinary.
- Speech: informal mentorship from senior to junior
- Full-time SW provides mentorship to P1 SWers, especially if they have a Stroke outlier

b. Formal mentorship program for clinical centres

- Unsure how to answer this – mentor [Hospital]

c. Investment in mentorship training for mentors

- There are mentorship training available.

d. Protected time for mentoring

- Medical: No
- OT: No
- Physio: No
- SW: No, need to self-allocate time
- SP: def not

How well these indicators are integrated into practice?

- Clear indicators. Mentorship is important. Can formalise it more as it is not integrated into standard practice. Also stroke specific mentorship, not just discipline-specific mentorship

Any barriers to collecting this data?

- None

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Clear

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- None

General comments

- Different modalities – not a priority
- Every discipline has a mentorship (formal and informal)
- No clear pathway for mentorship training

Criteria 5: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a shared strong ethical and value-based leadership, that inspires, motivates and drives forward successful rehabilitation.

1. Development

a. Rehabilitation workforce development

i. Commitment to recruitment of the 'best' staff

- Mostly through word of mouth.
- Considering sustainability of the service – full-time SP, however provided opportunities for upskilling

ii. Processes to promote professional growth and development of staff

- Opportunities for education, shadowing, double sessions with clinicians, clinicians spend time in other areas to develop knowledge (e.g. ward staff spend time in ESD to understand service).
- Regular sponsorship of conference attendance.

b. Leadership development

i. Mechanisms to gain feedback to/about leaders and assess leadership e.g. 360-degree feedback, formal appraisals, open door policies

- OT: OT staff complete 360-degree feedback as a routine part of professional development portfolios, regular formal appraisals are compulsory and written paperwork,
- PT: Mandatory Annual performance appraisals for leadership with option for 360-degree feedback from staff, open door policy throughout leadership in the department. Leadership positions have their desks in visible locations and sit in shared workspaces.
- SW: The social workers leaders are not based on Stroke or specialised in this area. Yet the leaders on the ward; P3 OT, P3 PT, CNS and Consultant has open-door policies and are accepting on formal and informal feedback. Furthermore, they usually attend our monthly seniors' meetings, which is a safe space to discuss feedback.
- SP: Minimal leadership feedback (not designed in the department however not discouraged), however open-door policy. Limited by agenda. Open discussion on the ward in regard to leadership with Stroke team.
- Medical: culture of open-door policy that is interdisciplinary.

ii. Investment in training and time to grow leaders (who are open-minded, adaptive, inclusive, team-focused, and knowledgeable)

- Not formal
- PT: will support leadership staff to take study leave for formal training in the area.
- SW: If there is an interest in this area, it needs to be self-allocated and self-driven by the clinician
- OT: Supportive of leadership to attend PD for formal training in the area and often part of PDP goals for leadership.

iii. Systems to support staff to take up global leadership roles (e.g. editorial boards, committees)

- Not formal
- Management support for attending presentation

2. Leaders engaging with key stakeholders

a. Engagement of leadership with patients and carers.

- PT: Leadership position has clinical caseload on the stroke unit/works alongside junior physiotherapy staff.
- All seniors have clinical caseload (informal or through feedback system to receive feedback from patients)

b. Leadership actively promotes delivery of successful rehabilitation

- Vague – did not understand

3. National/international leadership

a. Representation on influential national/international groups and professional bodies

- OT/PT: Previous membership on stroke foundation living guidelines content member for memory and home assessment however not formal time set aside so had to step down when on leave

How well these indicators are integrated into practice?

- It would be helpful to have leadership defined as some professions in the ward does not have stroke leaders. “Well and truly integrated”

Any barriers to collecting this data?

- Leaders engaging key stakeholders – it is very vague. Needs explanation

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- Commitment to recruitment of the ‘best’ staff
- “It's not structured. If I see that there's good staff elsewhere, I will try and poach them. That's essentially been what I've been doing, approaching people that I know are excellent and constantly providing opportunities”
- “This is more in regard to longevity of the service. What makes best staff, I guess, best staff for people that have experience and for a smaller profession like speech pathology. If you don't have a part-time senior, then there's no opportunity to for junior staff to have experience in that clinical area. We do think about the sustainability of the service.”
- Engagement of leadership with patients and carer “through complaints or through compliments”
- Did not understand leadership actively promotes the delivery of successful rehabilitation

Criteria 6: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery use their specialist knowledge to provide continuous high-quality education to people with stroke, carers, staff and the general public (Formal education such as In-house training, Masters Courses, Conference Presentations, Public Lectures etc).

1. Receiving education

a. Pathways for staff to gain higher-degree qualifications including Masters and PhD

- Yes, Scholarship opportunities through health for allied health.
- PT/OT: Dept supports study leave for postgraduate courses.

- SW: If there is an interest in this area, it needs to be self-allocated and self-driven by the clinician
- SP: new hospital grants allowing completion of Ph.D. with government support
- b. Onsite educational opportunities e.g. inhouse training**
 - Learning and development has generic courses staff available to attend eg. Communication skills, recruitment, leadership.
 - Stroke Services: Monthly stroke specific education series.
 - Frequent education opportunities through stroke unit and each individual department runs scheduled education programs.
- c. Support for off-site education e.g. sponsored workplace visits, conference scholarships, sabbaticals to other centres**
 - Department / Course specific.

2. Delivering education

- a. Delivering conference presentations and in-services to health professionals**
 - All stroke unit staff regularly provide education and presentations to other health professionals
 - OT staff have provided education to external sites such as private Hand and upper limb clinic and hospital OTs
 - Provide Stroke study day for AHP and NS
- b. Providing education to stroke survivors and carers, and the public**
 - Previously opened delivering education to public, however stopped due to poor turnout “We ran a short pilot program to provide educations to the public, but and they turn out was very low.”
 - “Volunteer peer support groups, so that would have strokes, survivors and carers. This and as part of that program they get twice a year refresher course about, you know, all things related to stroke. But that program is now on hold since COVID at some stage where might bring it back.”
 - “Driving education group too. That would be for outpatients and inpatients and their carers were like encouraged to attend as well.”
 - “Clinical psychologist running a wellbeing course; they provided post stroke education to multiple low mood and self-regulation.”
 - Chat time – re-education once a year for previous stroke patients (SP)

How well these indicators are integrated into practice?

- Repetitive on the education and conference

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Nothing on student training/education “I guess a big part of some of the Big Tertiary hospital the hospitals is students and student training and training were professionals.”

Are there any KPIs listed above that you think should not be included when measuring the

delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- Receiving education: Covered in other criteria

Criteria 7: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research

1. Processes that facilitate ongoing communication with key stakeholders

- Stakeholder meeting as per need basis with patient, carers and family but not standard for all patients
- Discharge processes, specific handovers provided upon discharge
- Different agencies in the community to present different services

2. Equitable access of stroke rehabilitation

a. Systems to promote equitable access

- Hospital wide DAIP (disability access inclusion program) program – not stroke specific
- “We just accept people and support them with what they require”
- Access to interpreters and access to ALO

b. Process to monitor access

- “So that if any issues were identified like, have a like a committee that we can feed that back to. We have a diversity and equality team lead as well. So, if there's ever any gaps in the service, we can email her and she will rectify it.”

c. Process to improve access if problems identified

- Barrier – no volunteer transport

3. Regular advocacy and outreach activities

a. For access to stroke rehabilitation services

- Consultants go to acute hospital to flag rehab patient

b. For innovative research

- Answered in previous criteria
- “that having that person in research who's done research giving links in regards to how we can advocate for research and access grants and apply for conferences, make posters, those kinds of things are a bit of a change in regards to access to research and presenting research.”

How well these indicators are integrated into practice?

- Integrated well after explanation of KPI. Not very clear – need more explanation or different wording or example

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- None

Post Trial Interview

Impact on their evidence collection/record keeping

- None

How Key Performance Indicators may change their service provision

- “Well, you've prompted us to check patient experience outcome. Yeah, which we hadn't formalized before. And that's probably one of the most important things.”

Specific issues during the whole process

- More specific questions with examples. It is difficult to judge relevancy of the questions

Exploring barriers/rationale if the indicators are not met or partially met

- We have started exploring the indicators - “with our strategic planning and a few things that already cropped up that were included”

Difficulty collecting evidence/information required

- No difficulty – just a slow process
- “unsure whether to comment on my discipline within the organization or just my discipline within the stroke rehab unit. That was probably also better part of the vagueness. Yeah, and small professions because there's not a big team, so there's not multiple clinicians on the ward.”

Would identifying as CoCE change/impact service delivery?

- “Benefit of shaking up the status quo.
I guess there it's nice to see what other if you are going to collect this and compare this, it's nice to know what other people are doing as well”
- “And also, when it just always striving to provide the best service for our stroke survivors and family”
- “They've got such a great unit and such a great bunch of people, and you know really think we do such a good job, it's good to showcase that.”
- “Nice to have something to really measure that like we all think it, but to measure it and then to share with others and really promote as well promote our unit to like within the state and then nationally and further on.”

- “That looks good for patients as well, saying that they are receiving rehab centre at a centre for excellent their carers like I automatically think. If you are going to receive good rehab, you are going to have better rehab. So, like building that trust with them quickly.”

Perceptions on how well site achieves key performance indicators compared to other sites/countries/areas

- “No, I do not know. We did the best.”
- Hard to answer - “basically a state like I think statewide we provide a similar service.
I would hope so. Yeah, to most other centres, it's hard to know Interstate because I know there's some big centres that are funded lots in terms of the research side of things, like links with Alfred and whatnot, which we just don't have at the moment, that are hopefully building. So, I'm not sure how it goes into some of the KPIs compared to those sorts of site internationally as well. It just depends on country and funding and things and yeah, so that's a hard one to answer as well because as you said, some countries are much more medically driven, which I don't think provides as good as stroke rehab because I the interdisciplinary approach is evidence based, but they might think otherwise.
I think that's the model that provides really good care.
But yeah, so yeah. And I think name there might be different clinic clinics that do different sort of teams that do have strength in different areas as well definitely.”

What is missing from the criteria that are relevant to health service/model/country

- Answered within criterion

What types of evidence do they like to see be considered for each of the indicators

- No response

The adaptability of the Key Performance Indicators to their healthcare model

- “I think it fits in quite well. Yes, in Australia, we're very spoiled with funding for health.”
- Ours is LOS stayed “We've got good data for, but anything else that patient needs to get going because it actually is much as we want to create a healthcare service that's great for patients. That's probably only a recent thing that they've really started to have her in on focus out in the last since I've been more about 10 years now.
Yeah. In the last five years, they probably really started looking at what is the patient experience and advocating for that.”
- “There's been a lot more, I think, even like within health, our health.
It's like WA Health and North Metro lot more recognition for research funding.
I think that's built a lot, especially for allied health opportunities for that has built a lot in the last five to 10 years too. So that fits well with the KPI's I guess.”
- “And their just now really talking about, you know, development for staff as well because there's been quite a lot of people exiting the health system and they're doing a forum to find out why. And they're their theory is because there's not much room for development or, you know, doing extra education. So that's also an area for growth.”

General Comments

- Initial thoughts are we don't know anything about the KPIs, but when we start to unpack it, realise we do fair bit. “I don't know if we do any of that. And then I think when we start to unpack it, actually it

brings something that we do subconsciously to the forefront and go actually do a fair bit turn regards to confidence what we provide and how excellent we think we are.”

Regional Australia

Background Questions

Name of Healthcare Facility:

Country: Regional, Australia

Where is your stroke rehabilitation unit based?

- ☐ Metropolitan - Capital cities
- ☒ Regional and Rural Centre
- ☐ Remote Centre

What type of stroke services do you provide?

- ☒ Inpatient stroke rehabilitation program
- ☒ Ambulatory/Outpatient stroke rehabilitation program/Day rehabilitation
- ☐ Rehabilitation in the home program (Early supported discharge program)
- ☒ Telehealth services (or virtual rehab) to rural sites
- ☐ Other

For inpatient rehabilitation services

- **What outcome measure(s) do you use, collect and where does it go – is it used for benchmarking? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures) (Own record or someone looks at it)**
 - ☐ Functional Independence Measure (collected within 72 hours), Length of stay, occupied bed days, AROC
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ Hospital-specific accreditation
 - ☐ National Stroke Foundation – Audit
 - ☐ Service level audit
 - ☐ Discipline-specific document audit for allied health

For ambulatory/outpatient

- **What outcome measure(s) do you use? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures)**
 - ☐ Nonspecific for rehab
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ None in place

Please select relevant disciplines involved in patient care in your rehabilitation services.

- ☒ Rehabilitation Consultant
- ☐ Neurologist
- ☐ General Practitioner

- X Physiotherapist/Physical Therapist
- X Occupational Therapist
- X Speech Pathologist/Speech Language Therapist
- X Registered Nurse
- X Dietitian/Nutritionist
- X Social Worker
 - Psychologist (Clinical Psychologist and Neuro Psychologist)
 - Exercise Physiologist
- X Others. **Please specify:** Allied Health Assistant, Physician/Duty Doctor/GP as primary medical support

How is your stroke rehabilitation program(s) currently funded?

- X Universal Health Care
 - Employer Funded
 - Mixed method funding
 - National Health Insurance
 - Out of Pocket Funding
 - Others. Please Specify.

Criteria 1: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery deliver outstanding rehabilitation to ensure optimal outcomes (health, social and well-being) for people living with stroke.

1. Optimal outcomes

a. Patient outcomes

i. Clinical/physiological measures

- KPI too big/broad - needed clarification measures versus outcomes -as they are assessments completed instead of outcomes? "Outcomes could be complications during admissions"
- NS: making sure blood pressure is within post-stroke guidelines, post-stroke complications (bladder and bowel functions – continence management plan, chest), Upper limb measure or assessments along the way, initial Ax within 24 hours for each discipline, rehab medical review within 24 hours,
- discipline-specific measures. Mood assessment and carer needs assessment. Malnutrition screening, falls risk, skin integrity tool, delirium screen
- Functional Independence Measure ultimate outcome
- transfer and mobility plan, cognition, pressure injury risk, upper limb subluxation risk, pain.
- "Clinical measures within the range recommended by physicians"
- "Are they measures or observations along the way" – confusing terminology
- "Some measurements (e.g. bladder and bowel plan) we don't do particularly well" Based on Stroke Foundation Audit

ii. Patient-reported outcomes

- We don't collect but should be with goal reviews and on admission
- Informal discussion within goal setting, however no formal expectation of documenting
- "It is not called patient-reported outcomes – but called a goals review"

iii. Patient-reported experience

- We do a patient reported experience at inpatient discharge
- There is no process to review the patient reported outcomes document as clinicians/sites– need a process + gaps identified. There are no feedback loop
- Offering of feedback forms for site-specific – good at this
- No ambulatory feedback given - the tool is available.

iv. Self-management skills

- Not sure if we do well. Can't find evidence when collecting audits. "Not sure if we are calling it as something else?"
- Not using self-management tool.
- "There are formal programs that can be used – definitely can do better"
Provide Home Exercise Programs for pt to complete
- Physitrack – has feedback/tracking included but not consistently filled out by pt.
Cognition iPad programs
- Informally done case by case. There is no expectation for each patient – not consistent and not structured
- No formal process for use of self-management skills – in medical and allied health.
- Stroke education – has some self-efficacy type questions
- Behaviour changes processes - informal

b. Carer outcomes

i. Carer reported outcomes

- We don't formally collect. Carers can assist with filling out patient reported experiences.

ii. Carer reported experience

- Not formally collected
- Sometimes captured within patient reported experience.

iii. Carer self-management skills

- Current work around 'Carer needs assessment tool' used by SW as a trial. "More on how we support carer and what does the carer need"
- We certainly do carer training but is that easily found in the documentation
- Carers are offered to join in for stroke education

c. Service outcomes

- Separations
- NWAUs
- AROC (clinical indicators and Functional Independence Measure changes)
- clinical benchmarks
- Occupied bed days
- LOS
- KPIs with therapy hours, time from referral to acceptance to assessments
- Clinical pathway forms -
- Measurement of service outcomes done well.

- Complications at the hospital level – Hospital Acquired Complications
- Well collected and documented

2. Deliver outstanding rehabilitation

a. Assessment of rehabilitation requirements

i. Comprehensive/holistic assessment

- Needed clarification
- Team: Multidisciplinary completed more in ambulatory space, more individual assessments for inpatients. Goal setting for both inpatients/ambulatory. Formation of goals better done in inpatients.
- NS: assessments to be completed for clinical (bladder, bowel, medication etc). There are documents available.
- OT: pressure injury management/braden score. Visual assessment, cognitive assessment – will impact how services are provided in other areas, UL assessment/positioning,
- Joint functional assessments (PT/OT, SP/OT) - do joint assessments well
- Mood support in therapy sessions done very well
- Mood assessment not as well documented

ii. Ongoing assessment at regular time points

- Team: completed each time we are seeing patients – incidental and there will be documentation for each session
- Individual and ongoing assessments that are discipline-specific - documented
- Ongoing communication/flag of individual discipline reviews done well e.g. diet difficulties, swallowing
- Not done well - goal review throughout the program for updates
- Do well within the team to keep up communication within the team

b. Rehabilitation interventions

i. Evidence-based

• Time of commencement

- initial Ax within 24 hours for each discipline, rehab medical review within 24 hours. Documented in progress notes
- Use of clinical pathway documents endorsed by metropolitan hospital for team action time frames.
- Commencement chosen to suit assessment time frames “A bit artificial”
- Time of day when commenced e.g. Starting in PM impacts ability for multiple allied health input.
- Service delays e.g. bed availability

• Duration

- Needed clarification - vague
- ? Duration for the whole rehab or during the day? Length of stay determines time
- There are no formal reports on the duration of therapy – not sure if it is looked at as well as it should be. There are KPIs around this (e.g. 2 to 3 hours of therapy a day) Clinicians know the importance of duration.
- Fatigue levels, medical wellness, dialysis
- Based on pt centredness.

• Dose

- 5-day service. So more therapy during the 5 days to balance therapy for the weekend. Provide modalities for patients to use over the weekend to continue therapy? Gap in service? Intensity versus length of service
- Impacted by weekends and public holidays
- Dependent on disciplines
- FTE impacted

- **Procedures/methods**

- Not sure what this means – Transfer/mobility/upper limb management routine
- Evidence-based therapy approaches – not documented in notes/throughout

- ii. **Addresses person's goals (tailored rehabilitation)**

- “Yes, there are conversations about goals, are they patient or therapist driven. Start of being patient-driven. The patient provided a copy of the goals however not weekly reviewed at the case conference. Ideally reviewed weekly. We do reasonably well.”
- Attempts to do patient-driven however sometimes impacted by their insight/expectations of return to functioning.
- Short vs long-term goals- what is achievable in the inpatient setting
- Ambulatory rehab goals not as well done.
- Goals not reviewed enough.
- Use of a goal attainment scale template would be beneficial to measure goals against.

- iii. **Integrated delivery (minimise duplication between professionals/services)**

- We do multidisciplinary sessions together and document together

- c. **Coordinated ongoing care and support**

- “No straightforward process”
- Inpatient stroke patients go onto ambulatory but after that there is no formal contact at 6 weeks or 6 months, so there isn't a longer term follow up. Used to complete individualised care plan/passport. Stroke clinic follow up - ?formal process
- Stroke clinical approach allows for touch in point and re-referral to rehab if required. Positive having overlap of clinician between stroke clinic/rehab
- No formal process

How well these indicators are integrated into practice?

- Some KPIs are integrated well and some are not and need to improve
- Never really do MDT for inpatients – need to improve
- Need to complete more reporting and make it more accurate so we can evidence for therapy hours etc
- Goal setting – could be discussed at the case conference

Any barriers to collecting this data?

- Not documenting data makes it harder to collect information
- Electronic Medical Record makes it easier to access some KPI information

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- “If we did all of these things – yes and they are all relevant but we don’t do all of them exceptionally well. I don’t think its unachievable”
- “?need to write holistic assessment including any cultural consideration” Does it need to be specifically written out?
- Not much about education – secondary prevention education
- Integration with other services would be good
- Discharge planning also would be good to have
- Does minimum resources need to be identified for the KPIs for centres to meet

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- “We have key worker role”
- Clinical/physiological measures, dose versus duration – needs clarification and definition attached to it
- All relevant - however time spent documenting everything and how important is it to spend time doing this instead of work – systems have to support documenting this.

Criteria 2: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice.

1. Organisational processes and systems

a. Research elements in all job descriptions and role profiles

- Quality improvement is included in the job description but no specifics about research.
- Should include QI but not necessarily research-based.
- QI evidence-based/research-based
- Not always fit within all roles. Could be more relevant in a clinical senior role with less of a clinical role to allow for more research tasks

b. Organised initiatives to support positive research culture

i. Regular research activities for all staff e.g. journal clubs, training or attending conferences

- PD program to fund research/training. Funding is dependent on if you are able to attend. Approval is also dependent on documented previous interest.
- Informal journal club – not documented but QI project.
- Nursing has an annual allowance for training.
- Should be able to have the opportunity to attend conferences. Difficulties to attend for on-ground clinicians to attend.
- At times opportunity for country clinicians to attend (limited number and putting name forward).

ii. Embedded quality improvement program

1. Regular collection of outcome data (for Criterion 1)

- AROC. Patient Report Experience Measure. Pre- and post-surveys for QI projects – results uploaded to QI database.

c. Infrastructure and resources to support research activity

i. Allocated research time

- No allocated time for research.

ii. Systems to support high-quality data collection

- QI platform. AROC extraction.

d. A recognised pathway or strategy to implement research into practice

- Following stroke guidelines which are updated. Informal ways not documented ways. “
- None locally”

2. Formalised links with external agencies

a. Links with universities:

- Link w/ uni for rehab specific placements. Clinical educators link but no formal links with university

b. Research collaborations with other national and international centres

- Yes, for UL trial. Monash University - minimal

3. Staff expertise and culture

a. Leading research, applying for and winning research funding

- Rural generalist program.
- Emails re: applying for seed funding PT, OT
- None for NS

b. Research leadership from multiple professional groups, not just medical

- No

c. Broad methodological research knowledge across staff base (or access to skills/knowledge)

- No – vary – dependent on position and experience

How well these indicators are integrated into practice?

- Poorly integrated and not a priority
- Not a priority and not emphasis as part of day to day working
- Room for improvement
- Not a top usually talked about
- “We have some sort of infrastructure for PD – lots of hoops to jump through to get funding”

Any barriers to collecting this data?

- No – we are not doing it so no information to collect – not applicable. We still think it should be a priority

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- “It needs to be there”

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Research elements in all job descriptions and role profiles – not necessary to be in there

General comments

- Research is not necessarily a priority compared to clinical – use more QI and that is more important
- “We should have the opportunity to attend relevant conferences, but it doesn’t triumph clinical load when short-staffed”
- “Look different in metro
- Cost less
- Less travel
- More numbers on the ground so if someone took time off for research, they have more to cover – more flexibility
- More opportunities for group training
- Would also be different if it was rehab hospital”

Criteria 3: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery ensure inter-professional working and person-centred rehabilitation where colleagues, persons with stroke and carers work together towards a common goal.

1. Organisations and systems to proactively support patient and family involvement in rehabilitation journey

a. Information provided routinely to patient and family about rehabilitation process and rehabilitation team

- Welcome pack documented.
- Conversations at intake about rehab expectations and documented
- Discussion with the patient about willingness to participate

b. Collaborative goal setting process (goals agreed upon by team, patient, family)

- Family not always included – dependent on their presence Keyworker completes goal setting, not always multiple disciplines.
- Brought back to the team and discussed. At times visualised goals however not consistently for each patient.
- Family meeting completed throughout and discussed updated goals/where to work towards.
- Slow improvements towards discussion of goals at case conferences.
- Need better process for goal setting

c. Regular opportunities between team, patient and family for 2-way information exchange

- Daily intake meetings for team updates.

- Family meetings completed throughout. Getting families in for ward rounds.
- Key point for contact h/e will often go through rehab ANUM due to phone availability.

d. Shared decision-making between rehabilitation team, patients and carers

- Documented notes from family meeting.
- Carer training.
- Conversations with carers and family documented. Discussion of risk with family on home visit.
- Discussions of discharge time between team and family.

e. Virtual communication available when indicated (eg lockdowns, supporting remote services)

- Telehealth
- Connecting family members in for social support via tele
- Use of telehealth links for family meetings via phone camera.

f. Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre

- Needed clarification – what does it mean
- Identifying health care providers
- Some involvement from external organisation however not documented anywhere.
- No formal processes – from experience

g. Culturally safe care provision

- Questions in patient-reported outcome measures about cultural/lifestyle support needed
- ALO involvement and attending sessions/meetings
- Specific My stroke journey pack for Aboriginal clients

2. Systems to support coordinated inter-professional teamwork

a. Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans

- Weekly case conference.
- Morning daily meetings.
- Family meetings.

b. Input from each team member is respected and valued

- Not sure how to answer – vague question and how do document this?
- In weekly case conference documentation – sections for each discipline to document.
- Case conference – ensure heard from each discipline and handover about each patient.
- Monthly team meetings.

How well these indicators are integrated into practice?

- Well integrated
- “We can do better at culturally safe provision... help support while in hospital”

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- Need to improve review of goals
- Very informal and not formally documented
- Do well in virtual communication as “we are a country site therefore provide a lot of services to other areas”
- “We can do better at family meeting instead of some patients. Focus on all patients”
- Systems to support coordinated interprofessional teamwork - I think we are missing a whole layer of clinical seniors that will help us work together”

Criteria 4: Centres of Clinical Excellence exchange new knowledge and actively promote mentorship with National/International colleagues and people living with stroke to advance best practice.

1. Knowledge exchange

a. Collaborations with external organisations to exchange knowledge about best practice e.g. clinical practice groups, national and international rehabilitation groups

- Stroke foundation through audits – provide information for benchmarks which then gives clinical info for best practice.
- Links with metro clinics for support.
- Rural support service
- Rehab Operational Workgroup
- “There is a gap – no stroke support group”
- “No connection with any international rehab group”

b. Protected time allocated for knowledge exchange activities e.g. networking

- No allocated time

c. Opportunities for staff to participate in training using different modalities for knowledge exchange activities e.g TED talk, social media, radio, TV

- Face-to-face, webinar, allied health conferences.
- On Facebook page to promote stroke week
- Nothing formal

2. Mentorship

a. Formal interdisciplinary mentorship program (i.e. allocated mentors and mentees) for individual clinicians and people living with stroke

- ☐ No

b. Formal mentorship program for clinical centres

- ☐ Informal with metro site

c. Investment in mentorship training for mentors

- ☐ Nothing

d. Protected time for mentoring

- ☐ No

How well these indicators are integrated into practice?

- ☐ “not well for mentorship”
- ☐ “there are huge gaps – mentorship is very valuable as resource, particularly with knowledge sharing”
- ☐ “no rehab clinical network in the state - a big loss”

Any barriers to collecting this data?

- ☐ “Nothing to collect – so no barrier”
- ☐ “Barrier to mentorship is the distance from major centres”

Are there other indicators reflecting exchange new knowledge and actively promote mentorship that you think should be included for your site/health services?

- ☐ More patient-specific indicators and need to separate from clinicians
- ☐ “External people come in to chat with patients (e.g. amputee)”

Are there any KPIs listed above that you think should not be included when exchange new knowledge and actively promote mentorship?

- ☐ No

General comments

- ☐ None

Criteria 5: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a shared strong ethical and value-based leadership, that inspires, motivates and drives forward successful rehabilitation.

1. Development

a. Rehabilitation workforce development

i. Commitment to recruitment of the ‘best’ staff

- ☐ Merit based processes but difficult due to region. No incentives to entice experienced staff.
- ☐ “Commitment part is there but sometimes it is getting who you get”

- “There is process to recruit best staff but struggle to get experienced clinicians and commitments should be actually putting more value on getting people to move here, should there be more incentives?” ?therefore not committed?
- There is nothing for staff retention

ii. Processes to promote professional growth and development of staff

- Professional development – formal documented process
- Local funding program – “allows for promoting growth”
- Online mandatory trainings and other available trainings.
- Functional Independence Measure training renewals.
- Processes there but offering may not be as ready due to multiple factors

b. Leadership development

i. Mechanisms to gain feedback to/about leaders and assess leadership e.g. 360-degree feedback, formal appraisals, open door policies

- Vague – needed clarification about this indicator
- Yes, formal appraisals (NS).
- No known processes to give feedback from leadership outside of Professional development. Local discipline-specific people to go.
- Lack of rehab allied health clinical governance. – a gap identified
- “Staff survey but never received a response, therefore not 360 deg feedback”
- No processes to approach anyone higher than team leader

ii. Investment in training and time to grow leaders (who are open-minded, adaptive, inclusive, team-focused, and knowledgeable)

- Growing leaders program – limited spots available. Lengthy processes to apply.
- Leading clinicians program. Time requirement out of clinical load

iii. Systems to support staff to take up global leadership roles (e.g. editorial boards, committees)

- No
- Professional rehab nursing association network – has journal/editorial board opportunities - not encouraged through work processes, personnel-driven. “No systems in place to access through work” May not actually be necessary through work – should be self-directed
- Less opportunities for clinicians to sit on committees
- No systems available to support leadership roles. Dependent on role – higher roles have increased opportunity for committees, workgroups.

2. Leaders engaging with key stakeholders

a. Engagement of leadership with patients and carers.

- Vague – need clarification – Team Leader (TL) role or clinician role? “is it clinical leadership or patient related” Need more definition or explanation – difficult to answer”
- No

- Nursing leadership involvement on the ward has higher involvement than rehab TL. Rehab TL is more involved with complaints. Use of discipline-specific skills and increased experience for complex presentations. Clinical senior for intake and appropriateness for rehab.

b. Leadership actively promotes delivery of successful rehabilitation

- TL – involved in processes e.g. ANSNAPS, hiring of staff
- Clinical Senior – Providing update re: AROC data, integrated care from ADL with clear pathways onto rehab programs.
- “Is it clinical or non-clinical leadership” – vague and a big difference between these
- “Not sure about the successful part”

3. National/international leadership

a. Representation on influential national/international groups and professional bodies

- ARNA (Australasia rehab nursing association),
- AFRM (rehab medicine group)
- Amputee committee as member
- Neurological group
- Australian physiotherapy association

How well these indicators are integrated into practice?

- Some integrated well but not all.
- Engaging leadership with patients and carers – interesting – what does it mean, what is the purpose?
Very vague

Any barriers to collecting this data?

- Not much information available

Are there other indicators reflecting the shared strong ethical and value-based leadership that you think should be included for your site/health services?

- Sometimes we get leadership development from clinical experience - ?include

Are there any KPIs listed above that you think should not be included when measuring the shared strong ethical and value-based leadership?

- “Leadership engaging with key stakeholder”
- “What level is the representation on the group – what time representation – member or on board on committee making decisions?”

General comments

- None

Criteria 6: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery use their specialist knowledge to provide continuous high-quality education to people with stroke, carers, staff and the general public (Formal education such as In-house training, Masters Courses, Conference

Presentations, Public Lectures etc).

1. Receiving education

a. Pathways for staff to gain higher-degree qualifications including Masters and PhD

- Rural Generalised Program
- Masters of Clinical Rehab
- MOOC, UTas
- Driver training course – funded by university – not hospital (rural scholarship)
- There are no pathways, they are just sent out by universities

b. Onsite educational opportunities e.g. inhouse training

- Functional Independence Measure, upper limb rehab training, resilience training.
- Sparse face-to-face training/in house

c. Support for off-site education e.g. sponsored workplace visits, conference scholarships, sabbaticals to other centres

- Some support available through PD funding – with leadership support
- self-directed secondment/sabbatical off-site – clinician driven but need approval
- occasional scholarship offers

2. Delivering education

a. Delivering conference presentations and in-services to health professionals

- Opportunity for conference presentations.
- Inservice opportunities for health professionals – journal club and nursing in-service
- Carer training with nursing – transfer training

b. Providing education to stroke survivors and carers, and the public

- Stroke education for survivors during rehab program.
- Stroke week education opportunities e.g. information, education, checking of blood pressure.

How well these indicators are integrated into practice?

- Yes, education opportunity out there but is self-driven, impacted by staffing levels and clinical priority
- A lot of the opportunity is in metro therefore takes longer time because have to travel far

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Offsite versus onsite – need clarification (face to face versus telehealth)
- Stroke survivors receiving education, how about being provided to survivors?

Are there any KPIs listed above that you think should not be included when measuring the

delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- None

Criteria 7: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research

1. Processes that facilitate ongoing communication with key stakeholders

- Vague
- Not formalised process to facilitate communication – it is general knowledge
- Coordination of referrals from ADL, allocation of key workers, discharge summaries to external providers, public health service, Coordination of care post-rehab.
- Negotiation of most appropriate rehab service – metro vs ADL consideration of catchment area.
- Pathways outlining who to provide info to, and who to include.

2. Equitable access of stroke rehabilitation

a. Systems to promote equitable access

- Generic system for referral to rehab service. Each postcode has allocated rehab facility/service.
- Gaps of knowledge where acute strokes are located within state.
- Lack of allocated stroke nurses to promote appropriate pathways for stroke rehab.
- Acute stroke pathway formalised however not always followed.
- Difficulties with equitable access for people outside “catchment” area

b. Process to monitor access

- Lack of allocated stroke nurses to promote appropriate pathways for stroke rehab.
- Don’t know about those that aren’t referred.
- No process to monitor access – limited by resources

c. Process to improve access if problems identified

- Individual process for acute stroke identified

3. Regular advocacy and outreach activities

a. For access to stroke rehabilitation services

- Vague indicator
- Use of telehealth for remote or those who can’t travel.
- Single location for face to face services

b. For innovative research

- Limited opportunities to be involved with stroke research.

How well these indicators are integrated into practice?

- “We all in same page about advocating patients to access stroke rehab when they need to however limited by resources (bed availability)
- Advocating – outside our control to accept within recovery window (early or too late)

Any barriers to collecting this data?

- Location barrier for research and monitoring and lack of acute unit stroke care – therefore processes to rehab are muddled

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Nothing about indigenous access
- ATSI – no consideration in ANSNAP – building rapport first – takes time to build rapport prior to starting program. Lengthens time in rehab

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- None

Post Trial Interview

Impact on their evidence collection/record keeping

- QI project – to improve record keeping
- Informally document - may need formalised processes for better documentation, but no capacity to complete this now. However having electronic medical record will help with record keeping and finding evidence

How Key Performance Indicators may change their service provision

- Identifies gaps along way (e.g. service delivery, regular family meeting)
- We know some things (weekly family meeting) are beneficial but we don’t have the resources to complete this – depending on staffing and conflicting priorities

What are the facilitators and barriers to using the Key Performance Indicators

- “Does it come with funding to identify gaps and meet all indicators – we could achieve a lot more of them”
- “We are pretty limited by funding”

Specific issues during the whole process

- A lot of them based around stroke specific centres with research and better link with stroke-specific bodies.
- “So we have lots of processes, but they're not all individualised to a stroke service.”

- It's good that we had to go through this in several sessions

Exploring barriers/rationale if the indicators are not met or partially met

- "All the criteria was said are all quite highly applicable and if we are only meeting some of them. We are not providing best practices, even if there is limits on it like funding and staffing and chronic staff shortages and whatever else."
- "And it's the same what they're trying to do in the acute stroke space is they have acute stroke units in Adelaide, but they're gonna call them Stroke centres in the country but we are not doing the same thing. I think if you're gonna call them all the same thing, they have to fit the same criteria, yeah."

Difficulty collecting evidence/information required

- Would be better with electronic medical record
- "Sometimes KPIs are confusing in their wording"
- "They need more clarification on what they mean as it is up to interpretation"
- "The indicators don't consider cultural influence"

Would identifying as CoCE change/impact service delivery?

- You would get higher quality services, due to meeting all the criteria therefore will have better resources. But you need everything that comes with it to meet the KPIs

Perceptions on how well site achieves key performance indicators compared to other sites/countries/areas

- "Answered research very poorly"
- "We would be very different because we are country site compared to metro sites that you might have spoken with different resources and actual options open to us"
- "Our resources will impact on indicators – doing what we can with what is available"
- "We don't have rehab physicians or medicines, no therapy over weekend – impacts on service"
- "not being a sole stroke rehab centres impacts on KPI"

What is missing from the criteria that are relevant to health service/model/country

- No

What types of evidence do they like to see be considered for each of the indicators

- No answer provided

The adaptability of the Key Performance Indicators to their healthcare model

- Country sites don't receive funding for research"
- "None of them will be considered stroke centres because there are no funding for research like metro site"

General Comments

- “it is great to know gaps but what do we do to improve the gap – feel a bit deflated”
- “we do well with what we got, but we are expected to do same level of service as metro site but without the resources and learning opportunities as a metro site”

Metropolitan China

Background Questions

Name of Healthcare Facility:

Country: Metropolitan, China

Where is your stroke rehabilitation unit based?

- ☒ Metropolitan - Capital cities
- ☐ Regional and Rural Centre
- ☐ Remote Centre

What type of stroke services do you provide?

- ☒ Inpatient stroke rehabilitation program
- ☒ Ambulatory/Outpatient stroke rehabilitation program/Day rehabilitation
- ☐ Rehabilitation in the home program (Early supported discharge program)
- ☐ Telehealth services (or virtual rehab) to rural sites
- ☐ Other

Note: These services are divided into branches with Northern and Western Branches providing inpatient and ambulatory rehabilitation services and Eastern branch (main hospital) providing only Inpatient services

For inpatient rehabilitation services

- **What outcome measure(s) do you use, collect and where does it go – is it used for benchmarking? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures) (Own record or someone looks at it)**
 - ☐ Discipline-specific outcome measures
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ Need to obtain and retain Joint Commission International (JCI) accreditation
 - ☐ Certification for primary, secondary and tertiary hospital requirements

For ambulatory/outpatient

- **What outcome measure(s) do you use? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures)**
 - ☐ Similar to Inpatient – discipline specific. Not Bartel Index, but inclusive of Motor Assessment Scale, Modified Ashford
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ None in place

Please select relevant disciplines involved in patient care in your rehabilitation services.

- ☒ Rehabilitation Consultant

- Neurologist
- X General Practitioner
- X Physiotherapist/Physical Therapist
- X Occupational Therapist
- X Speech Pathologist/Speech Language Therapist
- X Registered Nurse
- Dietitian/Nutritionist
- X Social Worker (*Not all patients can access SW – per need basis and need to pay*)
- Psychologist
- Exercise Physiologist
- Others. **Please specify:**

How is your stroke rehabilitation program(s) currently funded?

- Universal Health Care
- Employer Funded
- X Mixed method funding (*funded through medical insurance (a small portion) and commercial insurance. However, different areas have different percentages of this. China has a multilevel funding system with basic medical insurance and medical aid as backup. Commercial health insurance, charitable donations and medical mutual aid activities as supplementary services*)
- National Health Insurance
- Out of Pocket Funding
- Others. Please Specify.

General comments

- “No length of stay for patients – sometimes they can stay up to half a year in the hospital”
- “The basic medical insurance doesn’t cover all of the cost. They will pay for a small part and some of them may have commercial insurance and that will cover all of them. Different cities may have different policies. They will have different limit or range of insurance cover.”
- “Have same funding system but different cities have a list of programs covered in insurance. For example in Shanghai, it will cost patient less and insurance will cover most of it while other cities may be opposite”
- “It depends on local government”
- “Centres of Clinical Excellence – maybe a standard that hospital can know if they are doing best for patients and we should consider clinical outcomes”
- “Rehabilitation is a raising star in medical area and not all of us know how to do it. Maybe there is no standard or routine in rehabilitation hospital. Maybe I think this KPI will us to know how to do it generally.”

Criteria 1: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery deliver outstanding rehabilitation to ensure optimal outcomes (health, social and well-being) for people living with stroke.

1. Optimal outcomes

a. Patient outcomes

i. Clinical/physiological measures

- Assessment of functional impairment (structural and functional damage)
 - Motor function: Muscle strength, joint range of motion, muscle tension (Modified Ashworth Scale), balance function (Berg balance scale), gait
 - Sensory function
 - Pain (visual analogue scale)
 - Cognition (mini mental test or Montreal cognitive assessment)
 - Swallow (water swallow test for every patient, and some may use Flexible Endoscopic Evaluation Swallowing)
- Assessment of disability (limited activity)
 - Barthel Index
 - Instrumental Activities of Daily Living (some may use)
- Assessment of motor function in hemiplegic limbs
 - Bruunstrom
 - Fugl-Meyer Assessment (some may use)
 - motor assessment scale (some may use)

ii. Patient-reported outcomes

- Sorry, not sure about the difference between i. and ii.

iii. Patient-reported experience

- We don't collect data of this (but we do have patients who send us a thank-you letter sometimes, does it count?)

iv. Self-management skills

- Barthel Index
- Instrumental Activities of Daily Living (some may use)

b. Carer outcomes

i. Carer reported outcomes

- We don't collect data on this

ii. Carer reported experience

- We don't collect data on this

iii. Carer self-management skills

- We don't collect data on this

c. Service outcomes

- We don't collect data on this, or does turnover rates of beds count?

2. Deliver outstanding rehabilitation

a. Assessment of rehabilitation requirements

i. Comprehensive/holistic assessment

- It's the same with those in Patient outcomes

ii. Ongoing assessment at regular time points

- We assess every patient on their day admitted and discharged, some may be additionally assessed during their hospital stay (such as after Botox injection)

b. Rehabilitation interventions

i. Evidence-based

• Time of commencement

- We don't deliberately collect it. It's covered in patients' medical history after all. We start intervention as early as 24 hours after the patient is stabilized.

• Duration

- We don't deliberately collect it. It's automatically collected when patients get discharged by the hospital's system. Our recommended duration is one year, and more if the patient shows improvement in certain scales.

• Dose

- a. We don't quite understand what the dose stands for. If it means the frequency of our interventions, then it goes for at least five times a week. It may change depending on the patient's condition or requirement

• Procedures/methods

- We treat the patients differently depending on their condition. Basically, they will receive PT, OT, ST, TMS, **Acupuncture and moxibustion**, Shock wave therapy, Ultrasound therapy, microwave therapy, Joint Mobilization and Massage, electrokinetic standing bed, rehabilitation robots, direct current-stimulation, etc.

ii. Addresses person's goals (tailored rehabilitation)

- We don't collect data on this. We just give medical orders based on the patient's condition and requirements.

iii. Integrated delivery (minimise duplication between professionals/services)

- We will keep a daily progress log on the computer and a printed list of the patient's intervention schedule. Also, we keep communicating through the WeChat group, where all the doctors, therapists and nurses are in. And we do shift handovers every day.

c. Coordinated ongoing care and support

- We don't collect data on this

How well these indicators are integrated into practice?

- Discussed question above

Any barriers to collecting this data?

- “Yes, the problem is, normally when we do ward round and collect their opinions, we will record on the case notes in the system but for us we don’t normally record their therapies – what they have received. We just do doctor orders so they won’t be documented into the case notes.”
- “The printed paper is a list of that recording every pay, every treatment the patient received and when they received it.”

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Not anymore

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- “I think it is quite relevant but we don’t have much time for every indicator. We have lots of patients and not enough doctors or therapists to spend so much time on every patient”

General comments

- All data are documented in case notes.
- “Our hospital doesn’t routinely collect all the data”
- “The clinical measures and ongoing assessments at regular time points may have some overlap. Maybe.”
- Optimal outcomes (comes across as vague within categories – causing confusion)
- “Physically and psychological outcomes and social participation in social work something like that”
- “We have all kinds of outcomes measures for that”
- “Depends on patient. We don’t use the word optimal outcome. We just do our best with the patient. Maybe the patient wants to be more able to look after themselves or hand function. If we can do that, maybe that’s the optimal outcome for us”
- “We do ward rounds every day, in the morning and evening and we will ask the patients and their carers about their feelings or if they are well, if they are uncomfortable or if they have improved some function and we will ask if they have further requests”
- “I am a little confused about the difference between clinical measures and patient-reported outcomes”
- “There are some measures and that we use not for every patient because they have different disabilities. Maybe some have severe motor function disability and others may have difficulty in cognition function or not well in consciousness. So I am wondering if these clinical measures should only include the scales that we use for every patient or can we categorise them”.
- Clinical skills, self-reported outcomes and self-management skills are overlapping – “Isn’t it a little overlapping with clinical measures”
- “The patient reported experience we don’t normally collect that then, but some patients may send a letter to us does it count? But not routine”
- Delivering outstanding rehabilitation
- “Sense of achievement for both but mostly focused on patients”
- “It is not routine to measure this. We might do this three times a year maybe”
- “Of course, we have the chat group and we will communicate our time and we will do the shift handover every day”
- “Confused about rehabilitation interventions”
- “The time of commencement – the time they get treated after admission, then it is almost immediately. We will let them make an appointment with the therapist to decide their time to receive a different

therapist and they will start their treatment as early as the day that they are admitted or the day after”.

“We have printed paper that will show time and treatment the patients received”

- Duration – You know the patients will have tailored treatment and they may receive different combinations of therapies, therapy and well mostly they will receive the basic PT/OT/ST and that is for sure the duration will be recorded in the printed paper as I previously that.”
- “Almost all of our patients will receive Chinese traditional medicine”

Criteria 2: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice.

1. Organisational processes and systems

a. Research elements in all job descriptions and role profiles

- No, we don’t put it on job descriptions and role profiles. However, all the staff are required of research achievements, especially those with deputy or senior titles. They are usually asked to publish articles each year or have at least one provincial and above project. It is more of a tacit thing.

b. Organised initiatives to support positive research culture

i. Regular research activities for all staff e.g. journal clubs, training or attending conferences

- Yes, we have journal clubs, training and research lectures once a week (for all of them, just on different days). But we don’t document it.

ii. Embedded quality improvement program

1. Regular collection of outcome data (for Criterion 1)

- Yes, we usually collect them when the patients are admitted and when they’re discharged, or after they have received special treatment e.g. Botox injection therapy.
- However, it might change if the patients are enrolled into someone’s research

c. Infrastructure and resources to support research activity

i. Allocated research time

- No, we don’t have such a thing. Everyone just has to use their spare time

ii. Systems to support high-quality data collection

- Yes, we have HIMedc system to collect research data.

d. A recognised pathway or strategy to implement research into practice

- Yes. We have staff that converted their patents into machines for clinical use.

2. Formalised links with external agencies

a. Links with universities:

- Yes, we have links with Fudan University, Shanghai Sport University, etc..

b. Research collaborations with other national and international centres

- Yes

3. Staff expertise and culture

a. Leading research, applying for and winning research funding

- unsure

b. Research leadership from multiple professional groups, not just medical

- Yes, we have. The progress of each group will be discussed twice-trice a year to all staff, and once a month within the group.

c. Broad methodological research knowledge across staff base (or access to skills/knowledge)

- Yes, we have. There are vpn that enable the staff to access most of the articles on PubMed for free, and websites where they can learn research methods any time.

How well these indicators are integrated into practice?

- “Mostly”

Any barriers to collecting this data?

- “Yes, it would be better to give an example to illustrate “A recognised pathway or strategy to implement research into practice”

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- Would prefer examples for each KPI
- “We have different groups of research interest, like rehabilitation of neurology and for joints and muscles. They have different directions in their research and their research groups may include doctors and nurses. They will start their own program and maybe publish in papers and do some experiments. We would have weekly lessons about the research methods and sometimes we would hold the sharing of articles.”
- Organisational processes and systems
- “I wonder how each indicator works. Do they assess the facility by “1 or 0” (has or doesn’t have) or if they have specific scores or ranking, just like scales?”
- “The embedded quality improvement program” part might be more than just regular collection of outcome data. It should contain regular training of standard outcome assessment and data collection”
- “It is a must or demand for research outcomes. You must have a paper published every year or 2 years
- “We had to sign our signature every time we attended. We are required to attend every meeting and lecture if you are free. But it is not in the policy that we must do. The department organised it and it is by default we have to attend”
- Formalised link with external agencies
- Hospital belongs to University therefore there is a lot of collaboration between this hospital and around China. It might be a little personal because the collaboration is based on someone’s project”
- Recognise and promote staff expertise and culture
- “Weekly meeting to share”

Criteria 3: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery ensure inter-professional working and person-centred rehabilitation where colleagues, persons with stroke and carers work together towards a common goal.

1. Organisations and systems to proactively support patient and family involvement in rehabilitation journey

a. Information provided routinely to patient and family about rehabilitation process and rehabilitation team

- Yes, we tell the patients and their carers about these on our morning/evening ward rounds. We will record the feedback on each patient's ward round record every day.

b. Collaborative goal setting process (goals agreed upon by team, patient, family)

- We would collect the main goal of the patients and their carers when they are admitted into the ward. Then our team will decide the minor goals that help achieve the main goal. We'll do a ppt for each new patient, and record their state and goals.

c. Regular opportunities between team, patient and family for 2-way information exchange

- Yes, just as a..

d. Shared decision-making between rehabilitation team, patients and carers

- I think it's overlapping with a..

e. Virtual communication available when indicated (eg lockdowns, supporting remote services)

- No, we don't have that.

f. Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre

- No, we don't have that.

g. Culturally safe care provision

- During their stay, the patients will be looked after by their family or nursing workers (who are paid for safe care provision when the family are not available). We don't document this.

2. Systems to support coordinated inter-professional teamwork

a. Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans

- We will discuss the patient goals, progress and plans with the whole team once a week. We don't document this.

b. Input from each team member is respected and valued

- Yes, but we don't document this.

How well these indicators are integrated into practice?

- Answered above

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- Interpersonal working and person-centred rehabilitation means collect the patient and carer's opinion during our ward round.
- "We have shift handover every morning. Nurses and physios attend. Weekly meeting that all the doctors and therapist will attend, we will communicate patient's detailed information."
- Organisations and systems to proactively support patient and family involvement in rehabilitation journey
- We are promoting the idea of full cycle treatment. So they will receive treatment from inpatient then continue when the discharged. The problem is implementing this is not a huge success. If you want to give advice to patient through phone or far distance, then we don't have a policy that encourage us because we can't charge fees for that and no standard. Maybe it is more government problem if we want to ensure the patient gets more consistency in their treatment. *(it is in practice but it is not implemented due to time factor – we know it has to happen but there is no policy to enforce it)*

Criteria 4: Centres of Clinical Excellence exchange new knowledge and actively promote mentorship with National/International colleagues and people living with stroke to advance best practice.

1. Knowledge exchange

a. Collaborations with external organisations to exchange knowledge about best practice e.g. clinical practice groups, national and international rehabilitation groups

- Yes, we have regular clinical practice groups. Our hospital is a teaching hospital and will receive many trainees from other hospitals. Also, we will send trainees of our own to other hospital, national or international.
- All the trainees are required to write down their learning experience and some even are required to publish an article.

b. Protected time allocated for knowledge exchange activities e.g. networking

- No, most online or offline learning is held in spare time :)
- Vague – "What does it mean"? need clarification

c. Opportunities for staff to participate in training using different modalities for knowledge exchange activities e.g TED talk, social media, radio, TV

- Yes, plenty: social media, online lecture or conference, offline lecture, etc...

2. Mentorship

a. Formal interdisciplinary mentorship program (i.e. allocated mentors and mentees)

- No, we don't have interdisciplinary mentorship program, just within rehabilitation.

b. Formal mentorship program for clinical centres

- Yes, they are documented in hospital system.

c. Investment in mentorship training for mentors

- Yes, there are training lectures.

d. Protected time for mentoring

- No.

How well these indicators are integrated into practice?

- Well integrated into practice

Any barriers to collecting this data?

- No difficulty with knowledge exchange with other hospitals, but more difficulty with national groups and rarely with international groups

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- ? Protected time for knowledge exchange and mentorship – none allocated within work hours – expectation to be completed outside work hours or during however it is relevant to be included as KPI

General comments

None

Criteria 5: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a shared strong ethical and value-based leadership, that inspires, motivates and drives forward successful rehabilitation.

1. Development

a. Rehabilitation workforce development

i. Commitment to the recruitment of the 'best' staff

- Yes, though the description "best" is a little vague here. Our hospital is committed to recruiting staff with higher degrees, more academic achievements and better clinical skills.

ii. Processes to promote professional growth and development of staff

- We have regular training lessons and conferences

b. Leadership development

i. Mechanisms to gain feedback to/about leaders and assess leadership e.g. 360-degree feedback, formal appraisals, open door policies

- What do you mean by “leaders”? We have weekly meetings where can communicate with the head of our department, and have annual meetings with hospital leaders.

ii. Investment in training and time to grow leaders (who are open-minded, adaptive, inclusive, team-focused, and knowledgeable)

- Yes. But we don’t document it.

iii. Systems to support staff to take up global leadership roles (e.g. editorial boards, committees)

- Yes. But we don’t document it.

2. Leaders engaging with key stakeholders

a. Engagement of leadership with patients and carers.

- Our head of our department will do ward rounds at least once a week, receive their feedback, and help improve their treatment.

b. Leadership actively promotes the delivery of successful rehabilitation.

- The head of our department will attend the weekly reporting of patients’ progress and will give suggestions or instruments of their treatment.

3. National/international leadership

a. Representation on influential national/international groups and professional bodies

- We are National Center for Gerontology.

How well these indicators are integrated into practice?

- Not well

Any barriers to collecting this data?

- Needs to be clearer

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

General comments

- “Confused about the concept of “best staff” and the commitment to recruit the best staff – do we need to provide more salary to attract the best staff or something else”
- “Best staff – both research and clinical practice?”
- Leadership – vague as well – department or hospital? “Need to make it clear what is this leadership about”

Criteria 6: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery use their specialist knowledge to provide continuous high-quality education to people with stroke, carers, staff and the general public (Formal education such as In-house training, Masters Courses, Conference Presentations, Public Lectures etc).

1. Receiving education

a. Pathways for staff to gain higher-degree qualifications including Masters and PhD

- ☐ Yes

b. Onsite educational opportunities e.g. inhouse training

- ☐ Yes

c. Support for off-site education e.g. sponsored workplace visits, conference scholarships, sabbaticals to other centres

- ☐ Yes

2. Delivering education

a. Delivering conference presentations and in-services to health professionals

- ☐ Yes

b. Providing education to stroke survivors and carers, and the public

- ☐ Yes, through public media or offline lecture held in the hospital.

How well these indicators are integrated into practice?

- ☐ Well

Any barriers to collecting this data?

- ☐ No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- ☐ No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- ☐ No

General comments

- ☐ The criteria and KPI "It is pretty clear"

Criteria 7: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research

1. Processes that facilitate ongoing communication with key stakeholders

- No

2. Equitable access of stroke rehabilitation

a. Systems to promote equitable access

- Not sure what this means

b. Process to monitor access

- Not sure what this means

c. Process to improve access if problems identified

- Not sure what this means

3. Regular advocacy and outreach activities

a. For access to stroke rehabilitation services

- Yes, by public media, providing medical support to remote areas, etc..

b. For innovative research

- Yes, by public media.

How well these indicators are integrated into practice?

- Not well

Any barriers to collecting this data?

- Vague KPI

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- Straight forward criteria and KPI but vague
- "What do you mean by equitable access of stroke rehabilitation"
- "Related to medical insurance?" "Here our medical insurance will ensure that our patients will get their rehabilitation within a year – both inpatient and outpatient"
- "Patient with more severe stroke are sent to east district, not service stroke admitted to west and north district"
- "Maybe equal opportunity – we also have VIP" with higher priority
- "There are other rehabilitation hospitals – they will receive same treatment but may not be same quality."
- "Simple cold and they access high level services instead of going to community hospitals
- "we have enough reputation for patients to go our hospital"

Post Trial Interview

How Key Performance Indicators may change their service provision

- “KPIs that we don’t use in our routine work, we will consider documenting more regular or official”
- “Our hospital has a comprehensive development, so in every aspect, we have certain achievements, and there is no specific shortage in the hospital. There is no more focus in one area e.g. clinical versus research”

Specific issues during the whole process

- Explained during interviews

Exploring barriers/rationale if the indicators are not met or partially met

- “Some of them we don’t have them in our routine and when I ask my staff – they don’t understand what I am talking about”
- “We don’t have official international exchange – more like a personal relationship with professors from different countries”
- **Difficulty collecting evidence/information required**

Would identifying as CoCE change/impact service delivery?

- **Perceptions on how well site achieves key performance indicators compared to other sites/countries/areas**
- Fine – “I don’t think we have any shortage in this 7 criteria”

What is missing from the criteria that are relevant to health service/model/country

- **What types of evidence do they like to see be considered for each of the indicators**
- **The adaptability of the Key Performance Indicators to their healthcare model**
- “Most of them are relevant to healthcare model”

General Comments

- “I want to know how these KPIs work 0 assess the facility by 1/0 or has or doesn’t have or specific scores or ranking. Is there scales?”
- “I think we can set a score for when 7 criteria added total and when the reach certain score they will be categorised as certain level”

Regional China

Background Questions

Name of Healthcare Facility:

Country: Regional, China

Where is your stroke rehabilitation unit based?

- ☐ Metropolitan - Capital cities
- ☒ Regional and Rural Centre
- ☐ Remote Centre

What type of stroke services do you provide?

- ☒ Inpatient stroke rehabilitation program
- ☒ Ambulatory/Outpatient stroke rehabilitation program/Day rehabilitation
- ☐ Rehabilitation in the home program (Early supported discharge program)
- ☐ Telehealth services (or virtual rehab) to rural sites
- ☐ Other

For inpatient rehabilitation services

- **What outcome measure(s) do you use, collect and where does it go – is it used for benchmarking? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures) (Own record or someone looks at it)**
 - ☐ Discipline-specific outcome measures such as manual muscle test, berg balance scale, barthel index, finger to nose
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ Need to obtain and retain Joint Commission International (JCI) accreditation
 - ☐ Certification for primary, secondary and tertiary hospital requirements

For ambulatory/outpatient

- **What outcome measure(s) do you use? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures)**
 - ☐ Similar to Inpatient – discipline specific. Not Bartel Index, but inclusive of MAS, Modified Ashford
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ None in place

Please select relevant disciplines involved in patient care in your rehabilitation services.

- ☒ Rehabilitation Consultant
- ☒ Neurologist (*If required*)
- ☒ General Practitioner
- ☒ Physiotherapist/Physical Therapist
- ☒ Occupational Therapist
- ☒ Speech Pathologist/Speech Language Therapist

- X Registered Nurse
- Dietitian/Nutritionist
- Social Worker
- Psychologist
- Exercise Physiologist
- Others. **Please specify:**

How is your stroke rehabilitation program(s) currently funded?

- Universal Health Care
- Employer Funded
- X Mixed method funding (*funded through medical insurance (a small portion) and commercial insurance. However, different areas have different percentages of this. China has a multilevel funding system with basic medical insurance and medical aid as backup. Commercial health insurance, charitable donations and medical mutual aid activities as supplementary services*)
- National Health Insurance
- Out of Pocket Funding
- Others. Please Specify.

General comments

- “No length of stay for patients – sometimes they can stay up to half a year in the hospital”
- “The basic medical insurance doesn’t cover all of the cost. They will pay for a small part and some of them may have commercial insurance and that will cover all of them. Different cities may have different policies. They will have different limit or range of insurance cover.”
- “Have same funding system but different cities have a list of programs covered in insurance. For example in Shanghai, it will cost patient less and insurance will cover most of it while other cities may be opposite.”
- “It depends on local government”

Criteria 1: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery deliver outstanding rehabilitation to ensure optimal outcomes (health, social and well-being) for people living with stroke.

1. Optimal outcomes

a. Patient outcomes

i. Clinical/physiological measures

- Blood pressure, heart rate, oxygen saturation of the figure, pupillary reflex; Manual muscle testing, Brunnstrom stage, Berg balance scale, Finger nose test, Barthel Index, Modified Ashworth scale, Glasgow Coma scale, Water swallow test, Mini-Mental State Examination, Blue dye test for feeding.

ii. Patient-reported outcomes

- Quality of Life, do not use any type of questionnaire or sheet. Just ask them are you satisfied with your current life, are you happy?
- Functional Status, Barthel Index, for upper or lower limb function, ask them can they finish each function, shoulder abduction, adduction.

- Fatigue and pain intensity. Pain (Numeric rating scale), for fatigue, simple question, feel fatigue.
- Health behaviours, smoking, drinking, sedentary, exercise. We just ask patients do they have a healthy lifestyle.

iii. Patient-reported experience

- Administration will randomly phone some of patients, ask them opinions about the care they have received and their perceptions about the impact of treatment every quarter.

iv. Self-management skills

- None

b. Carer outcomes

i. Carer reported outcomes

- None

ii. Carer reported experience

- None.

iii. Carer self-management skills

- None

c. Service outcomes

- None

2. Deliver outstanding rehabilitation

a. Assessment of rehabilitation requirements

i. Comprehensive/holistic assessment

- Limbs' function, muscle strength, cardiopulmonary capacity, balance, walking, swallowing ability, cognition. Language performance, activities of daily living (ADL)

ii. Ongoing assessment at regular time points

- On a monthly basis, once a month.

b. Rehabilitation interventions

i. Evidence-based

• **Time of commencement**

- Every patient gets treatment from 8 am to 11.30 am, 2.30 pm to 5pm

• **Duration**

- 6 hours

• **Dose**

- It depends

• **Procedures/methods**

- Chinese traditional medicine therapy, manual therapy, physiotherapy, light, electrotherapy, exercise therapy, occupational therapy, speech therapy
- ii. Addresses person's goals (tailored rehabilitation)**
 - Clinicians and physios have a discussion and then draw a plan. But we do a bad job in this area.
- iii. Integrated delivery (minimise duplication between professionals/services)**
 - Professionals have their own tasks. We do not need to worry about duplication.
- c. Coordinated ongoing care and support**
 - We do a bad job in this area. Clinicians, physios and nurses lack communication because they are busy during workdays.

How well these indicators are integrated into practice?

- "Some indicators we can't collect. For example, carer outcomes – it is not routine"

Any barriers to collecting this data?

- Some information not collected

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- "We don't have enough time to ask every patient. I need to treat 15 patients a day and every patient gets 30 minutes of treatment time"

General comments

- "It covers all aspects".
- "You know, 80% of patients are those with severe disease in my hospital, they can't speak and cognition problem, so I can't get any useful information from them"
- Optimal outcomes (comes across vague within categories – causing confusion)
- "We focus more on mental and physical health. We use many methods to evaluate patient's function such as muscle strength, hand function etc."
- "Physical assessment belong to clinical/physiological measures and patient reported outcome is a professional term. Does patient reported outcome refers to the quality of life, function status and fatigue and pain. We use quality of life score, numerical rating scale to evaluate pain"
- Patient reported experience – "the administration of our hospital will randomly contact old patients to ask them opinions about their treatment and their perceptions about the impact of the treatment. Randomly contacted for survey"
- Delivering outstanding rehabilitation
- "For patients, they can enjoy much more useful service and recover as soon as possible. For the staff, we can more salary. Achievement is also important for us – Sense of achievement. We use questionnaire with staff – e.g. do you like your job for staff and do you like your treatment plan etc."
- "So I don't know what that coordinated, ongoing care and support."

- “The time of commencement – patient should line up for treatment, we arrange exact time for every patient.”
- Duration – patient will be seen every 30 minutes. Exercise therapy, occupation therapy/speaking test and Chinese traditional medicine will last 30 minutes

Criteria 2: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice.

1. Organisational processes and systems

a. Research elements in all job descriptions and role profiles

- For one thing, clinicians and physios are more involved in the research work, because they must publish papers or attend research projects for their professional title evaluation. Nurses do not need this. For another, physios like to share their experience, insights and novel skills with colleagues. Clinicians like to talk about the latest development of disease.

b. Organised initiatives to support positive research culture

i. Regular research activities for all staff e.g. journal clubs, training or attending conferences

- In my hospital, clinicians and physios hold a meeting every Tuesday afternoon to discuss papers, professions and relevant projects.

ii. Embedded quality improvement program

1. Regular collection of outcome data (for Criterion 1)

- No

c. Infrastructure and resources to support research activity

i. Allocated research time

- No

ii. Systems to support high-quality data collection

- No

d. A recognised pathway or strategy to implement research into practice

- No

2. Formalised links with external agencies

a. Links with universities:

- Our hospital is the affiliated hospital of [university]. We clinicians and physios undertake some teaching tasks. We are also tutors of university students. We can use [University] Library to search data.

b. Research collaborations with other national and international centres

- No

3. Staff expertise and culture

a. Leading research, applying for and winning research funding

- Yep, that is our sustained goal. To date, our rehabilitation sector has won a number of research funding, including provincial and municipal level funded by local government.

b. Research leadership from multiple professional groups, not just medical

- Professors of the university.

c. Broad methodological research knowledge across staff base (or access to skills/knowledge)

- We acquire methodological knowledge by self-learning. If we meet some problems of methodology, we will ask the professors of [University] for help.

How well these indicators are integrated into practice?

- “Our clinicians and physios are very involved in their research work. Because they need to publish papers and attend research projects for their professional title evaluations, but nurses don’t have to.
- “Physios like to share knowledge and ideas and latest developments”

Any barriers to collecting this data?

- “No”
- “Can’t collect some e.g quality improvement program, regular collection of outcome data, allocated research times, systems to support high-quality data collection, a recognised pathway or strategy to implement research into practice because we don’t have this”

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- “Links with universities” - finished the links because our hospital is affiliated hospital with the university so we undertake teaching tasks or tutors and we can also use the library at the university”

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

General comments

- Would prefer examples for each KPI
- Research culture - “I don’t understand what research culture mean”
- Organisational processes and systems
- It is a requirement to attend “Every Tuesday afternoon, clinicians and nurses will get together to share their opinions about their professionals”
- Formalised link with external agencies
- “Every year med students will do an internship in our facility – collaborate with a local university”
- Recognise and promote staff expertise and culture
- “Weekly meeting to share”

Criteria 3: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery ensure inter-professional working and person-centred rehabilitation where colleagues, persons with stroke and carers work together towards a common goal.

- 1. Organisations and systems to proactively support patient and family involvement in rehabilitation journey**
 - a. Information provided routinely to patient and family about rehabilitation process and rehabilitation team**
 - We provide rehabilitation process information to patients and families routinely every weekday morning.

b. Collaborative goal setting process (goals agreed upon by team, patient, family)

- We clinicians and physios set goals at the very beginning with patients and their families. But we seldom adjust goals with their progress. That is our drawback.

c. Regular opportunities between team, patient and family for 2-way information exchange

- Every weekday morning.

d. Shared decision-making between rehabilitation team, patients and carers

- It depends. Except for emergencies, special patients and tricky situations, clinicians, physios and nurses make decisions respectively. You know, physios in China do not have the exercise prescription right, clinicians prescribe and physios carry out the exercise prescription.

e. Virtual communication available when indicated (eg lockdowns, supporting remote services)

- No

f. Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre

- No

g. Culturally safe care provision

- No

2. Systems to support coordinated inter-professional teamwork

a. Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans

- We did a bad job in collaboration.

b. Input from each team member is respected and valued

- Sometimes we do not. Sometimes the treatment or therapy of clinicians and physios can not reach a consensus. Sometimes we overlook someone's opinion.

How well these indicators are integrated into practice?

- Well

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Organisation and systems to proactively support patient and family involvement in the rehabilitation journey
 - Virtual communication available when indicated
 - Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre
 - Culturally safe care provision - “They don’t care about this and asked my leader and they don’t know anything”

General comments

- Interpersonal working and person-centred rehabilitation mean every morning all clinicians will get together to share information. “We don’t share detailed information just state how many patients we have now and how many are discharged.”
- Organisations and systems to proactively support patient and family involvement in the rehabilitation journey
- No discussion about goals – identified as a drawback
- Systems to support coordinated inter-professional teamwork

Criteria 4: Centres of Clinical Excellence exchange new knowledge and actively promote mentorship with National/International colleagues and people living with stroke to advance best practice.

1. Knowledge exchange

- a. Collaborations with external organisations to exchange knowledge about best practice e.g. clinical practice groups, national and international rehabilitation groups**
 - No
- b. Protected time allocated for knowledge exchange activities e.g. networking**
 - No
- c. Opportunities for staff to participate in training using different modalities for knowledge exchange activities e.g TED talk, social media, radio, TV**
 - No – only do face-to-face communication – not other modalities

2. Mentorship

- a. Formal interdisciplinary mentorship program (i.e. allocated mentors and mentees)**
 - No
- b. Formal mentorship program for clinical centres**
 - No
- c. Investment in mentorship training for mentors**
 - No
- d. Protected time for mentoring**
 - No.

How well these indicators are integrated into practice?

- Not integrated well into practice

Any barriers to collecting this data?

- Difficult to find some information on knowledge exchange. Only have information within own university – difficult to

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- ? Protected time for knowledge exchange and mentorship – none allocated within work hours – expectation to be completed outside work hours

General comments

- Never heard about some key performance indicators
- Very young rehab unit – developing city
- No annual leaves – holidays are public holiday. Up to 80 patients with 30 physios within the month

Criteria 5: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a shared strong ethical and value-based leadership, that inspires, motivates and drives forward successful rehabilitation.

1. Development

a. Rehabilitation workforce development

i. Commitment to recruitment of the 'best' staff

- Yes, our leaders desire to recruit staff with high academic qualifications. We recruit clinicians with PhD. And we recruit physios with at least a master degree.

ii. Processes to promote professional growth and development of staff

- No, that is one of our shortcomings. One reason is that the best staff do not want to join us.

b. Leadership development

i. Mechanisms to gain feedback to/about leaders and assess leadership e.g. 360 degree feedback, formal appraisals, open door policies

- No, the only way to assess the leader's leadership is how the leader leads us to make a profit. Most of the mechanisms of assessing leadership is confidential.

ii. Investment in training and time to grow leaders (who are open-minded, adaptive, inclusive, team-focused, and knowledgeable)

- No

iii. Systems to support staff to take up global leadership roles (e.g. editorial boards, committees)

- ☐ No

2. Leaders engaging with key stakeholders

a. Engagement of leadership with patients and carers.

- ☐ No, that is what we lack

b. Leadership actively promotes delivery of successful rehabilitation

- ☐ No

3. National/international leadership

a. Representation on influential national/international groups and professional bodies

- ☐ No

How well these indicators are integrated into practice?

- ☐ Not all indicators integrated well – talked about it above

Any barriers to collecting this data?

- ☐ Needs to be clearer

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- ☐ No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- ☐ No

General comments

- ☐ We lack communication – “we are not like a big family” “I provide service and they receive service”
- ☐ “We don’t have right to lead patients”.
- ☐ “My responsibility is to tell them what to do”
- ☐ “Our hospital desires to recruit staff with high academic qualification – most hospitals will require this, especially the hospitals with higher level. Clinicians will need PhDs or at least a masters degree”
- ☐ “We have group leader, sector leader and hospital leader – so we don’t know which one you mentioned here”

Criteria 6: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery use their specialist knowledge to provide continuous high-quality education to people with stroke, carers, staff and the general public (Formal education such as In-house training, Masters Courses, Conference Presentations, Public Lectures etc).

1. Receiving education

a. Pathways for staff to gain higher-degree qualifications including Masters and PhD

- Yes, we have. Compared with other applicants, The [University] will give priority to we staff if we staff apply for Master degrees. Our hospital encourages the staff to apply for PHD and supports staff to finish their PHD, including financial support, but staff must go back to our hospital when they graduate.

b. Onsite educational opportunities e.g. inhouse training

- No

c. Support for off-site education e.g. sponsored workplace visits, conference scholarships, sabbaticals to other centres

- No

2. Delivering education

a. Delivering conference presentations and in-services to health professionals

- No

b. Providing education to stroke survivors and carers, and the public

- Seldom. Only in special days, such as word physiotherapy day and world stroke day

How well these indicators are integrated into practice?

- “We are not good at this year”.

Any barriers to collecting this data?

- “What is in-services” – not a terminology used in China

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- “We deliver talks to public on World Physio Day”
- “We go to rural areas to advocate about physiotherapy – twice a year”
- “After work time have to write papers”

Criteria 7: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research

1. Processes that facilitate ongoing communication with key stakeholders

- No

2. Equitable access of stroke rehabilitation

a. Systems to promote equitable access

- In our hospital, the system is not fair. VIPs such as government officials and social elites take the priority to receive medical service. Medical resources are limited, the number of rooms is limited.

b. Process to monitor access

- No

c. Process to improve access if problems identified

- No

3. Regular advocacy and outreach activities

a. For access to stroke rehabilitation services

- No

b. For innovative research

- No. We need policy and support to support our innovative research, including sponsors, financial support, limits of authority and so on.

How well these indicators are integrated into practice?

- Straightforward criteria and KPI but vague
- “Not fair and equitable in my hospital – because we have 90 beds, but most of the are occupied. Some patients take priority, especially within sector. The clinicians will select who will receive treatment in our sectors”

Any barriers to collecting this data?

Yes, described before

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

No

General comments

- “Selected according to severity sometimes and other times down to social class” “We have VIPs”
- “Sometime citizens have to wait up to a month – so longer waiting period”
- “Limited medical resources”
- “There are other rehabilitation hospitals – they will receive same treatment but may not be same quality – “In China people don’t like to go to community hospital”
- “Lower trust in the community hospital”
- “Use social media (WeChat) to publish comments to public

Post Trial Interview

How Key Performance Indicators may change their service provision

- “KPIs good and some aspects we can follow and it will be useful”

Specific issues during the whole process

- Answered above

Exploring barriers/rationale if the indicators are not met or partially met

- Answered above

Difficulty collecting evidence/information required

- "Sometimes we don't have the right to ask the leader about some information"
- "For example – it is impossible for me to ask my leader how to evaluate their leadership – we don't have right"
- "Some things are confidential"
- "International – because our hospital is not that international"

Would identifying as CoCE change/impact service delivery?

Not sure

Perceptions on how well site achieves key performance indicators compared to other sites/countries/areas

- Fine "I don't think we have any shortage in this 7 criteria"

What is missing from the criteria that are relevant to health service/model/country

No

What types of evidence do they like to see be considered for each of the indicators

Answered

The adaptability of the Key Performance Indicators to their healthcare model

- "Most of them are relevant to healthcare model"

General Comments

- "Every day need to treat 10 patients. Work 7 hours. Salary is dependent on number of patients."
- "Don't get time within work hours to complete research work. Will have to complete outside work hours"
- "hospital will try the best to abide by the criteria – it is useful"

Sweden

Background Questions

Name of Healthcare Facility:

Country: Sweden

Where is your stroke rehabilitation unit based?

- ☒ Metropolitan - Capital cities
- ☐ Regional and Rural Centre
- ☐ Remote Centre

What type of stroke services do you provide?

- ☒ Inpatient stroke rehabilitation program
- ☒ Ambulatory/Outpatient stroke rehabilitation program/Day rehabilitation
- ☐ Rehabilitation in the home program (Early supported discharge program)
- ☐ Telehealth services (or virtual rehab) to rural sites
- ☐ Other

For inpatient rehabilitation services

- **What outcome measure(s) do you use, collect and where does it go – is it used for benchmarking? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures) (Own record or someone looks at it)**
 - ☐ Functional Independent Measures (collected within 72 hours), Length of Stay
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ Commission on Accreditation of Rehabilitation Facilities

For ambulatory/outpatient

- **What outcome measure(s) do you use? (e.g. Length of stay, Functional Independence Measure Barthel Index, Discipline-specific outcome measures)**
 - ☐ Length of Stay
- **What auditing/accreditation process(es) that are currently in place?**
 - ☐ Commission on Accreditation of Rehabilitation Facilities

Please select relevant disciplines involved in patient care in your rehabilitation services.

- ☒ Rehabilitation Consultant (Rehabilitation Medicine Specialist)
- ☐ Neurologist
- ☐ General Practitioner
- ☒ Physiotherapist/Physical Therapist
- ☒ Occupational Therapist
- ☒ Speech Pathologist/Speech Language Therapist
- ☒ Registered Nurse
- ☒ Dietitian/Nutritionist (*only if needed on consultive request*)

- X Social Worker
- X Psychologist (Clinical Psychologist and Neuro Psychologist)
 - o Exercise Physiologist
- X Others. **Please specify:** Nurse Assistant, Physical Therapist Assistant, Physicians, Neuropsychologist

How is your stroke rehabilitation program(s) currently funded?

- X Universal Health Care
 - o Employer Funded
 - o Mixed method funding
 - o National Health Insurance
 - o Out of Pocket Funding
 - o Others. Please Specify.

Criteria 1: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery deliver outstanding rehabilitation to ensure optimal outcomes (health, social and well-being) for people living with stroke.

1. Optimal outcomes

a. Patient outcomes

i. Clinical/physiological measures

- o Functional Independence Measure, Holden in National quality register (SveReh).
- o Professional outcome measures are reported in each patients individual chart.
- o At admission and exit.
- o Discipline specific outcome measures

ii. Patient-reported outcomes

- o EQ-5D, HADS, Life Satisfaction ack. to Fuglemayer. in National quality register (SveReh).
- o Patients experience of goal attainment. In patients chart.
- o At admission, exit and follow-ups

iii. Patient-reported experience

- o Questionnaire regarding satisfaction with rehabilitation, care, interaction with the staff etc.
- o In National quality register (SveReh). At admission, exit and follow ups

iv. Self-management skills

- o Activities of daily taxonomy. measures are reported in each patients individual chart.
- o Continuously during stay

b. Carer outcomes

i. Carer reported outcomes

- o Planning for a questionnaire.
- o Carers welcome to participate in meetings, also individual support.
- o Carers perspective considered in planning.

ii. Carer reported experience

- Planning for a questionnaire.
- Carers welcome to participate in meetings, also individual support.
- Carers perspective considered in planning.
- Carers (everyone) are encouraged to provide feedback or complains on our services.

iii. Carer self-management skills

- Planning for a questionnaire.
- Carers welcome to participate in meetings, also individual support.
- We give information about patient and carers support groups
- Patients and carers are invited to information meetings
- Carers perspective considered in planning.

c. Service outcomes

- Number of patients
- Sex
- Age
- length of stay
- time to admission
- care-related complications
- Falls
- pressure sores/wounds
- Unplanned transitions
- Uncontinued / interrupted care.

2. Deliver outstanding rehabilitation

a. Assessment of rehabilitation requirements

i. Comprehensive/holistic assessment

- Physician /consultant assess referrals
- Team based assessment leads to patients individual rehab plan.

ii. Ongoing assessment at regular time points

- Admission and discharge.
- OT and PT also have a routine with specific timeframes for assessments during stay.

b. Rehabilitation interventions

i. Evidence-based

• Time of commencement

- First day of arrival

• Duration

- 5 days a week, continuously during stay. Individual schedules
- “when it comes to the stroke unit, the guideline says that we should have 45 minutes of physical therapy and 40 minutes of occupational therapy per day at least five days a week”
- “when it comes to the stroke rehab, there are no regulations or recommendation, should be but there aren’t”

- **Dose**

- According to patient's individual plan
- "was struggling with the question of dose because I know dose is very important and I know that dose is not the same thing as the being with staff person. I know it is important but we have no clue"
- "we have duration but we don't have dose"

- **Procedures/methods**

- National stroke guidelines.
- National stroke pathways.
- Local clinical stroke guidelines for each profession

- ii. **Addresses person's goals (tailored rehabilitation)**

- Yes.
- Individual rehabilitation plans. Goals and methods jointly agreed with patients.
- Planning meetings with patient, team, carers and others if needed.
- Client- centered care.

- iii. **Integrated delivery (minimise duplication between professionals/services)**

- Team conference weekly to coordinate each patients needs and each professions work.

- c. **Coordinated ongoing care and support**

- National stroke guidelines.
- National stroke pathways.
- "we have a digital system that we can communicate social care and other facilities out in the society. The main thing that was supposed to be used but still trying"
- Call for a meeting when the patient is in inpatient – family etc and call those we are handing over to. AHP contacted and should be done and available. It is on web-based and communicates with each other. Also, send written information.
- "Inpatient to-day rehab services are rarely instant – usually they go out and then come back to our day rehab"
- "When they come to day rehab – they need to transport longer, takes more stamina"
- "They also get rehabilitation in primary care s they are not left without any training"

How well these indicators are integrated into practice?

- "Just been through CARF accreditation, had already picked out the material – so it wasn't tricky. The most tricky part was to figure out if this is what you wanted or not. And some of the vocabulary."

Any barriers to collecting this data?

- Delivering outstanding rehabilitation – easier to understand and nothing further to add. "a lot of these in the medical chart but can't get data out of the medical chart in an easy way. It is not really doable" Some information is not easily accessible

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- Carer outcome

- “It is good it is there because it made us think”
- “I think the main thing for us is that we have been considering and taking care of what will happen to patients after they leave the clinic, whether its family, carers or the health system”
- “We have a questionnaire in Sweden that is called ‘Caregiver’s Burden’. There are tools available if we want to follow it but we haven’t done it in the clinic”
- “We know carers are caring as well but it is not our goal when they leave the clinic”
- Delivering outstanding rehabilitation
- “I think that it is very important to have outstanding rehabilitation that it a big team that doesn’t say which person is giving this rehabilitation. (*?teamwork*)
- “It is important and very applicable. that you see the different professions that they when they come directly from school, they are very and very professional in their own profession and then they have worked in teams for a while they they get contaminated and they learn more and they learn each others and they also learn to that they can step back and that the other person do it. So good team work means that not everyone has to do everything.
Do the same thing the whole time, but that you can actually hand over to another person and that takes time and professional development” – experience in teamwork

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Length of Stay
- The carer outcomes
- “That is something we don’t explore as much – that is where we had a hard time finding what we should answer”
- “That in Sweden, almost half of the population is single unit families, one person family”
- “We include families when they are there but we don’t see them as carers”
- “Due to the system, we don’t want the family to be the carer, we want them to be families and spouses and children, so that’s a philosophical idea”

General comments

- *Optimal outcomes*
- “Optimal outcomes means providing the care and rehabilitation the patient will benefit the most off”
- “I think it is very important.. for two reasons. One is for our services to evaluate how we are doing in order to improve ourselves, but also for the patient as well as funders, which is the government – to know what we are doing. What is new in Sweden is Care in Number which is a website – the results of some of the quality indicators will be online for each hospital from January. It attracts a lot of interest from journalists, so it is very important for us to know what we are doing”
- Service outcome – “don’t have anything like that. How long depends on their need and gain and development in the time period. Clinical estimate using technical experience” “I think Functional Independence Measure is underused”
- Self-management skills – “In outpatient care – we give things for patients to work with at home as they are in different stages of illness, with different needs and could be on their way back to work”
- *Delivering outstanding rehabilitation*
- Combined with professional assessment

- “Kind of requirement. They should have the ability to rehabilitate themselves with different tools. But it's not defined in time, but if they are not able to do it every day and not meeting requirements, and having active therapy then they are not admissible.”
- “They should be able to sustain at least 30 minutes at least three times a day” -criteria for rehab admission.
- “But not for day rehab – 2 to 4 days a week and depends of patient goals for 6 to 10 weeks. Depends on the patients and how much they can attend. Also depends on fatigue – sometimes we increase duration”.
- “What exactly is meant by duration and those and you know intensity because there are some definitions out but we still talk of those terminology a little bit differently.
So those can also be understood as just overall though, those of everything that includes duration or do we mean more the intensity?”
- “About the medical charts, these are mainly for their patients and the team to communicate. So don't have the structure to use them for making statistics and of getting out data that serve kind of shift in people's minds” “Whatever goes into the medical chart is immediately readable by the patient”
- “requires us to write the medical chart it would have to be understandable for the patient or carer or anyone else. We can't use the medical term or abbreviations”
- Carer outcome – vague
- Helpful if it has examples for each one and what it means – especially if it is used internationally
- “Not everyone knows that patient-reported outcomes and patient-reported experiences – not everyone understands time of commencement (advanced English word) – ‘start’ would be a better word
- Use of abbreviation e.g. KPI – translate in head
- Use easy/everyday words
- “Who is a carer? – we distinguish as next of kin, family and carer – what do you mean?” “You mean someone who actually performs care daily activities for another person? Or do you mean someone who lives in the same household?”

Criteria 2: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a strongly developed research culture, demonstrated by proactive national and international research collaborations and translation of research into best clinical practice.

1. Organisational processes and systems

a. Research elements in all job descriptions and role profiles

- All employees are expected to consume research to be up to date, take part in research and development activities, and participate in research and development.
- Research and development is integrated in career pathways and salary.

b. Organised initiatives to support positive research culture

i. Regular research activities for all staff e.g. journal clubs, training or attending conferences

- The research is quite accessible at the University Hospital in general and compared to other hospitals. Each department (or larger units and centres at the hospital) organizes research activities (journal clubs, professional development meetings, lectures). In daily clinical work, these activities are unfortunately quite often down-prioritized prior clinical work.
- Predominantly research active co-workers attend international conferences when they have something to present and can finance the costs externally. Local, regional and national meetings within stroke rehabilitation can be attended by a whole stroke team (Swedish Stroke Team conference, or other professional meetings).

- Specialists or senior HP in the team support the clinical teams on research activities and the implementation of evidence-based rehabilitation (local clinical practice guidelines).
 - Interest in research and research implementation can vary among clinicians and leaders, and along with unmet clinical needs (e.g. shortage of staff) can impede the research activities in everyday work.
- ii. Embedded quality improvement program**
- 1. Regular collection of outcome data (for Criterion 1)**
- Annual report of research activity, including studies, articles, participating in conferences, and number of employees with different academic degrees.
- c. Infrastructure and resources to support research activity**
- i. Allocated research time**
- Clinics may provide time for research, and provide opportunities for research in collaboration with University.
- ii. Systems to support high-quality data collection**
- Yes, we have quality registers: National Riksstroke (well used in research, less in local clinical practice, since it is mostly looking at stroke units and long-term outcomes, and not specifically the rehabilitation clinic we work in). We collect data to the Rehabilitation register (SweReh) These data are used in research projects with clinical questions and are relevant to our work.
 - Hospital library with journals, and staff to help out, also digitally available.
- d. A recognised pathway or strategy to implement research into practice**
- YES, partly. For example, OT/PT has many years of effort on research and development work supported by our leaders, which also resulted in local stroke rehabilitation guidelines and publications/presentations.
- 2. Formalised links with external agencies**
- a. Links with universities:**
- Yes, we have local agreements in place on collaboration regarding students, for all team professionals,
 - Many co-workers who are active in research work part-time at the clinic
- b. Research collaborations with other national and international centres**
- Yes, through research active co-workers, also visiting groups from other clinics
- 3. Staff expertise and culture**
- a. Leading research, applying for and winning research funding**
- Yes, through research active co-workers.
- b. Research leadership from multiple professional groups, not just medical**
- As a rehab clinic, we have quite a good connection to the research, but in more leading positions, only few have academic degrees (e.g. PhD).
- c. Broad methodological research knowledge across staff base (or access to skills/knowledge)**

- This is in large relatively good, through the closeness to the University, and research active co-workers; but could be better for new staff, and for clinicians with low contact or interest in research.

How well these indicators are integrated into practice?

- Because part of a university hospital – these criteria do integrate well
- “Pretty much well integrated”
- “Mostly clinical priorities first but we have activities all the time going on that will support the research part”
- “May researchers still have part in the clinic – so they don’t just do research

Any barriers to collecting this data?

- “It was quite easy – because of the closeness to university. What we were struggling with was that we may not live up to these as much as we would like”

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- “Have part of the research coming down to patients also. Personal clinical meeting with a patient, I have the background so I can tell the patient the latest research – Research dissemination to the patient”

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- “all parts are needed”

General comments

- Organisational processes and systems
- “I found these criteria relatively easy to check because we have many of those organisation structures just because we are a university hospital. Those structures and their organisation is roughly in place and are positive, it is also in the university hospital’s mission. It is the patient work, clinical work, research innovation and teaching”
- “We have documentation, plans, and work descriptions to state this”
- We have a multi-organisational structure, meaning that different health professionals (HP) work organisationally under different departments (physicians, nurses, PT, OT speech, psychologist, social workers). As a university hospital, all departments have quite similar strategies for activities for research and development, meaning that research is one part of the hospital task areas (where the patients come first, but research and teaching are integrated parts of the work activities). There is a clear policy on research and development and innovation.
- As a university hospital, the employees active in research can apply for state-financed research grants , this is indirectly connected to the hospital research output (reported by each department back to the hospital. These grants generate also some part of the budget that will be dedicated to research activities at each department. The region provides additional funding for research. The hospital can’t directly finance the research, but they encourage externally financed research projects and advocate clinical research that brings knowledge back to the clinical work and to the patients.
- For example, the OT/PT department has a clear research policy/strategy plan; and has during the last 10 years put extra effort into research; and support personnel in their research projects (making time available, positive attitude towards research, establishing research-connected job descriptions (specialist, and senior specialist).

- Rehabilitation medicine is a multiprofessional research group with closed ties to the clinic.

Criteria 3: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery ensure inter-professional working and person-centred rehabilitation where colleagues, persons with stroke and carers work together towards a common goal.

1. Organisations and systems to proactively support patient and family involvement in rehabilitation journey

a. Information provided routinely to patient and family about rehabilitation process and rehabilitation team

- YES, this goes also under the CARF. Here I think we are quite good, by individual planning meetings of care/rehab with patients and family and team. Individual meetings with doctor, nurse, and patient responsive health professional. (not always family)
- “Family members are invited to the first meeting and the last meeting. The contact person links the family and other staff members, but I think we could involve the family more than we do. The family is always welcome to join during training, during opening hours if needed or between opening hours. It is easy to get extra meeting with staff. I think we are available to family all the time, depending on their needs. We don’t have many formal meetings with them, but we are available.”
- We document in the patient’s journal if we have joint meeting

b. Collaborative goal setting process (goals agreed upon by team, patient, family)

- YES. (not always family). Reviewed frequently

c. Regular opportunities between team, patient and family for 2-way information exchange

- YES. (not always family).
- “It is not a regular meeting, meeting in the beginning and end. The communication with family is better with inpatient care than with outpatient. With outpatient, some of them chose not to involve the family as much. The patient chooses not to involve the family. IT is not because they cannot. It is when the patient chooses they should not be there.

d. Shared decision-making between rehabilitation team, patients and carers

- YES. (not always family)
- “A bit of culture in Sweden may be that the patient is more individual than the whole family. Of course, they can have the family as a support. we mostly discuss with the patient and prompt the patient side.”

e. Virtual communication available when indicated (eg lockdowns, supporting remote services)

- Yes, when needed
- “We have patients now in the Outpatient care – it is in the start and trying to do this more. Big goal for the hospital.

f. Processes to identify all key stakeholders in stroke rehabilitation within and beyond the centre

- Yes
- “It is a team responsibility”

g. Culturally safe care provision

- ☐ Yes
- ☐ "I don't think we are required by law"
- ☐ "It is a natural process, we don't discuss it."
- ☐ Everyone that requires care will get care

2. Systems to support coordinated inter-professional teamwork

a. Regular opportunities for rehabilitation team to collaboratively review patient goals, progress and plans

- ☐ Yes
- ☐ "It is documented in the policy but also given"

b. Input from each team member is respected and valued

- ☐ Yes
- ☐ "It is documented in the policy but also given"

How well these indicators are integrated into practice?

- ☐ "This is the foundation of how we work"
- ☐ "as a team, with the team and with the patients and their relatives"

Any barriers to collecting this data?

- ☐ "We discussed the meaning of culturally safe care provision and equal rights. We made a greater inclusion in that" – should be explained more and what information required with an example as it will differ a lot in different countries. I am thinking man, woman, sex, ethnicity, religion"
- ☐ "Same discussion we had earlier about the importance of relatives and family, we would not involve them to be actual caregivers. They are important but in a different way. They support more mentally or more psychologically or as a partner or whoever but role in their family role and not the carer". "we want them to find a way to stay married or stay as a parent or be independent as a child"

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- ☐ No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- ☐ No

General comments

- ☐ Under this KPI the teamwork is addressed only as system support; I think the teamwork as a way of working should be more visible somehow – maybe lift it into the KPI 1 more clearly – it is more the culture of teamwork and the holistic view on team and common understanding of teams that somehow disappears in the presented KPIs. Important to make the TEAM work more visible.
- ☐ Organisations and systems to proactively support patient and family involvement in rehabilitation journey

- Carer involvement
- “we have a social system here that is built up and if you cannot take care of yourself than you will get that help from the community and not always from the relatives.”

Criteria 4: Centres of Clinical Excellence exchange new knowledge and actively promote mentorship with National/International colleagues and people living with stroke to advance best practice.

1. Knowledge exchange

- a. Collaborations with external organisations to exchange knowledge about best practice e.g. clinical practice groups, national and international rehabilitation groups**
 - Yes, within professional contacts with colleagues, professional network meetings, national clinical practice guidelines work, clinic visits, representatives in regional network groups, activities within regional stroke networks
- b. Protected time allocated for knowledge exchange activities e.g. networking**
 - Encouraged, but not specifically allocated time
- c. Opportunities for staff to participate in training using different modalities for knowledge exchange activities e.g TED talk, social media, radio, TV**
 - Yes, partly, lunch webinars weekly for physicians, participating at conferences, professional webinars, and documentaries (when available)

2. Mentorship

- a. Formal interdisciplinary mentorship program (i.e. allocated mentors and mentees) for individual clinicians and people living with stroke**
 - Structure for mentoring is in place; e.g. more senior and experienced colleagues mentor newer ones (recently employed), and physicians have formal supervisors before they become specialists (it's part of their official training). No mentor program interdisciplinary.
 - Patients have a contact person (LOTS)
- b. Formal mentorship program for clinical centres**
 - ??? what is the difference from point a)
- c. Investment in mentorship training for mentors**
 - Not directly?
- d. Protected time for mentoring**
 - This is included in the job description (and expected for the senior colleagues).

How well these indicators are integrated into practice?

- Knowledge Exchange
 - Yes
- Mentorship
 - No

Any barriers to collecting this data?

- “The hospital has a framework that says that the University Hospital and in order to be University Hospital and university unit, there are certain criteria that you have to do.”
- “Most people are aware that teaching and research are part of requirements” and “with that there goes the collaboration”

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

No

- **Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?**
- No

General comments

- “Criteria 4 is more the clinical exchange or collaboration or the research because we have talked about the research collaboration already in the earlier points. Is there any difference in clinical collaboration, research collaboration. We thought this is something we already discussed and already answered – so it needs to be differentiated it much more”
- “the interaction between the clinic and researchers but also between different clinicians to learn more”
- “in general, we had a little bit trouble with those 4,5 and 6 to differentiate and others – we struggled a little bit. Differentiate from the others and there were many questions little bit similar. So we struggled a little bit to see what is exactly required here, what should go under that one.”
- Mentorship
 - Difficult to distinguish the difference between Indicators ‘formal interdisciplinary mentorship program for individual clinicians’ and ‘formal mentorship program for clinical centres’
 - “I wouldn’t say we are mentor centre but we are biggest centre in the region and therefore we get more questions and that will sometimes support the others but not in a mentorship way”. “we are the said to be the last line so we are to support everyone around”. “more qualified hospital, decided by politicians so we have to support”. “It is the policy” “We need to help not because we have to help”

Criteria 5: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery have a shared strong ethical and value-based leadership, that inspires, motivates and drives forward successful rehabilitation.

1. Development

a. Rehabilitation workforce development

i. Commitment to recruitment of the ‘best’ staff

- Best?
- “Do you really need this question?”
- “Would we answer no here?”
- “Don’t we want the best ones always”
- “So it would be a little bit stupid to say, you know, we don’t want the best ones”
- “Don’t see the point in this question”

- “They may have different opinions about what's best for the organization, because whether you look at, look at it in, in, in your own domain, or whether you take helicopters with perspective.”
- “Need to ask the questions differently – as you won’t get anything from this question otherwise”

ii. Processes to promote professional growth and development of staff

- This was partly taken up under research and knowledge exchange, mentoring KPIs, I think a better discrimination between these is needed.

b. Leadership development

i. Mechanisms to gain feedback to/about leaders and assess leadership e.g. 360 degree feedback, formal appraisals, open door policies

- 360 degree? We have yearly surveys that include feedback to leadership, open doors etc
- “We don’t know what 360 means – you have a lot of examples but we don’t’ know that it means. If you are doing this internationally, it is not clear”
- “I am convinced we have this, but your questions were not very clear to us”
- “We have this concept”

ii. Investment in training and time to grow leaders (who are open-minded, adaptive, inclusive, team-focused, and knowledgeable)

- Yes

iii. Systems to support staff to take up global leadership roles (e.g. editorial boards, committees)

- Yes, but system?
- “It is not we have systems that go different stages and reach the final level, not in an organised way.”
- “We talked about career stages, and discussion with leadership. It is encouraged but not listed”

2. Leaders engaging with key stakeholders

a. Engagement of leadership with patients and carers.

- Yes

b. Leadership actively promotes delivery of successful rehabilitation

- Yes

3. National/international leadership

a. Representation on influential national/international groups and professional bodies

- Yes, we have employees represented in influential posts, groups and professional organisations,
- Suggestion: this part had a bit too many different angles but difficult to separate

How well these indicators are integrated into practice?

- Ok

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Development – commitment to recruitment of the ‘best’ staff

General comments

- Rehabilitation workforce development – a commitment to the recruitment of the ‘best’ staff
- Two varying responses to this question - ? not understanding the question
- “No point in this question”
- Feedback mechanism not very clear

Criteria 6: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery use their specialist knowledge to provide continuous high-quality education to people with stroke, carers, staff and the general public (Formal education such as In-house training, Masters Courses, Conference Presentations, Public Lectures etc).

1. Receiving education

a. Pathways for staff to gain higher-degree qualifications including Masters and PhD

- Yes
- It is an opportunity – “not everyone needs to or wants to go the whole academic way”.

b. Onsite educational opportunities e.g. inhouse training

- Yes
- “differs between different professionals
- All professionals have different programs on what they need to go through
- Have different opportunities to leave their patients to their clinical work
- Do a lot of this in individual professional and within the rehab team regularly
- We have a whole clinic once a year
- Education for each other – give education for staff in the house at different levels

c. Support for off-site education e.g. sponsored workplace visits, conference scholarships, sabbaticals to other centres

- Yes
- The region sets money to apply and also to apply within its own organisation
- It is encouraged and requirement at the hospital that certain amount of money have to set aside for staff development
- Sabbatical – new development recently for part-time staff (part hospital and part uni)

2. Delivering education

a. Delivering conference presentations and in-services to health professionals

- Yes

b. Providing education to stroke survivors and carers, and the public

- Yes for patients.
- For the public - this is not the hospitals responsibility
- “We present for the patient organizations if they ask us to do a presentation”
- “So we can be invited to take part in public conferences and public presentations, but it's not as organizing it”
- “organised program through the hospital for clinicians and it is open for stroke survivors and for carers – it goes on all the time all through the year. It is a collaboration from the hospital

How well these indicators are integrated into practice?

- Answered above indicators

Any barriers to collecting this data?

- No

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

- No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- No

General comments

- “Many of these questions were also in earlier questions we went through. Felt like we have answered this before – structured in different ways or have less KPI for each criteria. Some questions was for clinical and some for patients”

Criteria 7: Centres of Clinical Excellence in Stroke Rehabilitation and Recovery advocate and promote equitable access and optimal delivery of stroke rehabilitation services and funding for innovative research

1. Processes that facilitate ongoing communication with key stakeholders

- Ongoing continuously or when needed

2. Equitable access of stroke rehabilitation

a. Systems to promote equitable access

- Sweden has strong laws for that, there are always individual differences,

b. Process to monitor access

- Yes

c. Process to improve access if problems identified

- Yes

3. Regular advocacy and outreach activities

a. For access to stroke rehabilitation services

- Not really
- “Not applicable”
- “We don’t have to go out and advertise and promote our care clearly. We are not competing between centres, people know what to expect when they go the hospital”

b. For innovative research

- Not clear for us why this is here or what should be included here
- “feels like this was added on and it didn’t fit anywhere so it was included here.”

How well these indicators are integrated into practice?

- I think it's important to have it because we have quite a large part of a population where with immigrants and as you said with health literacy, we use quite a lot of translators and there's been discussion in the policies in the by the politicians that certain political parties say that we would save money by not using interpreters as much as we do. And so I think it's important to be aware of that. There are sometimes dark streams going through the country and we need to wave the flag again. And say that this is important.

Any barriers to collecting this data?

Answered

Are there other indicators reflecting the delivery of outstanding rehabilitation and optimal outcomes that you think should be included for your site/health services?

No

Are there any KPIs listed above that you think should not be included when measuring the delivery of outstanding rehabilitation and optimal outcomes?

- Innovative research

General comments

- Regular advocacy and outreach activities
- For innovative research – “didn’t fit here. Included in everything else”
- We're not competing with other centers, but we'll need to. We need to step out, step up and because people said that what is rehab more than physiotherapy so.
So we do have to step up and go out and say this is stroke rehab.
This is rehabilitation and to make people understand that this is the what we are talking about is highly specialized rehab which is not the same as everyday rehab that is going on with the home care system in the in the hospital or in in in the home setting.
So we need to we need to wave the flag.
I would say not, for not for competing with other centers, but to be not to be down prioritise.
- “we checked the hospital because in Sweden you have a personal identification number.
If you live in Sweden and we have checked all the patients that have been admitted to the hospital with the stroke, who do not have a Swedish personal identification because they are from Norway or there are illegal immigrants or they are passing through the airplane and whatever reason and they get the same care.” “We know that and that’s a fact”

Post Trial Interview

How Key Performance Indicators may change their service provision

- “I don’t think it is going to change anything but it was good to see because we had CARF accreditation a few months earlier so we already gone through most of these questions”
- “good reminder”

Specific issues during the whole process

- Lengthy KPIs
- We have gone through most of it. It has been interesting

Difficulty collecting evidence/information required

- “We had CARF accreditation a few months earlier so we already gone through most of these questions”
- “No, as a group we were able to answer all questions”
- “Since there are so many open questions, maybe you should narrow it down a bit.
- “Cause all this open questions, we had to analyse them on what you want to know and how does it affect us”
- “There are so many professionals in the rehabilitation team, we had to compare them and give you a combination of all those answer” “For example, physicians meet every Thursday, but psychologist meet every second Wednesday. So how do we translate that into an answer for you?”

Exploring why sites would like to identify as Centres of Clinical Excellence (CoCE) in stroke recovery and rehabilitation

- Why
- “Proudness
- Competition
- Goals to strive for
- Have good internal standards for ourselves
- “I think also what is very important is that feel secure in the team and feel secure to voice their opinions when there is disagreement. Because there is always disagreements once in a while and you should be able to voice having different opinions without being bullied.

Would identifying as CoCE change/impact service delivery?

Perceptions on how well site achieves key performance indicators compared to other sites/countries/areas

- “I Think we are good”
- “We are the best in certain things, but I mean e are not using modern models for training and rehabilitation. We have a lot lack of equipment that that should be used according to modern standards. So we are a bit old fashioned and I would say.”
- “We are good at research. We are good in education, we have a lot of students coming in from different professions. We have students coming from different countries. The OT her students coming in, we have Erasmus. Students come in, which is the European project for exchange, so there's a lot of people coming in, so we'll do going out. So we do, we do good things. But it's not really up to date, but we are delivering. It's not that we're doing wrong things, but we are not in the forefront when it comes to clinical application of new findings.”
- “we also have very high patient satisfaction”

- “We are also very good in teamwork. Because in the clinic we have very high satisfaction among the patient and carers. Patient centred and team centred”
- “There is a flexibility in the staff, so people try to cover for each other when there is a like staff missing so people are quite flexible in trying to deliver the best for the patient”
- “Open friendly atmosphere”

What is missing from the criteria that are relevant to health service/model/country

- Answered within indicators

What types of evidence do they like to see be considered for each of the indicators

- Answered within indicators

The adaptability of the Key Performance Indicators to their healthcare model

- Adaptable

General Comments

- “Good ground to talk about and check off. If this applies for us, we have had really good discussions about it and its waking is us up in many ways. Is this something we should do, it this something we are doing or is this not applicable to us?”