A Student Nutrition Service for Patients with Peripheral Arterial Disease: Student and Patient Perspectives to Explain Outcomes

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ABBREVIATIONS

AGHE – Australian Guide to Healthy Eating

ABPI – Ankle brachial pressure index

ADL – activities of daily living

APD – Accredited Practising Dietitian

BMI – body mass index

BP- blood pressure

BND – Bachelor of Nutrition and Dietetics

CI – confidence interval

cm – centimetres

COVID-19 – Coronavirus disease 2019

CVD – Cardiovascular Disease

DAA – Dietitian's Association of Australia

DBP – Diastolic blood pressure

DHA- Docosahexaenoic acid

EPA – Eicosapentaenoic acid

FLO – Flinders Learning Online

FMC – Flinders Medical Centre

FMD – flow mediated dilation

GP – general practitioner

g- grams

HbA1c – Haemoglobin A1c

HDL – High Density Lipoprotein

Kg - kilograms

kJ- kilojoules

LDL – Low Density Lipoprotein

MeSH- Medical Subject Heading

mg/day – milligrams per day

mg/dL – milligrams per decilitre

mmHg – millimetres of mercury

mmol/L – millimoles per litre

MND – Master of Nutrition and Dietetics

MS- Metabolic Syndrome

NP – not provided

NR – not reported

NS – not significant

OFR – Office of Research

PAD – Peripheral Arterial Disease

PUFA – Polyunsaturated fatty acids

RCT – randomised controlled trial

RDI – Recommended Dietary Intake

ROS- Reactive Oxygen Species

SA – South Australia

SD – standard deviation

SCT – Social Cognitive Theory

SBP – Systolic Blood Pressure

SES – Social economic status

TG – triglycerides

USA – United States of America

GLOSSARY

The research study presented in this thesis is complex and involves a number of people. This glossary provides definitions of the personnel referred to in the thesis to provide clarity.

Patients –refers to those with a medical condition. In this thesis, this is the term used when presenting or referring to literature on people with a medical condition.

Patient participants – refers to patients that have consented to participate in the research study presented in this thesis.

Control patients – refers to patient participants who are allocated to the control group and received usual medical care.

Intervention patients – refers to the patient participants who are allocated to the intervention group and received the Student Nutrition Service intervention.

Students – refers to tertiary students and is used alongside descriptions to present or refer to literature on people studying in university.

Student participants – refers to students studying Nutrition and Dietetics at Flinders University who have consented to participate in the research study presented in this thesis.

Participants – refers to both patient and student participants.

Candidate – refers to Jenni Suen.

Researchers – refers to members of the research team.

Supervisors – refers to the person who supervised the student participants in the

Student Nutrition Service intervention. Primarily the supervisor was the candidate, Jenni Suen. However, on less than 5 occasions when the candidate was not available, the supervisor was a researcher or academic with Accredited Practising Dietitian status.

RESEARCH OUTPUTS AND GRANTS DURING THIS CANDIDATURE

Research outputs

Peer reviewed journals

1. **Suen, J.,** Attrill, S., Thomas, J.M., Smale, M., Delaney, C., Miller, M. (2020) The effect of student-led health interventions on patient outcomes for those with cardiovascular disease or cardiovascular disease risk factors: a systematic review. *BMC Cardiovascular Disorders,* 20:322 [10.1186/s12872-020-01602-1]
2. Thomas, J., Delaney, C., **Suen, J.,** Miller, M. (2019). Nutritional status of patients admitted to a metropolitan tertiary care vascular surgery unit. *Asia Pacific Journal of Clinical Nutrition*, 28(1), pp64-71 [10.6133/apjcn.201903_28(l).0010]

Conference poster presentations

1. Smale, M. Thomas, J., **Suen, J.,** Wray, A., Jak, H., Allan, R., Spark, I., Delaney, C., Miller, M. (2018). Student-led health interventions for adults at risk of or with chronic disease: A systematic review. Dietitians Association of Australia 35th National Conference. Sydney, Australia. May 2018.

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DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university, and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Jenni Suen

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THESIS SUMMARY

The worldwide aging population and population longevity presents a unique challenge where the need for healthcare provision rises. Effective alternate healthcare provision strategies are required to ease the burden on healthcare. This thesis explores student-led health interventions as a strategy for prevention, treatment, and management of chronic conditions on the cardiovascular risk factors. Chapter 1 demonstrates the literature available on patient outcomes through two systematic reviews. A case study example of a Student Nutrition Service for community dwelling people with Peripheral Arterial Disease, an underserved population, is presented in Chapter 1. The effectiveness of this strategy is explored through a mixed methods study with an embedded randomised controlled trial. Table 10 summarises the four research objectives and the respective data collection tools and outcome measured used. Both patient and student participant perspectives are considered to explain the outcomes. Figure 7 summarises the timeline of the randomised controlled trial for the patient participants. Figure 13 summarises the student participants' involvement in the research study.

The case study demonstrates that a Student Nutrition Service reduces the consumption of discretionary foods based on the Australian Guide to Healthy Eating through increased nutrition knowledge and skills amongst patients. Discretionary foods may provide variety but not essential nutrients to the body. These foods are energy dense and high in saturated fat, salt, sugar and/or alcohol are classified as discretionary foods based on the Australian Guide to Healthy Eating. Additionally, dietetic students across all bachelor and masters' year levels perceived the

development of competency towards dietetic practice from participating. From a process evaluation of the Student Nutrition Service model both patient participants and student participants, perceived that the intervention components based on Bandura's Social Cognitive Theory aided their learning. Original contributions to knowledge in the fields of nutritional treatments, health professional education and alternate service delivery models are demonstrated.

Findings demonstrate that a Student Nutrition Service is effective from the patient participants' perspective at assisting with dietary change and is a model of care that is acceptable. To date, there has been no research that has demonstrated perceived dietetic competency development amongst dietetic student volunteers from all year levels. This research adds to the evidence available that supports the student clinic learning model as a feasible educative method amongst health professional students from the beginning to the end of their course of study.

The evaluation also demonstrated a unique relationship between patient participants and student participants within the Student Nutrition Service. Patient participants viewed themselves as educators encouraging student participants to learn about them and develop skills of a dietitian whilst student participants felt motivated to improve their practice from observing the dietary changes the patient participants had made. This unique relationship demonstrates one of the core factors in an effective student-led health intervention model identified.

These findings are further explored in Chapter 3 and discussed in Chapter 4 to consider the effectiveness of the Student Nutrition Service. Throughout Chapter 3 key findings are featured in summary boxes. Chapter 4 also presents the

candidate's position in this case study. A new Student Nutrition Service model for patients with chronic disease to consider based on patient and student participants' perspectives is also posed. Future directions for practice and research are posed in Chapter 5.

CHAPTER 1: INTRODUCTION

Dietetic interventions are effective for dietary-related chronic disease management in the community (1). Specifically restricting the consumption of fat, sugar and salt, while increasing the consumption of fruit and vegetables is effective in the prevention and management of chronic diseases such as obesity, hypertension, hyperlipidaemia, diabetes, and cardiovascular disease (CVD) (2, 3). These dietary modification strategies feature in practice guidelines (2, 4, 5) and are recommended by the World Health Organisation (6).

In Australia, dietetic services are under resourced (7), limiting the ability for the community to access public and private dietetic services to gain individualised guidance on dietary modification. As a result, access to public dietetic services in tertiary hospitals in Australia are limited to complex cases. Referrals for patients with obesity, hypertension, hyperlipidaemia and stable type 2 diabetes are not routinely accepted by tertiary dietetics services and are recommended for community dietetic service (8). Access to community dietetic service is limited by its cost (9). In comparison, tertiary dietetics services are fully subsidised by Medicare while many community dietetic services are structured as private fee paying services (10).

The cost to patients to access private community allied health services have been acknowledged through government subsidies but the available subsidies for dietetic services are limited (11). The Team Care Arrangement scheme was introduced in 2005 to enable patients with chronic disease to access subsided allied health services through Medicare (12). Medicare subsidised 85% of the fee for a total of

five 20-minute independent community allied health consultations per calendar year (13). This cap included telehealth consultations (14), although telehealth is considered a more cost effective form of service delivery (15). As standard dietetic consultations are currently 60 minutes for $120 to $150 and review appointments are 30 minutes for $70 to $90, the subsidies available, do not cover the full cost of dietetic services and the time that is required to conduct high quality dietetic service (16).

Subsidised dietetic service under Medicare is constrained by time due to the remuneration received. Dietitians spend less time with fully Medicare subsidised patients compared those who pay the fee for a 60 minute standard consultation (17). Based on semi-structured interview data from dietitians working in the community setting, these constraints are perceived to affect dietetic practice, specifically the provision of patient-centred care (18, 19). As a result, patients may not benefit fully from subsidised consultations as patient-centred care is a recognised facilitator for long-term adherence to dietary modification (20). Therefore, although community dietetic services exist, adequate care from these services are structurally biased towards consumers who can afford the full consultation fee or private health insurance policies that subsidise dietetic services.

Additional evidence suggests that community dietetic services, subsidised by Medicare, are not sufficiently utilised to enable optimal patient outcomes. Based on Medicare-subsidised allied health service data, physiotherapy and podiatry were the most common allied health services subsidised under the Team Care Arrangement Scheme (21). Dietetics services were the third most utilised Medicare-subsidised allied health service (22), translating to 1 or 2 dietetic visits per calendar

year (23). One or 2 visits per calendar year is insufficient to manage the nutritional care of chronic disease patients, particularly those newly diagnosed with diabetes (16, 23).

The lack of access and utilisation of dietetic services described places patients of low social economic status vulnerable to suboptimal management of their chronic disease. Five visits provide less treatment than the clinical practice guidelines for chronic disease management and therefore may compromise the clinical outcomes of patients (16, 24).

This situation causes patients who are unable to pay for continued allied health services to be vulnerable to poor clinical outcomes. However, patients of low social economic status are already more vulnerable to chronic diseases associated with poor nutrition (25, 26). Based on 2014 to 2015 data, adults in the lowest socioeconomic group were 2.6 times more likely to have diabetes than adults in the highest socioeconomic group (25).

Due to the complexities of the health systems in Australia, alternative methods of care provision are required to reduce the health impact on disadvantaged populations (27), and to reduce the impact of chronic disease. Based on 2018 data, 47% of Australians had one or more chronic conditions (26). Additionally, chronic diseases related to diet are the cause of the largest public health burden due to its direct cost to society and the government or indirectly due to the associated increase in disability adjusted life years (6, 28).

For patients who are less resourced, dietetic care provided through student-led nutrition and dietetic clinics is an alternative source of dietetic service delivery that

exists in Australia (29). Student-led clinics amongst other health disciplines also exist to provide care for underserved populations (30, 31). In evidence from one study suggests this model of care was associated with saving health dollars. An estimated $430,000 worth of cost savings to the health service was demonstrated by a nursing student-led clinic in Australia for an underserved population (31). While an economic evaluation of an interprofessional student clinic was associated with a government health saving but also an increased cost of student education (30). Due to differences in clinic structure amongst both studies, further exploration of how a dietetic student clinic as a form of service delivery functions and how it could be used for chronic disease patients is warranted.

In these student-led models of care, dietetic services are provided by students under the supervision of a qualified Accredited Practising Dietitian (APD) (32-37). The Accredited Practising Dietitian supervisor ensures that the care provided follows the Code of Professional Conduct and Statement of Ethical Practice as required by Dietitians Australia, the organisation governing dietetic practice(38). Therefore, supervision ensures that dietetic care provided by students to patients avoids the ethical conflicts associated with negligent care and unsupported learning that could after both patient care and student learning (39).

As of August 2020, seven student-led nutrition and dietetic clinics providing the community with general dietetic service existed in Australia (32-37). General dietetic services included providing patients healthy eating advice or nutrition advice for the management conditions such as obesity, diabetes, high cholesterol, high blood pressure, irritable bowel syndrome, cancer, malnutrition, pregnancy and lactation, coeliac disease, diverticular disease and vegetarian nutrition. See Figure 1

for student-led nutrition and dietetics clinics located across the states and territories of Australia.

Across these student-led clinics, patients were mostly charged a low fee for student dietetic services where no referrals were required (32-37). Three clinics specified the cost of initial consultations to range from $20 to $50 and review appointments range from $10 to $25 (32, 34, 35). Some sites also provided other services such as body composition analysis for $15 to $25 (34, 35) or small group supermarket tours for $15 (35). Two clinics provided consultations free of charge (33, 36), whilst two clinics did not publicly disclose the small cost charged to consumers on their website (36, 37). Additionally, websites did not mention any yearly limits on the access to these services suggesting that services may be accessed without limit. Due to COVID-19, some student-led nutrition and dietetic clinics had also provided free student dietetic services (32) while other clinics did not mention any changes to their cost structure on their website.

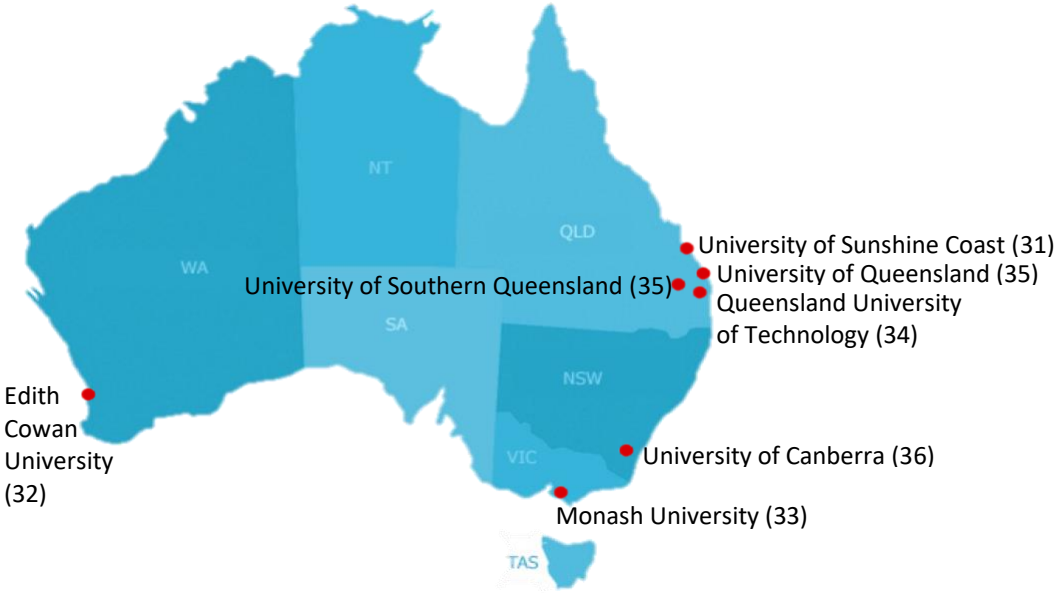

Figure 1: Nutrition Clinics in Australia that involve Dietetics Students

WA = Western Australia, NT = Northern Territory, SA = South Australia, QLD = Queensland, NSW = New South Wales, VIC= Victoria, TAS = Tasmania

There is some evidence that the student-led model responds to the needs for healthcare that has resulted in a rise in chronic conditions amongst the population (40). Therefore, this model could be important as an alternate form of care delivery for CVD prevention and management, as CVD is the leading cause of death (41), and its prevalence will increase as the worldwide population ages (27). Therefore, CVD is expected to continue to place a burden on health care costs (42, 43), stretching the need for healthcare provision further.

To understand the use of this model as an alternate model of dietetic care provision for patients with or at risk of CVD, three aspects need to be explored to understand the literature available. The three aspects include: (i) the intensity of dietetic intervention required for patients with or at risk of CVD, (ii) effect of student-led clinics on CVD patient outcomes and (iii) effect of student-led clinics on student outcomes. The next sections will explore the evidence available in these three areas.

1.1 Intensity of dietetic intervention

As the provision of dietetic services is limited, understanding the intensity of service required for patients with, or at risk of, CVD to elicit clinical changes in CVD risk factors and how the service should be provided, are important. This knowledge can inform the provision of future community dietetic services to meet patients' clinical outcomes and reduce the burden of CVD on healthcare.

The clinical guidelines for obesity recommend at least 14 or more sessions of comprehensive weight loss intervention by multidisciplinary teams provided on site, however the fraction of dietetic service required is not specified (44). Whilst specific

dietary strategies are recommended in practice guidelines for CVD (45, 46), other risk factors for CVD (47, 48) and in management to reduce CVD risk (5, 49), the type and intensity of dietetic intervention has not been specified. As there are different types of dietetic services (i.e., individual one-to-one consultations or group-based interventions) and hence different intervention intensities that can be provided, it is important to determine the type of dietetic service delivery and the intensity of service delivery required to achieve patient outcomes. This knowledge would provide a better understanding for dietetic service provision for patients with CVD or at risk of CVD.

A systematic review was conducted to determine if patients' outcomes were associated with a type of dietetic service. Additionally, the dose or frequency of the dietetic intervention required to elicit positive patient outcomes was also explored. As the systematic review aims to determine a causal relationship between intervention and outcome, the inclusion of randomised controlled trials is required to ideally enable a meta-analysis. However, if heterogeneity in the outcomes is present across the included studies, a narrative synthesis of the findings will still be sufficient to descriptively provide an answer to the research question.

1.1.1 Systematic Review: Type and dose of dietetic interventions for patients at risk of or with cardiovascular disease

Dietitians provide evidence-based strategies to improve diet responsive CVD risk factors amongst adults. There is evidence on the provision of dietetic consultations (50-52) and group education (53, 54). Evidence about the contextual factors that influence the effect of intervention strategies, such as the mode and frequency of intervention delivery is not as evident, with reports from two known studies (55,

56). .

A systematic review of randomised controlled trials in this area found fair evidence (57) that dietetic consultations for adults in the primary care setting are effective at improving diet quality, diabetes outcomes, weight loss outcomes and limiting gestational weight gain (51). Additionally, dietetic counselling in the primary care setting has been demonstrated to be effective at reducing triglyceride levels (MD -0.22mmol/L CI -0.43, 0.02; p=0.03)in managing CVD risk (50). Sun and colleagues also concluded that dietitian interventions are more effective at achieving larger weight reductions amongst people with diabetes (52). An average additional 1kg weight loss was observed in dietitian interventions compared to non-dietitian-led interventions (52).

Amongst literature on dietetic group education, some primary research studies compare one-to-one and group education. Johnston and colleagues observed significant change in plasma cholesterol from baseline within group (-0.5 mmol/L, $p<0.01$) and one-to-one interventions (-0.9mmol/L, $p<0.01$) (58). There was no statistical difference in the reduction between group and one-to-one interventions at outcome (6.1mmol/L vs. 6.25mmol/L, p-value not reported. These data suggests that group sessions are an efficient use of available resources to achieve the same outcome in patients with hyperlipidaemia (58). Interventions amongst patients with diabetes providing group or one-to-one education have suggested that both group and one-to-one education are effective (53, 54) and are equivalent in effectiveness (54).

The availability of different learning formats such as facilitated group format and

self-directed learning format have been proposed to improve effectiveness of CVD self-management (59). Their success underpins the theory that not one mode of delivery fits all (53). The current understanding of dietetic intervention effectiveness suggest that different modes of intervention delivery can be effective and combining modes to create a dual modal intervention may improve effectiveness (60). Increased frequency of intervention (55, 56) may also improve effectiveness. Effective outcomes have been reported for frequency of contact ranging from monthly consultations for 6 months (56) to weekly contact over 12 months (55).

Although there is evidence from systematic reviews supporting one-to-one individualised education (50, 51); the evidence for the group-learning format, the availability of different learning formats and the frequency of intervention is yet to be systematically synthesised. This evidence is required to support or refute group and dual modal interventions and better direct future intervention design and delivery to facilitate optimal patient outcomes at an acceptable cost to the healthcare system.

This systematic review had three aims. The first aim was to explore if the use of dual modal dietetic interventions providing individual and group-based interventions would be more effective than usual care (i.e., usual medical care) or no intervention at reducing CVD risk factors. Secondly, the review aimed to determine what intensity would be effective from the available literature. Thirdly, interventions that included only individual or group-based interventions alone were compared to explore whether one form of dietetic service delivery would be more effective than the other at reducing CVD risk factors. The following section details the methods

applied.

Interventions that were solely provided by dietitians within a group or individual setting were included. This inclusion criteria ensured consistency in the method of nutrition intervention provided and reduced confounders associated with additional healthcare provision. Therefore, studies where dietary interventions were provided as an adjunct intervention by a dietitian in a multidisciplinary team were excluded. Individual intervention settings included telehealth methods and face-to-face.

Adults with established CVD, diet responsive modifiable risk factors or a collection of diet responsive risk factors were included. Specifically, adults with coronary artery disease, carotid artery disease, atherosclerotic CVD (e.g., peripheral arterial disease), hypertension, hyperlipidaemia, dyslipidaemia, diabetes, obesity, overweight, insulin resistance, metabolic syndrome or syndrome x were included in the search to capture adults with CVD and at risk of CVD.

This inclusion and exclusion criteria described, formed the basis of the key words and MeSH terms used in the search strategy. Systematic electronic literature searches were conducted in MEDLINE, Cochrane Library and CINAHL databases as well as the following sources of grey literature: Trial Register of Promoting Health Interventions, and International Clinical Trials Registry Platform for randomised controlled trials, Google, TROVE and DART for dissertations up to the 27th of August 2019. No date or language limits were applied to the searches.

An example of a search strategy used:
arteriosclerosis or atherosclero* or peripheral arter* disease or coronary or intermittent claudica* or stenosis or cardiovasc* or occlusi* or hypertension or

dyslipid* or hyperlipid* or "type 2 diabetes" or insulin resist* or "metabolic syndrome" or "syndrome x" or overweight or obesity or "high blood pressure" or "high cholesterol”

AND

"health promotion" or "healthy people programs" or "weight reduction program" or "health education" or "lifestyle program" or "healthy lifestyle" or "life change" or "secondary prevention" or "diet education" or "community nutrition" or "food preparation" or cookery or cooking demonstration

NOT

child* or animal* or children or childhood or adolescen* or teenage

Results gathered from MEDLINE, Cochrane Library and CINAHL were imported into Covidence (61) for screening and data extraction. Results from grey literature sources were printed to form paper copies to enable reviewers to screen the same results. The first 10 pages containing the first 100 Google results were printed for screening to identify records (62).

Two independent reviewers screened the title and abstracts of records on Covidence (61) and page descriptions of grey literature sources on the internet against the selection criteria. Reference lists of systematic review articles and of the included sources where hand-searched to identify additional studies that met the inclusion criteria. Data was extracted from all included articles independently by each reviewer and entered into the standardised template on Covidence (61). If additional data from included articles were required, authors were contacted through emailing the corresponding author or other authors of the article, if the

corresponding author could not be contacted.

From the included studies, data was extracted on the sample (i.e., number of participants, CVD disease or risk factor, gender, age), the intervention (i.e., duration, frequency of contact, duration of each contact, method of intervention delivery) and clinical outcomes (i.e., lipid studies, haemoglobin A1c, blood pressure, body weight, body mass index). To determine the frequency and dose of intervention delivery the duration of the intervention (e.g., 3 month, 6 months, 12 months etc.), contact frequency (e.g., daily, weekly, monthly etc. exposure to the intervention) and duration of the exposure (e.g., 30 minutes, 1-hour etc.) were also recorded.

Clinical outcome data reported in the included studies were baseline and outcome values rather than mean change and standard deviations. Therefore, standard deviation of change and effect sizes could not be calculated in many cases and not all studies presented data on each clinical outcome measure of interest which limited the possibility of collating ten studies measuring the same outcome measure to enable a meta-analysis (63). Weight and blood pressure outcomes were most commonly reported in amongst the included studies and were synthesised in tables for comparison. Other clinical outcome data that were only reported by single studies are summarised in the descriptive synthesis. Reviewers also independently critiqued each of the included studies for study quality using The Joanna Briggs Institute Critical Appraisal Tool for Randomised Controlled Trials (64).

The search strategy captured 5326 records where 5317 records were screened against the inclusion criteria after the removal of duplicates by Covidence (61). Four

hundred and forty-seven articles were screened to identify if the intervention was completely provided by a dietitian, 13 articles were subsequently included in data extraction, quality critique and qualitative synthesis (Figure 2). Articles that met the inclusion criteria were not found from the sources of grey literature explored. This result suggested that complete unpublished randomised controlled trials that provided a dietetic intervention to people with CVD or at risk of CVD, did not exist.

From the 14 included studies, 11 were randomised controlled trials while 3 were non-randomised controlled trials. While there were no studies that captured patients with CVD, risk factors such as hypertension, obesity, type 2 diabetes, hyperlipidaemia and metabolic syndrome were captured in the 14 included studies.

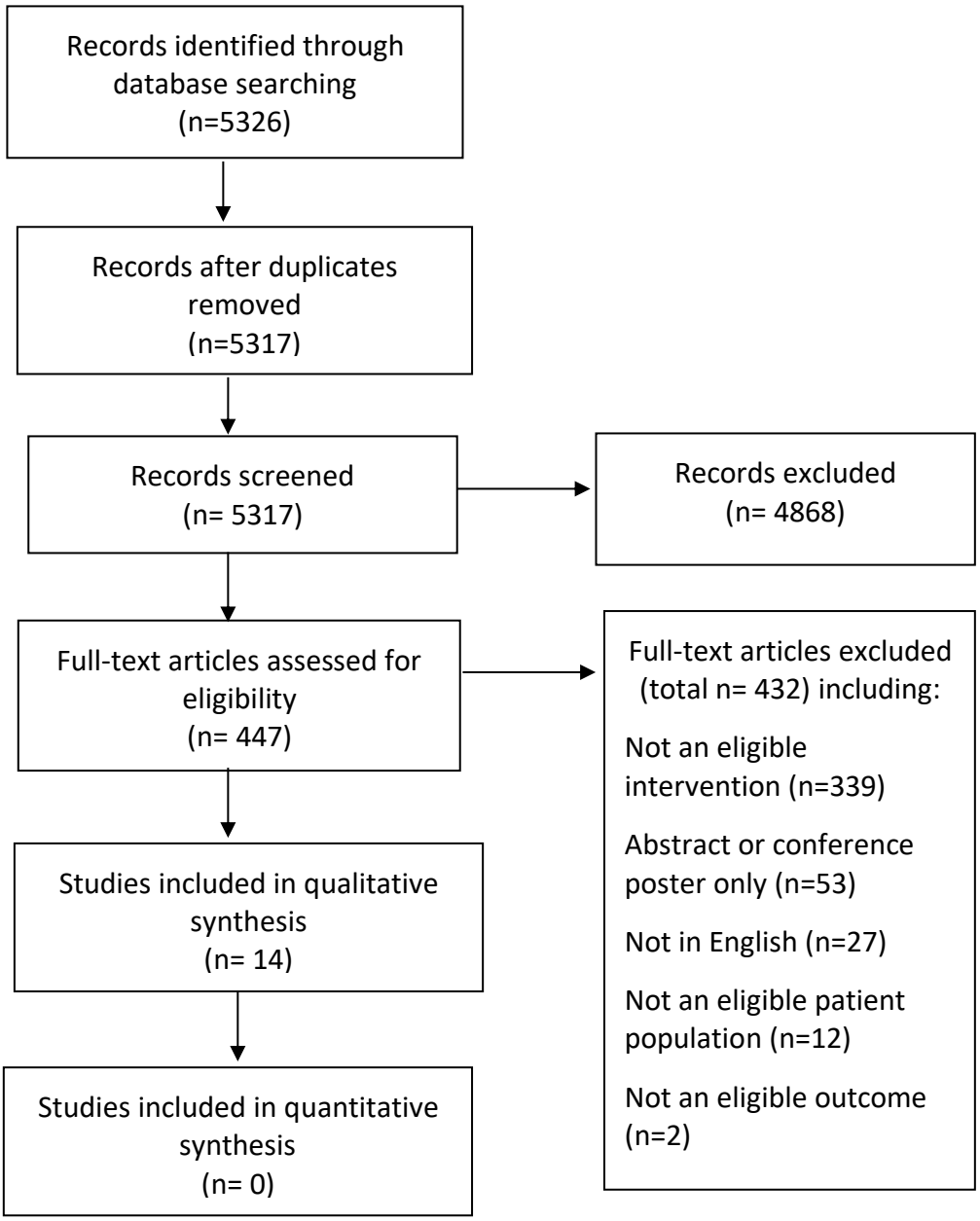

Figure 2: Dietetic Intervention Review – Study Selection (65)

1.1.1.1 Dual modal dietitian-led interventions compared to no intervention

From the 14 included studies, eight studies compared dual modal intervention to a no intervention control group (66-70). These dual modal interventions provided 1 to 12 one-to-one sessions and 3 to 22 group sessions to participants (Table 1). The no intervention control groups provided no intervention (67, 68, 70), printed materials

(71, 72) or non-nutrition related health professional appointment (73), check-ups (69) or meetings (66) (Table 1). Five studies reported body composition related data (67, 69, 70, 72, 73), 3 studies reported blood pressure data (66, 67, 72) and 1 reported on dietary change (71) and 1 study reported on change in metabolic syndrome (68). From the 4 studies that reported weight change (67, 69, 70, 72, 73), two studies reported change in waist circumference and body mass index (BMI) (70, 72). Statistically significant ($p<0.05$) weight reductions from -1.8kg to -6.8kg were reported amongst the participants of the five dual modal interventions (67, 69, 70, 72, 73) whilst no significant weight change of 0.0kg to 0.8kg were reported amongst the control group (Table 2). Statistically significant reduction ($p=0.001$) in waist circumference was reported by Zhang and colleagues in the intervention group -3.9cm compared to -2.2cm in the control group while no significant reduction in BMI were observed in the intervention -0.2kg/m^2 and control group -0.3kg/m^2 (72).

Three studies reported changes in blood pressure (66, 67, 72). Statistically significant ($p<0.05$) reductions in systolic blood pressure (SBP) from -4.6 to -8.7mmHg was observed amongst intervention group compared to the control group (-0.4mmHg to -4.5mmHg) (66, 67, 72). The same studies (66, 67, 72) also reported statistically significant reductions in diastolic blood pressure (DBP) in the intervention group -2.2mmHg to -6.8mmHg compared to the control group -0.2mmHg to -1.9mmHg. One study observed non-statistically significant reductions in SBP and no change in DBP compared to the control (Table 3).

In the study that measured the effect on dietary change, the dual modal intervention observed statistically significant ($p<0.001$) more fruit, vegetables and fibre intake along with less energy from fat compared to the control group which

Table 1:Dietetic Intervention Study Characteristics

#	Author, year	Population			Intervention Intensity						Control		Outcomes	Duration	Follow up
		Country	CVD Risk Factor	N	Group sessions	Individual sessions	Resources or patient tasks	Contact Schedule	n	Dose (Hrs)	Contact Schedule	n			
1	Appel, 2003 (76)	USA	Above normal BP	542	14	4	Food, physical activity, calorie and sodium intake record.	Not detailed	269	Not detailed	1 x 30-minute individual session. Printed materials.	273	SBP, DBP, weight, fruit and vegetable servings/day, dairy servings/day, saturated fat %kcal	6 months	No follow up.
2	Appel, 2001 (63)	USA	Hypertension	681	22	6	Not detailed	1x individual session 16 x weekly group 6 x fortnightly group Individual sessions at each 4th contact	319	Not detailed	Regular meetings unrelated to BP, cardiovascular disease or nutrition	320	SBP, DBP	7 months	At 9 and 18 months
3	Applegate, 1992 (64)	USA	Mild hypertension	56	12	2	Not detailed	8 weekly group. 2 individual sessions. 4 monthly groups	28	Not detailed	No intervention	28	SBP, DBP, weight	6 months	No follow up.
4	Burke, 2005 (71)	Australia	Hypertension	399	6	Unclear	5 handouts	Unclear	123	Group: 540 mins	4 Group seminars. Brochures	118	SBP, DBP, weight, waist circumference	4 months	At 12-month
5	Camhi, 2010 (65)	USA	Metabolic Syndrome High LDL and low HDL	328	8	6	Not detailed	Individual session bi-monthly.8 weekly group sessions	87	Not detailed	No intervention. Maintain usual diet and exercise.	81	Waist circumference, triglycerides, HDL, fasting glucose	12 months	No follow up.
6	Cordero-MacIntyre, 2000 (66)	USA	Obesity	49	3	1	Not detailed	1200 calorie diet and monthly group session	24	Not detailed	Usual care – monthly check up	25	Weight	3 months	No follow up

7	Iriyama, 2014 (67)	Japan	Obesity	57	4	1	Not detailed	Not detailed	40	≥100 mins	No intervention	39	SBP, DBP, Weight, BMI, waist circumference, TG, HDL, LDL, fasting glucose, HBA1c	6 months	At 12 months
8	Kumanyika, 1999 (72)	USA	Hyperlipidaemia or Hypertension	330	4	4	Food cards and nutrition guide	Individual session at baseline and every 4 months. 4 monthly classes (tapes to play at home)	167	Not detailed	Individual session at baseline and every 4 months. Food cards and nutrition guide	163	SBP, DBP, TC,, HDL, LDL, TG, TC: HDL ratio	4 months	At 8 months 12 months
9	Mayer-Davis, 2004 (73)	USA	Type 2 Diabetes	152	3	1	Not detailed	3 x 1 hr group 1 x 1 hr individual	47	4hrs	1 x 1 hr individual session	56	SBP, DBP, weight, HbA1c, TC, LDL, HDL, TG	12 months	No follow up
					19	7	Not detailed	19 x 1 hr group 7 x 1 hr individual	49	26 hrs					
10	McNabb, 1993 (74)	USA	Type 2 Diabetes	23	18	Not detailed	Not detailed	12 weekly classes + 6 x weekly reinforcing sessions	13	Not detailed	Individual nutrition counselling	10	Weight, HbA1c	18-week	At 12 months
11	Ribeiro, 2011 (75)	Brazil	Hypertension	31	5	5	Not detailed	5 x monthly 30- 60 mins home visits. 5x nutrition education workshops.	15	Additional 5hrs	5 nutrition education workshops	16	SBP, DBP, weight, waist circumference, BMI, TG, TC, LDL, HDL	5 months	No follow up

12	Saquib, 2009 (68)	USA	Overweight or Obesity	1510	Not detailed	Not detailed	Newsletters, discounted juicers	Telephone counselling, monthly cooking classes	750	Not detailed	Printed materials. Bimonthly newsletter	760	Weight, fruit and vegetable servings/day, energy from fat %	4 years	No follow up
13	Stamler, 1989 (70)	USA	Hypertension	201	Not detailed	Not detailed	Resources	Individualized with nutrition counsellor (biweekly to quarterly depending on goal status) + group sessions	102	Not detailed	Usual care – see a health care professional every 6 months	99	SBP, DBP, weight,	5 years	No follow up
14	Zhang, 2011 (69)	China	Metabolic Syndrome	272	14	12	Not detailed	2 lectures then education lesson and nutrition consultation once every month	130	Not detailed	Instruction on choosing healthy food every 4 months. No individualized consultation	142	BMI, waist circumference, SBP, DBP, TG, TC, HDL, glucose, energy kcal	12 months	No follow up

Table 2: Weight outcomes from dual modal intervention versus no intervention

#	Author, year	Control (C)			Intervention (I)			C vs. I		Control		Intervention		C vs. I	Control		Intervention		C vs. I	Overall
		Weight change in kg Mean± SD	% Weight change from baseline	n	Weight change in kg Mean± SD	% Weight change from baseline	n	p-value	Effect Size	WC cm	n	WC cm	n	p-value	BMI	n	BMI	n	p-value	Favour I or C
1	Applegate, 1992 (64)	0.3±NR	+0.4%	26	-2.1±NR	-2.4%	21	0.009	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	I
2	Stamler, 1989 (70)	0.8±3.7	+1.0%	98	-2±4.5	-2.4%	95	<0.001	d = 0.68 g = 0.678	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	I
3	Cordero-MacIntyre, 2001 (66)	0.78± 1.83*	+1.0%	24	-6.78± 3.09*	-7.1%	25	<0.05	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	I
4	Iriyama, 2014 (67)	0.0±NR	0%	29	-1.8±NR	-2.4%	28	NR	NR	-0.2	29	-1.3	28	NR	+0.3	29	-0.3	28	NR	I
5	Zhang, 2011 (69)	NR	NR	NR	NR	NR	NR	NR	NR	-2.2	120	-3.9	115	0.001	-0.3	120	-0.2	115	0.869	I

n, number; SD, standard deviation; WC, waist circumference; BMI, body mass index; NR, not reported

Table 3: Blood pressure changes in dual modal interventions versus no intervention

#	Author, year	Control		Intervention		Between group			Control		Intervention		Between group			
		SBP mmHg Mean±SD	n	SBP mmHg Mean±SD	n	p-value	Effect Size	Random Effects, Mean Difference (95%CI)	DBP mmHg Mean± SD	n	DBP mmHg Mean± SD	n	p-value	Effect Size	Random Effects, Mean Difference (95%CI)	Favours intervention or control
1	Appel, 2001 (63)	-0.4±10.5	296	-4.6±11.3	317	<0.001	d = -0.385 g = -0.384	4.20 (-5.93, -2.47)	-0.2±7	296	-2.2±8	317	0.001	d = -0.266 g = -0.265	-2.00 (-3.19, -0.81)	Favours intervention
2	Applegate, 1992 (64)	-4.5	26	-8.7	21	0.02	Not reported	Not reported	-1.9	26	-6.8	21	0.003	Not reported	Not reported	Favours Intervention
3	Zhang, 2011 (69)	+2.0	120	0.0	115	0.489	Not reported	Not reported	0.0	120	0.0	115	0.721	Not reported	Not reported	Favours Intervention (SBP) Neutral (DBP)

SBP, systolic blood pressure; DBP, diastolic blood pressure; CI, confidence interval, d, Cohen's d; g, Hedges' g; SD, standard deviation; n, number

had no dietary change (71). While the study that measured change in metabolic syndrome observed a greater change in markers of metabolic syndrome from the dual modal dietary intervention than the control group (Table 2 and 3) (72). Overall dual modal dietitian-led interventions appeared to be more effective than no intervention at reducing CVD factors in patients with hypertension, obesity and metabolic syndrome. Changes in CVD risk factors included body weight, blood pressure, lipid status and improved diet quality.

1.1.1.2 Dual modal dietetic interventions compared to single modal dietetic interventions

Six studies compared a dual modal dietetic intervention to a single modal dietetic intervention as a control capturing patients with type 2 diabetes and patients with hypertension or hyperlipidaemia (74-79). Single modal interventions included one 30- or 60-minute individual session; 4 or 5 group sessions; or an unspecified number of individual sessions. The dual modal dietetic interventions provided one to 7 individual sessions and 3 to 19 group sessions (Table 1).

Amongst all four studies (74, 77-79) that measured weight as an outcome, statistically significant weight reductions were observed amongst dual modal intervention (-1.7kg to -5.8kg) compared to single modal interventions (+1kg to -1.4kg). Changes in waist circumference were also statistically significantly larger from dual modal interventions (-5.0cm and -4.3cm) compared to single modal interventions, -1.1cm and -1.8cm respectively (74, 78). Additionally, changes in body mass index (BMI) favoured the dual modal

intervention, -1.0 and -0.7kg/m^2 reductions in BMI were observed compared to -0.1 and 0kg/m^2 BMI change in the single mode intervention (76-78). Similarly changes in both SBP and DBP mainly favoured dual modal intervention (74, 79). Reductions in SBP of -6mmHg and in DBP of -2.6 mmHg and -2mmHg from dual modal interventions that were achieved were also clinically meaningful. In one study, both dual modal and single modal interventions achieved statistical and clinically meaningful changes in SBP

(-7.4mmHg vs. -10.6mmHg respectfully) and DBP (-3.7mmHg vs. -6.6mmHg respectfully) over 12 months (75). The majority of the findings demonstrate that dual modal dietetic interventions are more effective than single modal interventions at reducing CVD risk factors in patients with type 2 diabetes and hypertensive (Table 4).

Table 4: Mean changes form baseline in dual modal interventions versus single modal interventions

Author, year	CVD Risk Factor	Outcomes	Single modal	Dual Modal	P-value	Favours single or dual modal
Appel, 2003 (76)	Above normal BP	Weight (kg)	-1.1	-5.8	<0.001	Favours dual
		SBP (mmHg)	NR	-4.3	<0.001	Favours dual
		DBP (mmHg)	NR	-2.6	<0.001	Favours dual
Burke, 2005 (71)	High BP	Weight (kg)	-1.4	-3.9	<0.001	Favours dual
		Waist circumference (cm)	-1.7	-5.0	<0.001	Favours dual
		SBP (mmHg)	-2	-6	0.002	Favours dual
		DBP (mmHg)	0	-2	0.006	Favours dual
Kumanyika 1999 (72)	High BP or High cholesterol	SBP (mmHg)	-7.4	-10.6	0.2	Favour neither
		DBP (mmHg)	-3.7	-6.6	0.06	
Mayer-Davis 2004 (73)	Type 2 diabetes	BMI (kg/m^2)	-0.161	-0.974	<0.001	Favours dual
McNabb, 1993 (74)	Type 2 diabetes	Weight (kg)	NR	-4.1	<0.05	Favours dual
		BMI (kg/m2)	NR	-1.5	<0.05	Favours dual
Ribeiro, 2011 (75)	High BP	Weight (kg)	+1	-1.7	0.018	Favours dual
		BMI (kg/m^2)	0	-0.7	0.019	Favours dual
		Waist circumference (cm)	-1.8	-4.3	0.001	Favours dual

Frequency of intervention to achieve intervention effectiveness

Thirteen out of the fourteen included studies demonstrated statistically significant outcomes. Frequency of intervention delivery was detailed in eight studies (See Table 5). The majority of the included studies (5 out of 8 studies) began their intervention with weekly contact for 8 (67, 68), 16 (66, 76) or 18 weeks (77) before the intervention ceased (77) or reduced to fortnightly (66, 76), monthly (67) or bi-monthly contact (68). Two studies consisted of monthly contacts during the intervention period (69, 75) whilst another study consisted of fortnightly contacts during the intervention period (78).

As the effect size could not be calculated, this limited the ability to report which frequency of intervention was associated with the largest improvements to CVD risk factors. From the data collected, it appears that weekly contacts were most common amongst interventions that led to statistically significant changes. Of 5 studies that demonstrated clinically significant outcomes in the dual modal intervention such as weight loss of ≥5% body weight or ≥5mmHg reduction in SBP and ≥2mmHg reduction in DBP, two did not detail the intervention schedule (74, 79), two began with weekly contacts (66, 67) whilst one began with monthly contacts (69). The study that began with monthly contacts had prescribed Fastin a pharmaceutical drug for appetite control, along with nutrition goals at the beginning of the intervention (69). The studies that began with weekly contacts only prescribed nutrition goals. This suggests that weekly contacts may be required to change habitual behaviours without pharmaceutical aids to achieve clinically significant outcomes.

Table 5:Patient contact amongst dual modal interventions

#	Author, year	Intervention		Patient contact		
		Duration	Schedule	Minimum contact	No of contact over intervention period	Average contact over intervention period
1	Appel, 2003 (76)	6 months	Not detailed	Unknown	Unknown	Unknown
2	Appel, 2001 (63)	7 months	1x individual session 16 x weekly group 6 x fortnightly group Individual sessions at each 4th contact	Weekly to fortnightly	23 over 28 weeks	0.8 contacts per week (weekly)
3	Applegate, 1992 (64)	6 months	8 weekly group session 2 individual sessions 4 monthly groups	Weekly to monthly	14 over 24 weeks	0.6 contacts per week (fortnightly)
4	Burke, 2005 (71)	4 months	Unclear	Unknown	Unknown	Unknown
5	Camhi 2010 (65)	12 months	Bi-monthly individual session 8 weekly group sessions	Weekly to bimonthly	14 over 48 weeks	0.3 contacts per week (3weekly to once monthly)
6	Cordero-MacIntyre, 2001 (66)	3 months	Monthly group session	Monthly	3 over 12 weeks	0.25 contacts per week
7	Iriyama, 2000	6 months	Not detailed	Unknown	Unknown	Unknown
8	Kumanyika , 1999 (72)	4 months	1 x individuals' session 4 monthly classes 1x individual session	Monthly	6 over 16 weeks	0.38 contacts per week
9	Mayer-Davis, 2004 (73)	12 months	19 group sessions & 7 individual sessions in pattern of 3 group sessions then 1 individual session	Weekly for 1st 4 months. Fortnightly for next two months. Monthly for next 6 months	0.5 over 52 weeks	Weekly then 0.5 per week (fortnightly) then 0.25 per week (monthly)
10	McNabb, 1993 (74)	18 weeks	12 weekly classes 6 weekly reinforcing classes	Weekly	18 over 18 weeks	1 contact per week
11	Ribeiro, 2011 (75)	5 months	5 monthly home visits 5 nutrition education workshops	Fortnightly	10 over 20 weeks	0.5 contacts per week
12	Saquib, 2009 (68)	4 years	Telephone counselling Monthly cooking classes	Unclear	Unclear	Unclear
13	Stamler, 1989 (69)	5 years	Individualized with nutrition counsellor (biweekly to quarterly depending on goal status) + group sessions	Fortnightly to monthly	Unclear	Unclear
14	Zhang, 2011 (70)	12 months	2 lectures then education lesson and nutrition consultation once every month	Twice to monthly	12 over 12 months	Once a month

Based on the Joanna Briggs Institute Critical Appraisal Tool for Randomised Controlled Trials (64), the included studies were subjected to bias associated with reporting the intervention and high risk of selection bias. Nevertheless, outcomes measured across all studies were objective, appropriately and reliably measured, and appropriately analysed to answer the research question, limiting the measurement bias (80).

This review provided moderate evidence (81) from controlled trials among patients at risk of CVD for dual modal dietetic interventions as the more effective intervention at reducing CVD risk factors compared to no intervention or single modal interventions. From the studies that also reported intervention frequency, there is moderate evidence (81) to suggest that weekly contact with the interventionist for at least 8 weeks during the initial intervention is associated with statistically significant reductions in CVD markers. Some studies with this level of intensity also achieved changes in CVD markers that would be considered meaningful.

Although not relevant to the aims of the review, sustained intervention compliance of more than 1 year indicates long term reduction in CVD risk factors. Some of the included studies, had long intervention durations of 12 months (72), 4 years (71) and 5 years (73). Zhang and colleagues demonstrated that monthly individualised consultations over 12 months were more effective at reducing SBP, waist circumference and BMI compared to four-monthly general healthy eating advice over 12 months (72). Saquib (71) and Stamler (73) compared dual modal interventions to usual care or printed materials. While

Saquib did not observe any statistically significant changes in body weight over the 4 year intervention, intervention participants increased and sustained their fruit and vegetables servings to 5 servings per day ($p<0.001$) and fibre to 16grams per day ($p<0.001$) compared to the control group which consumed 3 servings of fruit and vegetables and 12 grams of fibre per day (71). The intervention group also reduced their energy intake from fat sources to 23 to 28% compared to the control group that intake from fat was 29 to 30% over the 4-year period. Stamler observed that the incidence of hypertension was twice as high in the usual care group compared to the intervention group who received the dual modal intervention (73). This data demonstrates that sustained compliance to dietary interventions appear to be achieved through individualised advice and dual-modal interventions.

Due to the limited number of studies that clearly reported the intervention frequency, definitive evidence on intervention frequency could not be identified. This was further complicated by the lack of outcome data that would enable effect size of the intervention to be calculated. Therefore, the evidence provided was considered to be of moderate quality where the true effect is likely to be close to the findings (71). Based on the study quality appraisal, this review exposes the need for dietetic intervention studies to be more rigorous. Reporting methods of reducing selection and reporting bias as well as accurately reporting interventions in sufficient detail to enable replication is required. Use of tools such as the CONSORT checklist (82) and TIDieR checklist (83) are recommended to guide the reporting of information in intervention trials. Additionally, this review also revealed the common understanding that dietetic

interventions are difficult to blind from the interventionist and/or the participant, where blinding of the outcome assessor at minimum is important (84). Therefore, dietetic studies are able to and should maintain at least one level of blinding.

Whilst there are risks of bias presented and inconclusive overall findings, the notion that increased intervention frequency and interventions (55, 56) and interventions that adapt delivery to its audience such as dual modal interventions (60) have long been thought to be associated with positive clinical outcomes. This review provides moderate evidence (81) to support this association in patients at risk of CVD disease.

Therefore, data from this systematic review supports qualitative data from expert opinion that suggests five individualised dietetic consults per year is insufficient to achieve dietary behaviour change and optimise patient outcomes (16, 24). This review adds to the literature by demonstrating that change in behaviour and CVD markers amongst patients at risk of CVD, requires more than five consultations. Dual modal dietetic interventions and weekly contact with the interventionist for at least the first 8 weeks of intervention could be required. Therefore, it is recommended that randomised controlled trials testing dietetic interventions for patients at risk of CVD should trial this intervention intensity at minimum. Trials should also plan and report methods rigorously through utilising resources such as the CONSORT checklist (82) and the TIDieR checklist (83) to reduce the risk of bias common to dietetic interventions. As the intensity recommended is greater than what is currently subsided under the

Team Care Arrangement scheme (11), alternative models of dietetic service provision such as student-led models need to be explored.

1.2 Effect of Student-led Clinics on Patient CVD outcomes

Student-led clinics may function to provide an underserved population with health services provided by student health professionals (85, 86). Services provided are highly differentiated but can include health screening (31) to provide individualised care and medication (87), offering patients benefits towards their health.

While the effect of student clinics can impact patient health, patient satisfaction from student health interventions is the most widely reported outcome (88-93). This form of evaluation only captures the patient's reaction to the service and not more objective clinical outcomes associated with chronic disease (94). Therefore, although patients report satisfaction with student service (88-93), the ability of student health interventions to impact upon CVD markers is important. These findings will determine the intervention's effectiveness and function as a feasible alternative service delivery model for patients with CVD or CVD risk factors.

The feasibility of utilising a student-led model in CVD, was informed through undertaking a systematic review exploring patient outcomes. Section 1.2.1 provides a summary of a systematic review written for this thesis that was accepted for publication in BMC Cardiovascular Disorders in July 2020.

1.2.1 Systematic Review:
Student Health Interventions on patient outcomes for those with cardiovascular disease or cardiovascular risk factors

This systematic review aimed to explore the effectiveness of student health interventions on patient outcomes for those with CVD or CVD risk factors. To capture the topic investigated, studies that were conducted with adults with established CVD or risk factor/s of CVD where a student-led intervention was provided and objective patient outcomes were measured, were included. Specifically, adults were considered to be aged 18 years or older. Established CVD included heart failure and coronary heart disease. Risk factors for CVD included overweight, obesity, hypertension, hyperlipidaemia or diabetes. Objective patient outcomes included body weight, BMI, blood pressure, lipid studies, Haemoglobin A1c, hospital readmission rate.

Student health interventions were defined as the inclusion of student participants in the intervention, regardless of the level of participant interaction or supervision provided to the participating students. Therefore, the students could be responsible for the collection of patient information or also have responsibility for the provision of an educative or treatment intervention. These levels of student participation have been described as student-assisted clinics (95) or student-run clinic (85, 87, 96-98) in the literature and therefore have been included in this review. Included studies were also written in English and available as full text articles to enable synthesis and quality appraisal.

A systematic literature search was conducted in Medline, Scopus, ProQuest Health & Medicine, Informit Health Database Collection, CINAHL, PsycINFO,

Cochrane Library and Web of Science. The search strategy used contained a combination of key terms informed by previous reviews (99, 100) and MeSH terms. The search included studies published up to the 19th of August 2019.

An example of the search strategy used in the Cochrane Library was '((student* near/4 (led or run or managed or facilitated or directed)) and (clinic or clinics or service* or consult* or care or healthcare or program* or practice* or model* or initiative* or intervention* or promotion* or centre* or center*)) and obes* or "morbid* obes*" or overweight or diabet* or hypertensi* or "blood pressure" or heart or cardiac or cardiovascular or coronary or vascular or stroke or "cerebrovascular accident*" or arrhythmi* or atrial or myocardial or hyperlipidemia or cholesterol or Hypercholesterolemia or hypertriglyceridemia*)'. All the search strategies used in the respective electronic databases are detailed in Appendix 1.

Studies identified through the search strategies were imported to Covidence (61) for duplicate screening and data extraction. Article screening and data extraction was conducted by two independent teams of two to three reviewers in each team. Reference lists of included papers were also screened by reviewers to identify potentially relevant studies, for inclusion. This process of screening reference list is termed snowballing (101). Any studies identified from this snowballing process were imported into Covidence (61) for double blinded screening and data extraction. Any conflicts in allocation of records were resolved in Covidence (61) through discussion between one representative from each team of blinded reviewers. Conflicts that were not resolved by the

reviewers across the two teams were resolved through discussion with an external reviewer.

Reviewers independently extracted data specifically on the study design, methods, the patient population, the baseline characteristics, patient intervention and data on the objective patient outcomes measured in the study. Any detail on orientation, learning, training or supervision provided to students that assisted students to provide patient care in the interventions were also extracted and detailed on Covidence (61). Consensus data formed the tables and synthesis reported.

The Joanna Briggs Institute Critical Appraisal Tools (64) were used to assess study quality amongst the included studies according to their study design. The tools include checklists that consist of key questions to identify the possibility of bias based on the study design that may impact on the interpretation of the results (64). Each question on the checklist was allocated, 'Yes', 'No', 'Unclear' or 'Not applicable'. A reviewer from each team recorded (i) the answer to each question on the checklist, (ii) evidence from the paper that supported their answer, (iii) page number that the evidence is located, (iv) any other comments, on a standard Microsoft Excel spread sheet prepared for both teams prior to independent critique. Reviewers allocated 'Yes' when studies met the criteria, 'No' when studies did not meet the criteria or did not report on the criteria, or 'Unclear' when the studies mentioned criteria but did not provide all the detail required to eliminate bias from the criteria. Consensus of Critical Appraisal conducted by two independent reviewers was discussed and any discrepancies

were resolved by a third reviewer. The quality of the included studies was used to inform the level of evidence available according to the GRADE method of reporting the quality of evidence (81). According to the GRADE method, the available evidence can be categorised into one of four grades of evidence; high, moderate, low or very low (81). The grades represent the confidence that the researchers have on the estimated effect (81).

A qualitative synthesis of the evidence is presented due to the heterogeneity of the interventions, study designs, outcomes and data available amongst the included studies. Clinical significance amongst the clinical outcomes was considered and guided by the current literature. Clinical outcomes considered included HbA1c, BP, lipid analysis and body weight.

Specifically, a 0.5% reduction has been recognised as a clinically significant change by the American Diabetes Association and National Institute for Health and Clinical Excellence (102). Based on a randomised controlled trial, a 0.5% reduction in HbA1c was also associated with a reduced risk in composite all-cause mortality, stroke and non-fatal myocardial infarction (HR 0.84, p=0.027) (103). With respect to blood pressure, a meta-regression analysis suggested that each 5mmHg reduction in SBP and 2mmHg reduction in DBP was respectively associated with a 13% and 12% less risk of composite cardiovascular endpoint (104). Lipid analysis demonstrated that each 38.7mg/dL reduction in LDL is associated with a 23% lower risk of major vascular events (105), while an evidence-based review, concludes that a 5% weight loss was related to improvements in BP as well as HDL and LDL (106). In addition, a waist

circumference reduction of greater or equal to 3cm demonstrated improvements in metabolic syndrome (107, 108), lowering cardiovascular risk. Therefore, a 0.5% reduction in HbA1c, 5% weight loss, ≥3cm reduction in waist circumference, change in LDL of ≥38.7mg/dl and ≥5mmHg reduction in SBP and ≥2mmHg in DBP were deemed clinically meaningful in this review.

After duplicate removal, the search strategies yielded 709 records for duplicate screening (Figure 3). Following full text screening and handsearching of reference lists of included studies, 16 studies were eligible for qualitative synthesis (Figure 3). Common patient outcomes measured across fifteen studies included HbA1c, total cholesterol, LDL, HDL, BP, body weight and BMI. Only one study reported on hospital readmission rate amongst participating patients as the primary outcome (109).

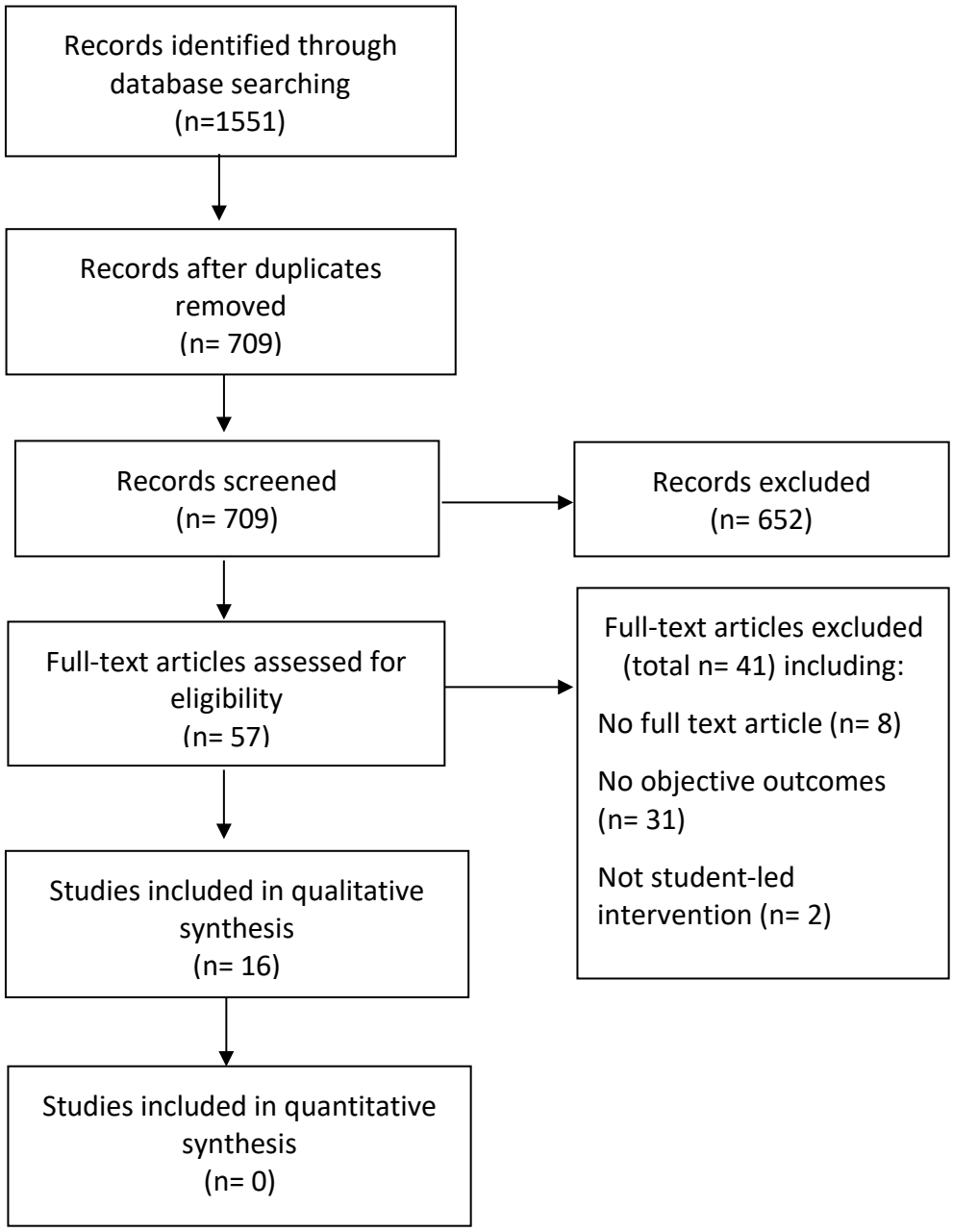

Figure 3: PRISMA Flow Diagram of Search Strategy

Study characteristics

The 16 included studies captured 2504 patients with a CVD or CVD risk factor and at least 656 students that participated in a student-led health intervention (Appendix 1). The number of student participants were not reported in all the included studies (Appendix 1). Eleven studies focused on patients with diabetes (97, 110-119), two focused on patients who were overweight, or obese (120, 121) and three single studies included patients with hyperlipidaemia (87), hypertension (98) or heart failure (109).

Student-led health interventions were most commonly (i.e., 14 out of 16 studies) located in a clinic setting (87, 97, 98, 110-118, 120, 121). Of the student-led clinics, five out of 14 studies described the service provided as a "free clinic" (87, 98, 112, 115, 121). One study provided student-led home visits (119) and one study provided a student-led discharge consultation (109). All student-led health interventions described were located in the United States of America (USA), except a study by Adam and colleagues (110) which was located in the United Kingdom.

Student-led health interventions consisted of medication reviews (110, 114, 116), counselling from an interprofessional team of students (111, 114), medical appointments (112, 115, 118), home visitations for medication and dietary review (119), a program of medical care and group education classes (117) or an individual program of phone calls and group classes (113).

Student involvement in the student-led health intervention, training prior to participation and the level of supervision provided during the intervention varied amongst the student-led interventions. In some studies, students were provided a

training program before obtaining the role of delivering the patient intervention (113, 116, 119, 120). Other students were supervised by a health professional (110, 117) or mentored by a senior peer (97, 121) whilst providing the intervention. In two studies, students were mainly involved in collecting information prior to an intervention administered by health professionals (112, 114). Student involvement, training and supervision were not clearly reported amongst six studies (87, 98, 109, 111, 115, 118). A 'Results Summary Table' can be found in Appendix 1.

Clinical Outcomes: HbA1c

Amongst patients with diabetes, a statistically significant mean reduction in HbA1c that ranged from -0.9 to -1.7% ($p=0.008$ to <0.001) was observed when individual counselling (97, 116) or medical appointments (115, 118) or multiple pharmacy appointments (116) were provided as student-led interventions (Table 6).

Table 6:**Changes in HbA1c with intervention observed across studies**

Author, year	HbA1c (%)				
	Baseline (Mean±SD)	N	Outcome (Mean±SD)	N	P-value
Adams et al, 2015(107)	7.3±3.2	67	7.3±3.2	67	NP
Gorrindo et al, 2014 (94)	9.6±2.3	45	7.9±1.8	45	<0.0001
Janson et al, 2009 (108)	7.7±1.7	384	7.7±1.6	384	NP
Kahkoska et al, 2018 (109)	9.7±1.6	29	9.2±1.4	29	NP
Lee et al, 2016 (110)	9.2±NP	22	8.0±NP	22	NP
Martin et al, 2016 – uncontrolled (111)	9.3±NP	NP	7.6±NP	NP	NS
Martin et al, 2016 – controlled (111)	6.2±NP	NP	6.4±NP	NP	0.004
Mehta et al, 2016 (112)	9.5±2.3	21	8.3±2.2	21	0.008
Nuffer et al, 2012 (113)	7.7±2.0	346	6.8±1.1	346	<0.001
Nagelkerk et al, 2018 (114)	7.3±NP	250	7.2±NP	250	0.346
Smith et al, 2014 (115)	9.2±2.5	157	8.2±2.2	157	<0.001
Stroup et al, 2003 (116)	11.2±1.3	30	10.0±2.0	30	NP

N, number of patients in the sample; NP, not provided; NS, not significant; SD, standard deviation; %, percentage, <, less than

Individualised counselling was provided by medical students (97) and pharmacy students (116) to diabetic patients. First and second year medical students provided individualised disease and nutrition counselling in a student-run free clinic in an urban community health centre(97). Students continued patient care outside the clinic via phone call contact, answering patient's questions (97). In a separate study, student pharmacists who were undergoing a six-week placement in the community in rural Colorado provided individualised diabetes self-management sessions (116). These patients were provided with six sessions over a six-month period by student pharmacists (116). Medical students provided medical appointments through a student clinic (115, 118). Students involved in the study by Mehta and colleagues (115) provided two or more appointments. The number and frequency of medical

appointments provided to patients was not described by Smith and colleagues (118).

Two studies reported a mean reduction in HbA1c of -0.5%, n=8 (112) and -1.1%, n=18 (114) but did not report statistical significance represented as p-values. These studies included different student interventions. Kahkoska and colleagues (112) provided a student-run free clinic which included a triaged medical appointment by a physician assistant, nursing students, a pharmacy resident and medical student. The student intervention was followed by a shared medical appointment prior to seeing the attending endocrinologist (112). Medical appointments were shared amongst cohorts of four to twelve patients with diabetes where students led a discussion on diabetes self-management (112). Martin and colleagues (114) provided multidisciplinary counselling (i.e., physician, pharmacist, nurse and dietitian) followed by student pharmacist review. The pharmacy student provided follow up the next day making recommendations and answering any patient questions (114).

Three studies found non-statistically significant changes in HbA1c when the student-led intervention was provided (110, 111, 117, 119). When pairs of pharmacy students provided level two and three medication reviews to 67 patients with diabetes, the intervention group had a lower post-intervention HbA1c (56.32±11.5%) than the control group (59.68±13.2%, n=66, p=0.14) who received usual care (110). Level 2 medication reviews included a review of medications with all patient notes whilst a Level 3 medication review included face to face review of medications and conditions with the patient (122). Each student pair attended to four patients (110). Within intervention group change was -0.49% compared to -

0.03% in the control group (110).

Pharmacy students who provided home visits or a telephone call to check patient compliance to medications and diet as instructed by a dietitian, led to a mean -1.2% reduction in HbA1c amongst 30 patients (119). A similar mean reduction of -0.8% in HbA1c was achieved when patients did not receive this compliance check from pharmacy students (119). The frequency of the intervention over the 2-year intervention period was not reported (119).

Medical, pharmacy and physician assistant students who were on a 4-8 week placement depending on their discipline were involved in leading a 12-month group program for 221 patients with diabetes, supervised by a dietitian, which led to no change in HbA1c (7.3 to 7.2%) (117). Additionally, students provided individualised care through phone calls supervised by nursing staff (117). Details of the group program or the phone calls and the frequency and duration of the contact were not detailed (117).

Ten of eleven studies demonstrated a clinically significant change in HbA1c (-0.5%) when a student-led health intervention was applied (102).

Clinical Outcomes: Lipid Studies

Patients with diabetes were provided six individual pharmacy student-led appointments over six months (116) or medical appointments by medical students (118). Two studies demonstrated statistically significant ($p<0.001$) mean reductions in total cholesterol of -14.1mg/dL (116), LDL of -12mg/dL and -28.2mg/dL, TG -31.2mg/dL and 70.6mg/dL (118) respectively. The type of care provided at these appointments was not detailed.

A free medical student-led intervention providing patients with education, specialist consultations and dispensing of free medications led to a statistically significant mean reduction in LDL of -34.5mg/dL from 135.8±37.2mg/dL to 101.3±34.6mg/dL ($p<0.001$) amongst 96 patients with hyperlipidaemia (87). Additionally, a statistically and clinically significant (<100mg/dL) (123), mean LDL reduction of -38.9mg/dL from 133.6mg/dL to 94.7mg/dL, ($p<0.001$) was observed in 72 participants who also had diabetes (87).

Clinical Outcomes: Body weight outcomes

Two studies observed an increase in BMI of 0.5kg/m^2 (n=19, p=0.04) (115) and 0.3kg/m^2 (n=238, p=0.025) (117) when less than two medical appointments (115) or a 12 month program of medical care and group education (117) were provided respectively by medical students for patients with diabetes. Baseline and outcome weight is an important co-marker of health alongside BMI amongst patients with diabetes (48), however these outcomes were not reported amongst these two studies.

Amongst patients who are classified as having an overweight or obese BMI, intensive group or individualised programs were provided. Brown and colleagues (120) provided 25 patients a 10 week program consisting of group classes by medicine, nursing or graduate studies students where each session was co-led by two to four students. Cusumano and colleagues (121) provided a 12- week program led by physician assistant students consisting of an individualised one to one intervention of weekly goals, 12 individual meetings, six cooking classes and one supermarket tour to 28 patients. Across both studies, a mean weight loss between 2

to 3kg (120, 121) and statistically significant reduction in mean BMI score 41.21±10.64kg/m^2 to 40.13±10.98kg/m^2 ($p<0.001$) was achieved (121). Whilst changes to BMI were statistically significant, these changes were not clinically meaningful (106). A mean reduction of only 2 to 4% of total body weight was achieved through student-led interventions that provided an intensive group or individualised programs (120, 121).

Clinical Outcomes: Blood pressure

Similarly, a statistically significant reduction in systolic blood pressure of 9.5mmHg (CI 7.4, 11.5) and DBP of 5.7mmHg (CI 4.4, 7.0) ($p<0.0001$) amongst 496 patients with hypertension was observed after a free medical student-led clinic supervised by a physician (98). There was no set contact schedule for patients accessing this service, as they were free to attend the clinic, as required (98). When medical appointment/s were provided to patients with diabetes through a student clinic, a statistically and clinically significant improvement in mean SBP -5.2mmHg ($p<0.05$) and DBP -6.8mmHg ($p<0.0001$) was observed (118).

Pairs of pharmacy students providing level two and three medication reviews observed non-statistically significant post-intervention SBP (132.26±12.9 mmHg) in 67 patients compared to the control group (127.98±98mmHg, $p=0.06$, $n=66$) and DBP (73.38±6.8mmHg compared to 70.97±9.5mmHg in the control group, $p=0.11$) (110). The change in SBP (132.48±11.98mmHg to 132.26±12.9mmHg) and DBP (73.22±8.15mmHg to 73.38±6.8mmHg) in the intervention group were not clinically meaningful (110). A 12-month education program for 238 patients with diabetes provided by medical, pharmacy and physician assistant students as a part of

placement led to no change in SBP (136mmHg to 136.9mmHg, p=0.217) or DBP (81.3mmHg to 82 mmHg, p=0.073) (117).

Clinical Outcomes: Hospital readmission rate

Only one study measured 30-day hospital readmission rate amongst heart failure patients as a post-intervention follow-up outcome measure. Patients were counselled on medication management and lifestyle considerations such as weight, smoking, salt intake, alcohol and exercise at discharge and additionally provided a follow-up phone call in three to five days post discharge (109). One 52-minute pharmacy student-led discharge counselling elicited better understanding of medications in 89% of patients but no statistically significant changes in readmission rates were observed, compared to standard counselling by a nurse (109). Eleven per cent were readmitted in the intervention group versus 9% readmitted in the control group (p=0.80) within 30 days of discharge, and 11.1% of the intervention group were readmitted for heart failure (109).

Student vs. Professional

Two studies compared the student-led health intervention to a professional-led health intervention. Care provided by nursing or pharmacy students in a 30-minute appointment on diabetes self-management was consistent with care provided by medical residents alone based on mean HbA1c levels, LDL and blood pressure of both groups (111) (Table 7).This clinic serviced 384 patients with diabetes in a university clinic (111).

Table 7:**Usual care provided by medical residents versus care provided by an interprofessional team of students (111)**

	Medical residents		Interprofessional team of students		Between group
	Baseline (Mean±SD)	Outcome (Mean±SD)	Baseline (Mean±SD)	Outcome (Mean±SD)	P-value
HbA1c (%)	7.6±1.7	7.5±1.7	7.7±1.7	7.7±1.6	0.24
SBP (mmHg)	130±20.5	130±21.1	134±21.0	134±20.3	0.07
DBP (mmHg)	72.1±12.0	71.8±11.5	71.4±10.6	71.0±11.7	0.52
LDL (mg/dL)	107±34.3	98.4±31.9	106±34.3	100±31.3	0.64

When a 10-week group intervention for patients classified as having an overweight and obese BMI, was led by an interprofessional group of students (i.e., medicine, nursing, graduate studies and health professions), change in weight (-2.5% vs. -3.1%, p=0.32) and BMI (-1kg/m^2 vs. -0.7kg/m^2, p-value not reported) was comparable to a 10-week group intervention taught by an interprofessional group consisting of a dietitian, psychologist and exercise physiologist (120). Regardless of whether the intervention was led by students or professionals, high individual participant attendance rate was associated with greater weight loss amongst the participants (p<0.001) (120).

Collectively, from the CVD and risk factors sampled, student-led health interventions generally resulted in positive patient outcomes. While these outcomes do not necessarily pertain to the achievement of optimal clinical targets, it is important to note that even small improvements in the CVD profile are considered to be clinically meaningful and may lead to a significant reduction in CVD morbidity (105) and mortality (103, 104). The findings, therefore, provided moderate evidence (81) that student-led interventions improved CVD markers and were comparable to professional-led interventions. Positive patient outcomes did

not appear to strongly favour individual interventions over group interventions and vice versa.

This review provides evidence from quasi-experimental studies that lacked randomisation and a control group (97, 112-114, 117, 120, 121). Nevertheless, most studies, especially studies amongst patients with diabetes, reduced bias through the study design. Multiple outcomes were measured; follow-up was complete and reported; outcomes were measured with a reliable method and appropriate statistically methods were used to reduce bias. For critical appraisal of each study, see Appendix 1.

The measurement of some patient outcomes was subject to a high risk of bias either due to only measuring one outcome measure or a lack of detailed reporting of how the outcome was measured. Rojas and colleagues used LDL as the only patient outcome to determine hyperlipaemia control (87). The determination of hyperlipaemia control could have been strengthened through reporting and considering a complete lipid study profile. This would enable hyperlipaemia control to be determined by multiple measures which increases the reliability of the results (81).

Although, medical student appointments were associated with statistically significant increases in BMI amongst patients with diabetes, body weight was not reported to support whether this negative result is clinically meaningful or not (115, 117). Two retrospective studies did not report how weight was measured (i.e., with calibrated scales or patient reported weight) (120, 121). One retrospective study did not report the method of measuring blood pressure (i.e., measured once or three

times where the average of the second and third measures are used) (98). This detail is required to determine the validity of the results and efforts to reduce measurement bias (81).

Student-led interventions compared to professional-led interventions demonstrated comparable reductions in HbA1c, LDL, BMI and blood BP (111, 120). Along with the evidence that the quality of care from student-run clinics in USA are comparable to the national standards (124, 125) , this finding supports emerging evidence that students can provide comparable care, when the environment to provide and lead care, exists. This literature reduces the uncertainty of whether student-led interventions deliver the same level of care and intervention efficacy as professional-led services. Therefore, the student-led services as alternate service delivery model appears to be feasible.

Although this review provides some evidence that student-led interventions can improve CVD markers amongst patients at risk of CVD, the findings were predominantly based on studies from the USA. Therefore, the generalisability of these findings to other population groups and countries with alternate national health care delivery models could be reduced depending on the countries' differences. Additionally, the largest limitation of the included studies to enable replication, is the lack of intervention detail according to the TIDieR criteria. See 'Patient intervention detail reported according to the TIDieR criteria' and 'Student intervention detail reported according to the TIDieR criteria' in Appendix 1. In particular, the details that described student-led aspects of the interventions, regarding the provider, procedures, schedule and intensity of the intervention are less commonly reported than the patient intervention (83). Amongst the patient

and student interventions, changes to the study design and intervention fidelity were not commonly reported in all included studies see Table 5 in Appendix 1. In the student interventions, what the intervention was, who provided it, how it was provided, where it was provided and how often or how much intervention, where also more scarcely reported than the patient intervention.

The lack of detailed information within these studies to describe what the students did and therefore how the intervention impacted on student learning was unclear. Descriptions of what the experience was for students such as how much training, preparation and supervision is required, but was not presented. These factors limited the understanding of how much and what resources students require to achieve these patient outcomes as well as what the students' learning outcomes are. To enhance the implementation of student-led clinics, it will be important to understand the resources required. Resources to consider could include supervision and learning materials. Frameworks in countries with different health systems could also be considered to determine the cost effectiveness of student-led interventions.

Additionally, this lack of reporting on what the students did sometimes impacted how the patient outcomes could be interpreted. For example, whether medical students counselled patients, dispensed medication or provided both services were not reported (115, 117). Without this detail, it was difficult to determine if the intervention could have resulted in weight loss and reduction in BMI, the patient outcomes reported.

Although the included studies lacked detailed reporting on the student intervention, there is literature that independently describes the training,

supervision and resources required without clinical patient outcomes. For example, Froberg and colleagues detailed the administration, the organisation and the physical environment that students were exposed to when exploring student, patients and supervisor perceptions of participating in a student-run clinic (93). Nevertheless, one of the included studies (120), recognised this limitation and likewise recommended that future research should investigate and report both patient and student outcomes.

As student-led health interventions for patients involve and provide benefits to both patients and students, reporting the intervention and outcomes for both participant groups will aid to inform the delivery and design of future services. The use of this alternate service delivery model could increase with the increasing demands on healthcare services. Therefore, this knowledge will assist in determining the feasibility of applying student services not only for underserved and socially disadvantaged populations alone but also more broadly to supplement usual healthcare provision.

Overall, student-led health interventions appear to improve CVD markers amongst patients have CVD and associated risk factors. Individualised student-led health interventions by medical and pharmacy students, amongst patients with diabetes, led to clinically and statistically significant improvements in HbA1c. Individualised and group-based programs of 10 or 12 weeks were associated with statistically significant weight loss amongst overweight and obese patients. Patient outcomes amongst student-led interventions were comparable to professional-led interventions. From the available evidence, weekly contact over the initial 8 weeks of the student-led intervention is recommended to optimise CVD markers.

Additionally, this review illustrates the need for student-led health interventions to be thoroughly reported from both the patient and student perspectives and applied within a rigorous study design, to enable a meta-analysis of patient health outcomes from student-led health interventions and enable the intervention to be replicated. This knowledge will assist in determining the feasibility of student-led health interventions as an alternate service model to current provisions.

1.3 Student outcomes

Although the systematic review demonstrated that student health interventions can provide a positive impact on CVD markers for patients at risk of CVD, student outcomes were only captured in three of the quasi-experimental studies included in the review (113, 116, 117). Each study captured a different student health intervention for patients with diabetes. Lee and colleagues had volunteer medical students provide six 2-hour classes and 12 weekly phone calls over 12 weeks (113). Nagelkerk and colleagues explored a 12-month education program provided by teams of interdisciplinary students (i.e., medical, pharmacy and physician assistant students) as part of field placement in the university course curriculum (117). Finally, Nuffer and colleagues provided patients 6 visits with a student-pharmacist over 6 months (116).

Although the interventions differed in duration, the type of students providing the intervention and dose of the intervention, each intervention demonstrated a post-intervention reduction in HbA1c (Appendix 1) and benefit towards student learning (113, 116, 117). The benefit towards student learning appeared to depend upon the activity that the student engaged in, associated with the patient intervention.

For example, volunteer medical students who accompanied patients to group classes and at least two follow-up appointments and provided patients with weekly phone call reminders to encourage the patient to self-manage, reported satisfaction towards their contribution in the patient's life and the development of a personal connection with the patients they cared for (113). Conversely, patients appreciated the student involvement (113). As students observed improvements in their patient, they appreciated the importance of patient exposure to education and application of new knowledge from patient education into the patients' lives (113). Students perceive the develop skills in patient communication from their role (113). As students were not directly associated with providing patient care, it was reasonable that students only reported observations and communication-based learning as the benefits achieved rather than competency development toward their role as a medical professional.

Similarly, Nagelkerk and colleagues provided an interdisciplinary practice environment for students. The common benefit reported amongst students was observing other professionals questioning style and patient examination techniques which changed their perception of the other professions that they observed (117). As pharmacy students were able to perform duties associated with a professional pharmacist, students reported that the experiences increased their didactic knowledge and also their self-confidence to practice pharmacist competencies associated with improving patient outcomes, communication and collaboration with others, developing patient-care plans and dispensing medications (116). Students also reported a high level of self-satisfaction from participating in the activities (116) through developing professional identity as a health practitioner

(126). However, these studies lacked a control group for comparison (Table 4 in Appendix 1) and complete intervention details as specified by the TIDieR checklist (83) to enable replication of the study (Table 6 in Appendix 1). Nevertheless, these findings are consistent with literature on student outcomes from student-led clinics that demonstrate student-led models as novel teaching methods that benefit the training of the future workforce (96).

The evidence from 3 quasi-experimental studies demonstrated that students in the student-led model integrated and applied theoretical knowledge as suggested in the literature (113, 116, 117). Therefore, the student-led model not only provided students as a resource for patients but also offered a placement site for student learning and competency development.

Placement provides students with the opportunity to develop competencies associated with practice as a health professional because learning occurs in workplaces similar to the work setting of the students' future profession (96). Placement enables active learning through learning from the setting, repetition, feedback, and the provision of responsibility in learning and therefore enables the development of knowledge, skills and attributes that enable students to practice in the placement setting. The development of knowledge, skills and attributes that enable practice in the placement setting is associated with competency development (127). Whilst competency development requires learning within the placement setting, health professional students also have a proportion of competency learning structured within the course curriculum (128). Placement learning within the curriculum aims to bridge theory to practice through student demonstration of observable traits related to health professional practice. To be a

competent health professional, students are therefore required to demonstrate an observable ability to integrate knowledge, skills and attributes in the placement setting (129, 130) as well as develop an identity as health professional (131). Amongst dietetic students, 47 to 306 occasions of practice exposure were required for students to gain entry-level competency required to pass their clinical placement (132). Therefore, early exposure or more exposures may assist students to attain competency on placement.

Amongst dietetic students, student outcomes from pre-placement dietetic-related experience have been reported. The provision of dietetic experiences to students prior to placement was associated with skill and confidence development (133). Whilst clinical practice experiences prior to placement have been associated with dietetic student learning, these opportunities are scarce. In America, it is recognised that the opportunity for dietetic students to obtain clinical practice experiences primarily comes from clinical placement or internships (134). The lack of opportunities to practice in the clinical setting causes students to experience a steep learning curve when presented with clinical placement or a dietetic internship (135). It is difficult for students to obtain exposure to the clinical setting from student driven volunteer efforts to gain dietetic work experiences (136). Volunteer efforts driven by students are often limited to shorter unassessed dietetic opportunities. Clinical volunteering opportunities are rare and may be limited to shadowing a dietitian at work in the clinical setting (136). Most volunteer opportunities that exist are community nutrition-related activities where clinical dietetic skills are not observed or utilised (134).

Therefore service-learning within the curriculum which links academic learning to

community service, has been one method trialled by universities (136-138). Service-learning aims to provide students real-life situations where they work with a community partner to meet the community partners' needs using knowledge developed from the course curriculum (137, 139). As service-learning is often offered as an elective topic within a course curriculum, students who enrolled into the topic also obtained credit from completing a community service project (136).

Service learning has the capacity to provide students with dietetic-related experiences such as rotational menu planning for a facility, developing a training module for clinical dietitians and nutrition lessons to school students associated with upkeep of the school vegetable garden (136). Students reported satisfaction in using their dietetic knowledge to help the community partner (136). Therefore service-learning assisted students to prepare for placement or internship through developing practical skills from using theoretical knowledge, and also assisted students to gain professional identity, confidence and self-efficacy in their role as a future dietitian (126, 136). Dietetic students reported positive perceptions of in service learning experience (138).

Service learning has also been used as a method to assist students to develop competencies (140, 141). Six studies demonstrated that service-learning enabled nutrition or dietetic students to develop cultural competency (141-144) and interprofessional collaboration skills (141, 142, 144, 145) that were an important component of their training to become a health professional.

From the patients' perspective, only one study reported patient outcomes associated with service learning from dietetic students (146). Dietetic students who

provided nutrition education programs to students from a kindergarten and their families to reduce paediatric obesity, resulted in increased nutrition knowledge amongst kindergarten children and a decreased obesogenic risk from the family home environment (146). These results occurred due to changes to parental practices in food choice and decisions around bedtime and television watching compared to the control group that did not attend the program (146).

Although service learning facilitates dietetic student learning (147), the exploration of how this learning develops and its impact upon student's perceptions of competency development (148), patient outcomes and the patient's perceptions about student-led interventions (149) have just begun. To the authors' knowledge, in the context of student-led service delivery, clinical outcomes on adults with CVD, dietetic student perceptions as well as patient perceptions of dietetic student services have not been explored in the same context. This is important to understand effectiveness as both patients and students benefit from participating in student-led health interventions. Patients can gain better care and management of their CVD or risk factors whilst students are able to gain knowledge, skills and develop competency required as a graduate health professional.

Although student clinics for dietetic students exist and provide care for patients with CVD risk factors and CVD, the literature available is limited to one study on a paediatric population group (148). The effectiveness of these services to improve CVD markers in adults have not been reported in the literature. Student outcomes from working in student-led services on adults with CVD or CVD risk factors are limited to these studies (150), that do not include dietetic students. The next section further summarises the problem, the literature, the gaps in the literature

and the aim of this thesis.

1.4 Original Contribution to Knowledge

Although dietary modification is an effective intervention strategy for patients with chronic diseases such as CVD, dietetic service delivery in the primary care setting is limited. Additionally, the intensity of dietetic services required to elicit clinically and statistically significant changes in CVD markers is greater than what is currently provided in the community. As the prevalence of CVD continues to grow, the burden on healthcare provision will continue. Alternative models such as dietetic student services for the management of CVD should be explored as a strategy to address this gap.

Whilst dietetic students have demonstrated skill and knowledge development from providing patient health interventions (151), the effect of dietetic student interventions on CVD and student learning that can be achieved in this context is unknown. Therefore, exploring dietetic student interventions on CVD will lead to findings that will provide an original contribution of knowledge in the field of service delivery, vascular research and research addressing placement-based learning and from a dietetics student perspective through determining whether a dietetic student service is an effective model of care for patients with CVD.

Peripheral arterial disease (PAD) is a type of CVD. Therefore, this research will be conducted amongst adults with PAD as a case exemplar of CVD to determine the effectiveness of a dietetic student intervention on patient and student outcomes. Clinical patient outcomes and the perspectives of patient and students from participating in the intervention to elicit dietary change in patients and learning in

students are the outcome measures reported to understand the effectiveness of this intervention.

Peripheral arterial disease is a suitable example of CVD for this thesis, as this population is underserved within the CVD population (150, 152). Similar to other forms of CVD, patients with PAD have a range of modifiable chronic diseases such as hyperlipidaemia, hypertension, diabetes, overweight and obesity, that can be improved with dietary modification (153, 154). Additionally, PAD is expected to affect 20% of the older people aged over 60 years and 50% of older people aged 85 years and over (155). With an expected rise in the prevalence of PAD, the demand for vascular surgery services is expected to increase by 32% between 2013 to 2025 (156).

Specifically, as PAD also affects the limbs, distance walking can be difficult amongst patients (157). Additionally, surgical treatment can result in limb amputation resulting in disability (158). Therefore, aside from the demand on vascular surgery services, disability support services and social support services could increase if disease management continues to be suboptimal compared to the clinical management guidelines. Over 8 years (from 2005 to 2012) data from USA suggests that diet counselling amongst PAD patients did not change (159). Less than 20% of patients received diet counselling over this period suggesting that diet counselling was underused (159), whilst it's recommended for all patients for first line treatment in clinical guidelines for PAD. The burden on health care from PAD diagnosis after 1 year is similar to a diagnosis of myocardial infarction (160). Due to the burden on healthcare services due to the progression of PAD, models of care that offer prevention and disease management strategies are required to reduce

the burden of disease (161).

As PAD has lifestyle risk factors (153, 154), models of care for patients with PAD must be well designed to ensure that they are effective at changing behaviour amongst patients. Similarly, a dietetic student service for patients with PAD needs to ensure that it is effective at changing dietary behaviour amongst patients while providing students with placement learning opportunities. The service should also be effective at improving the development of competency amongst dietetic students. For example, students participating in activities associated with dietetic practice should develop dietetic behaviours from participating that results in increased competence in their practice as a future dietitian. Therefore, an effective student service would elicit behaviour change from new learning in both patient and student participants.

To ensure that behaviour change can result from the dietetic student service, this model of care was designed based on Bandura's Social Cognitive Theory (SCT) (126). Bandura's SCT (126) provides a suitable theoretical framework for the design of the student dietetic service as it describes how behaviour change occurs and the factors that are associated with behaviour change. The next section will describe the use of Bandura's SCT (126) in this thesis.

1.5 Bandura's Social Cognitive Theory

Bandura describes how behaviour change occurs through the influence of personal, behavioural and environmental factors on shaping behaviour (126). The theory describes a reciprocal interaction between these three factors (Figure 4). Self-efficacy, known as the belief, that one is able to carry out an ideal action, is

described by Bandura as an influencer of all factors in the triad (126). Bandura describes a reciprocal influence of personal, behavioural and environmental factors to ultimately affect a person's psychological functioning and in turn, their capacity to learn new skills and behaviours (126). Specifically, modelling, goals, motivation, reducing obstacles to change and reciprocity are described as facilitators of learning through their impact on the triad and self-efficacy (126). For example, modelling which is performing a desired skill in front of others who desire to learn the new skill, can be an environmental factor that helps an observer develop personal factors such as skills and knowledge. Additionally, modelling a desired behaviour by observing and performing the behaviour is a behavioural influence that can assist in the development of self-efficacy and impact attitude (a personal factor) toward the desired behaviour. Therefore, Bandura's Social Cognitive Theory (126) is a theoretical framework that provides a conceptual lens to study behaviour change amongst patient and student participants.

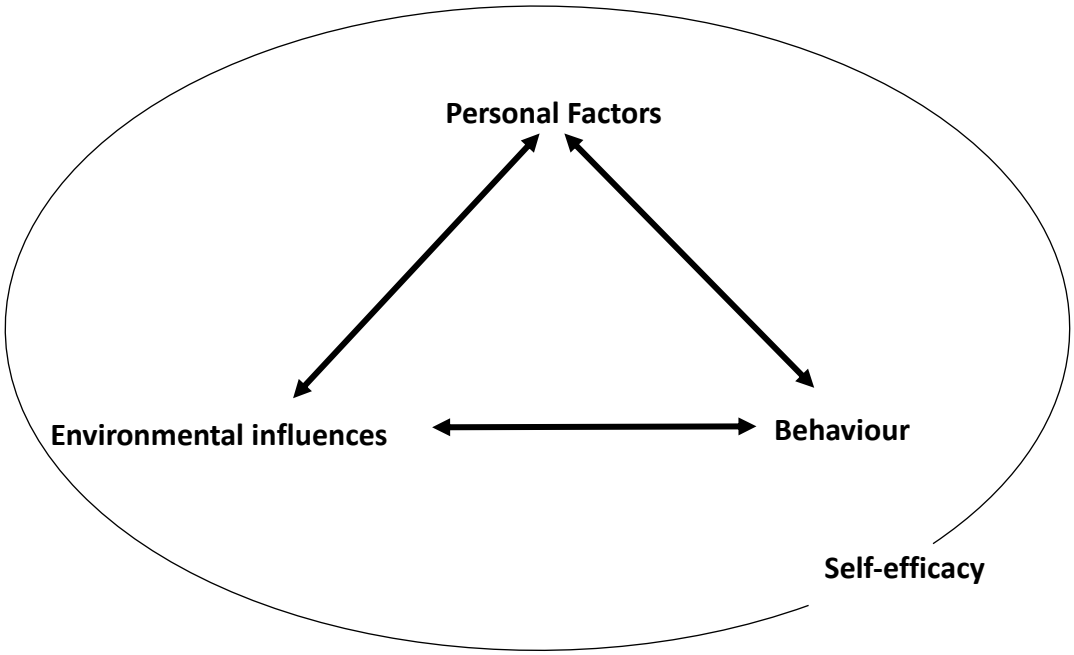

Figure 4:Bandura's Social Cognitive Theory.

Information adapted from Bandura, 1986 (126)

As a theoretical lens, Bandura's Social Cognitive Theory has been used to design behaviour change interventions (162), analyse behaviour in patient participants to determine how and why health behaviour change does or doesn't occur (163) and evaluate the perceptions of health behaviour change (164). Therefore, Bandura's Social Cognitive Theory (SCT) (126) can be used in intervention design and analysis or evaluation of behaviour change outcomes.

Using Bandura's SCT (126) therefore provides a useful lens to explore behaviour change and learning amongst patient participants with PAD, which has been the subject of limited previous research. Additionally, although skill and knowledge development amongst dietetic students from exposure to patients has been reported in the setting of student clinics, using Bandura's SCT (126) in the design of the student intervention provides a framework to explore both positive and negative influences of student learning in the intervention setting. Bandura's SCT (126) can also provide a framework to analyse how and why behaviour change does or doesn't occur in the student service model for patients with PAD and evaluate the patient and students' perceptions of participating. These aspects are important as they are unknown and can provide contextual understanding of the factors that facilitate behaviour change within the student service model for participating patients with PAD and improve our understanding of the effectiveness of this model.

As the intervention aims to provide a setting that facilitates learning for both patient and student participants, a range of learning theories were considered as the theoretical underpinning for the intervention design. The learning theories

considered, included the behaviourist, humanist, constructivist and situated learning theories. The behaviourist theories describe learning as a response to external stimulus where repetitive and reinforced instruction is provided to develop learning (165). Constructivist theories describe learning as an active process where new learning is linked to old learning and is contextualised to construct new knowledge and thinking (165). Humanist theories consider the whole person such as their values, skills and knowledge and looks at improving the learners' view of themselves in these personal aspects (166). Finally, the situated learning theories describe knowledge and skill acquisition through exposure and adaptation to the learning environment (167).

Each learning theory examined describes different aspects of learning that could occur in the student service model for patients with PAD. As learning within the model occurs through exposure to a personalised learning environment, all theories were considered to apply. However, Bandura's SCT (126) appeared to broadly encompass core schools of thought related to the learning theories considered. Additionally, Bandura's SCT (126) was considered the theoretical lens with the best fit as it describes the interaction between personal, environmental and behavioural factors (126) that are pertinent for the learning outcomes of both patient and student participants, and supports learning derived from the environment and self-construction. Therefore, Bandura SCT (126) was the theoretical framework used to guide the development of a student service delivery model for patients with PAD. The model that was designed for this program of research was called 'The Student Nutrition Service.'

1.6 Aims, Research Question, Objectives, Hypotheses

This thesis aims to evaluate the effectiveness of a Student Nutrition Service for patients with PAD as a case study of an alternative model of care, for underserved communities with chronic diseases. The research question: 'What is the effect of the Student Nutrition Service for patients with PAD on objective patient outcomes and from the perspectives of patient and student participants?' will be explored through a randomised controlled trial embedded in an explanatory mixed method design that utilises Bandura's SCT (126) as a design and analysis framework. This program of research will answer the research question through the following four objectives:

I. Test the effectiveness of the Student Nutrition Service intervention compared to usual care on markers of peripheral arterial disease (PAD).
II. Explore how the Student Nutrition Service intervention influences dietary behaviour change amongst participating intervention patients;
III. Determine the student's perceptions of competency and professional identity development from participating in the Student Nutrition Service; and
IV. Evaluate the process of the Student Nutrition Service from the perspective of participating patients and students.

It is hypothesised that the Student Nutrition Service for patients with PAD will improve clinical markers of PAD compared to usual care and lead to dietary behaviour change in patient participants and perceptions of student competency and professional identity development amongst student participants. It is

hypothesised that aspects of the Student Nutrition Service model of care that consider the personal, behavioural and environmental influences described by Bandura (126) are associated with patient and student participant satisfaction.

Findings from this program of research will determine the effect of the Student Nutrition Service model for patients with PAD and propose a model of care for underserved communities with chronic disease.

CHAPTER 2: STUDY METHODOLOGY AND METHODS OF DATA COLLECTION, MANAGEMENT AND ANALYSIS

2.1 Methodology

To answer the research question, this thesis uses an explanatory mixed method design within a randomised controlled trial (RCT) to design and evaluate the effectiveness of a Student Nutrition Service for outpatients with PAD. The Student Nutrition Service designed facilitates the exploration of behaviour change outcomes. The service is quantitatively and qualitatively evaluated in both patient and student participant populations in the same setting. This method enables the patient participants' quantitative clinical outcomes from the intervention to be triangulated with the qualitative data collected of the patient participants' perspective. Amongst student participants, exploring both quantitative and qualitative outcomes enable their reports of competency or professional identity development obtained from quantitative questionnaire data from the intervention, to be explained from qualitative interview data. Therefore, the patient and student participants' perspective of how and why behaviour change, and learning did or did not occur within the intervention environment can be determined. Qualitative data gathered follows the case study approach where the Student Nutrition Service for patient participants with PAD provided by dietetic student participants under the supervision of an Accredited Practising Dietitian is the case under consideration (168). Bandura's SCT is the theoretical framework utilised in design of the intervention, interview and focus group data collection and data analysis of the case (168).

This chapter describes the use of effective components of a behaviour change

program described by Bandura (126) to inform the design of the Student Nutrition Service intervention tested in this thesis. The methodological aspects of the intervention used for patient and student participants and other aspects of the RCT will also be described and considered. The methods used for recruitment, the Student Nutrition Service intervention deployed for patient and student participants as well as design of the supervisory support model are then sequentially detailed.

2.2 A Student Nutrition Service based on Bandura

The influence of the 3 facets of Bandura's SCT, namely, cognitive factors, environmental factors and behaviour factors (126) on learning and the interaction between them are considered in the design of the Student Nutrition Service. Similarly, the students and staff (i.e., the candidate), which are new environmental factors for patient participants were considered to possibly influence the patient participants' perception of nutrition (the cognitive factors) and motivate or demotivate patient participants to attend and engage in the Student Nutrition Service (the new environment). This example demonstrates how the cognitive, behaviour and environmental facets have the ability to influence one another (126).

The Student Nutrition Service aims to provide and observe the learning achieved by patient and student participants where learning is a result of developing skills, knowledge, competency and professional identity (which are cognitive factors) through engaging (which is a behaviour) in the intervention (situated within an environment designed to facilitate behaviour change and knowledge transfer). Therefore, components of Bandura's SCT (126) that are described to influence behaviour change, such as self-efficacy, modelling, goal setting, self-reflection and

self-regulation, obstacles or enablers to change and reciprocal determination were considered in the intervention design. These components described represent influences to consider when applying a student-led service for patients with chronic disease.

Specifically, these components were considered in the provision of knowledge and an environment to facilitate development of skills and self-management components of the intervention design amongst patient and student participants. The intervention was individualised to both patient and student participants to provide enablers to change (e.g., guidance and realistic strategies to meet personal goals). Goal setting was incorporated in both the patient and student interventions to enable both to have a personalised action focus for the duration to promote self-efficacy. The intervention aimed to encourage patient and student participants to self-reflect and self-regulate by building on their existing knowledge and skills to make choices about utilising the extra knowledge and skills to drive the desired behaviour. The setting of a student-led intervention aims to provide a unique environment where patient and student participants understand that each other are learning and thus reciprocal determination between patients and students can occur. Reciprocal determination is described by Bandura (126) as the ability of mutual action between two factors. For example, in the unique environment of the student-led intervention the patient can influence the students' behaviour and the student is able to influence the patients' behaviour as both learn to adopt new behaviours from the intervention. Patients and students learning from each other is one type of modelling described by Bandura (126). Modelling is described as observing the behaviour, of another, where models have the role of motivating and

informing the behaviour of their audience (126). Peer modelling has been reported as an important facilitator for learning amongst patients with chronic disease (169) and undergraduate student education (170). Therefore, the intervention design included a site for patient participants to observe other patient participant peers and student participants to observe other participating students.

The relationship between these components and the triadic interactions of Bandura's SCT (126) in this model is illustrated in Figure 5. The bolded two-way arrows represent the reciprocity relationship between the personal, behaviour and environmental facets of Bandura's SCT (126). The components on the bolded two-way arrows represent the impact on the reciprocity relationship between the facets. As Bandura suggests that self-efficacy influences each of the three central pillars, this influencing pillar is depicted by the circle surrounding these three central pillars (126). The next section details how these facets and components were considered in the patient and student intervention tested in this thesis.

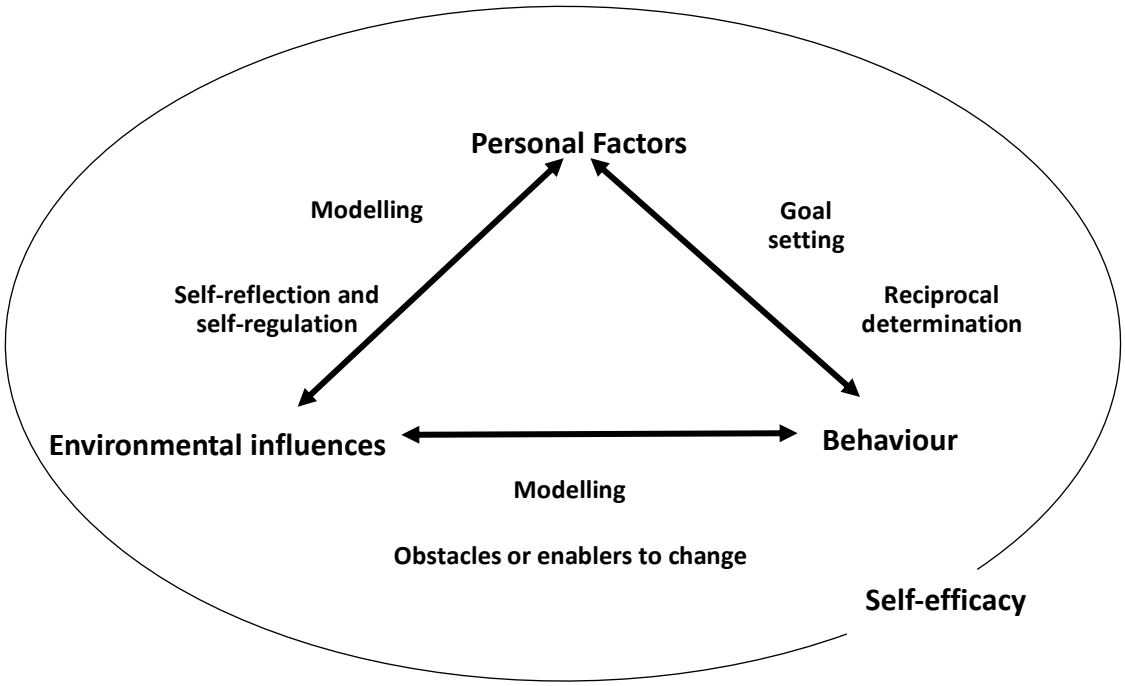

Figure 5: **Relationship between component and 3 facets of Bandura's SCT (126)**

2.2.1 Patient Participant Intervention

The Student Nutrition Service is a 12-week intervention that included one individualised education appointment, six small group education and cooking classes, one individualised review appointment and six motivational messages. Appointments and classes were face to face and provided to patient participants by dietetic student participants supervised by an Accredited Practising Dietitian. The motivational messages were provided either through short message system (SMS), email or phone call based on the patient participant's preference by an Accredited Practicing Dietitian. The intervention was based on the findings of the systematic review on dietetic interventions in the Introduction chapter and the timeframe required for CVD clinical markers to change (171). The effectiveness of this Student Nutrition Service intervention was tested through this RCT design.

2.2.1.1 Individualised consultation

The Student Nutrition Service intervention for patient participants was designed to facilitate dietary behaviour changes amongst intervention patients. Knowledge of the relationship between the patient participant's disease condition and current dietary habits was provided in an individualised education appointment by final year dietetic student participants to build on this cognitive factor. The education appointments were designed to provide intervention patients with one-to-one individualised specific support for the patient participants' nutrition goals. Specific supports were provided with the aim to improve cognitive factors (such as nutrition knowledge, cooking skill and attitude towards foods) that are barriers to favour behaviour change and to assist patient participants to gain self-efficacy in adopting new behaviours (126). An individualised appointment at 6 weeks to review changes

and progress on personal goals also enabled another opportunity for the patient participant to gain knowledge to maintain or further improve the quality of their diet.

2.2.1.2 Group-based education

Dietetics student participants conducted fortnightly small group education and cooking classes with patient participants. Generalised nutrition messages were provided to build upon the participants' knowledge from the individualised education appointment. The education component of the small group education and cooking classes also included an individual or group activity aimed to enable patient participants to put their knowledge into practice. For example, in one session knowledge was provided on the importance of label reading and how to read food labels. This knowledge was then followed by a group activity on label reading designed to help patient participants develop label reading skills. The cooking class component of the small group education and cooking classes were designed to reinforce the key messages from the education session. Modelling and practice of the desired behaviours were performed through reading the label of ingredients used in the recipe and cooking with recommended foods. The additional knowledge and skill provision within these classes were designed to enable self-regulation of behaviour, remove barriers to dietary change through the provision of skills and encourage the patient participants to adopt new dietary behaviours.

2.2.1.3 Motivation messages

Motivational messages were sent to intervention patients, aiming to instil or reinforce nutrition knowledge as well as provide practical suggestions for application. Messages were sent to intervention patients via short message system

(SMS), email or phone call. These motivational messages were designed to provide intervention patients a supportive environment outside of the face-to-face intervention the re-exposure (126). Information from the nutritional education and suggestions of how to apply the knowledge in their personal situation and context outside of the face-to face intervention were provided.

Practical suggestions provided, aligned with the intervention patient's own goals established at the baseline education appointment. If the goal was achieved, practical suggestions were provided to encourage the intervention patient to continue to improve the quality of their diet. Strategies were individualised according to the patients' likes/dislikes and capabilities, to assist the development of self-efficacy where the intervention patient feels enabled to implement these (126).

Points of contact included one individualised education appointment, fortnightly motivational messages and fortnightly small group sessions. These contact points were designed to create a consistent exposure to an environment that facilitates behaviour change throughout the intervention. The environment consisted of positive messages, modelling of desired behaviours, achievable changes and tangible rewards.

2.2.2. Student Intervention

To facilitate the development of competency, skills and professional identity, dietetic students voluntarily participated in the Student Nutrition Service. Students were studying the Bachelor of Nutrition and Dietetics or the Master of Nutrition and Dietetics at Flinders University. At Flinders University, two Nutrition and Dietetics programs existed, a four-year undergraduate bachelor program and a two-year

masters' program. Both programs qualify graduates to become entry-level dietitians. Bachelor students were exposed to theoretical dietetic curriculum in the third year of the bachelor's degree and dietetic placement in fourth year. Masters' students were exposed to theoretical dietetic curriculum in the first year and placement in second year. Therefore, many topics for third year bachelor students and first year masters' students were the similar and concurrently completed, and most topics for final year bachelor and masters' students are the same. The key differences between final year bachelor and masters were the extended scope and assessment expectations for the masters' students in line with the Australian Qualification Framework. Students who voluntarily participated in the Student Nutrition Service were supervised by the candidate, who is an Accredited Practising Dietitian (APD) and Casual Academic who completed the Academic Internship for Doctoral Students in 2018. On three occasions when the candidate was not available during the intervention period, student participants were supervised by academics within the Flinders University, Nutrition and Dietetics Department. Academics who supervised student participants were also Accredited Practicing Dietitians who were provided handover by the candidate and a pre-training when required.

Placement in the Student Nutrition Service was provided to support students to build upon the theoretical knowledge undertaken in the course at the time of participation through exposure to practice. This enabled all dietetic students studying at Flinders University during the intervention period had the opportunity to participate as the student intervention was personalised to the student's year level of study. The supervisor also personalised each student's intervention through

negotiated student involvement while considering the student's strengths, weaknesses and opportunities within the service to develop areas of learning that would provide them with early exposure to dietetic skills. The scaffolded provision of learning tasks followed Vygotsky's theory that described the zone of proximal development as the learning that can be achieved with guidance and encouragement (172). Utilisation of this theory (172) aimed to support student learning to continue through scaffolding despite the level of exposure to dietetics practice that students had, prior to participating in the Student Nutrition Service. Therefore, the Student Nutrition Service was designed as a place for students to experiment with their learning in a safe environment under the supervision of an Accredited Practising Dietitian. Simple skills were intended to be learnt through orientation and experience. Conversely, complex tasks (e.g., conducting a diet history and patient education) were only performed by students who had completed the theory taught in the dietetics course curriculum.

During the intervention, learning opportunities were provided to students to progress in their learning goals. This assisted the students to develop dietetic skills through opportunities to interact with patient participants and provide care in practice. Scaffolded learning was provided as it has been described as an environmental factor that facilitates learning (173).

The intervention exposed student participants to an environment that encouraged practice and modelling of dietetic behaviours. Dietetic behaviours related to skills are described as competencies by the Dietitians Association of Australia (DAA) (174). Behaviours include clinical reasoning skills, patient communication skills, self-reflective skills, patient assessment, and education (174). The intervention was

designed to promote dietetic behaviour through exposure to a safe, encouraging and non-assessed learning environment that removed obstacles to practicing dietetic behaviours. The intervention was designed to promote the development of cognitive factors (such as knowledge and skills) that were aimed at enabling dietetic behaviour development through goal setting, reflection and supervisor support (123). Students were also provided with peer mentoring opportunities that facilitate modelling of dietetic behaviours amongst students. Therefore, underpinned by concepts derived from Bandura's SCT (123), the Student Nutrition Service intervention aimed to provide an environment that facilitated practice-based learning of dietetic skills and knowledge and the development of new dietetic behaviours.

2.2.3 Acceptable variations in the Intervention

The intervention was planned to enable flexibility with time, for patient and student participants, as well as flexibility in learning opportunities presented to student participants.

2.2.3.1. Student Participants

For students it was recognised that developing skills can be difficult to perform without scaffolded learning and flexibility with time. For example, for final year students, to develop skills in dietetic patient education and immediate provide dietetic assessment could be difficult as traditionally these skills are developed over a 10-week clinical placement.

To create an environment conducive to student learning and practice of dietetic skills, time which could be a barrier (123), was flexible. For example, final year students, although 30 minutes for patient education and review appointments was

ideal, student could take 30 to 60 minutes. Students were also supported with an APD as a supervisor who aimed to provide a conducive environment for student learning. Additional opportunities such as participation in baseline or outcome assessments or community sessions were also assigned to students to enable their exposure to extra practice-based experiences to facilitate skill development, if these opportunities aligned to the student's learning goals and extra learning opportunities were of interest in the student. Students participated in the Student Nutrition Service as an extracurricular activity so spending their time on additional opportunities associated with the service was a choice.

2.2.3.2. Patient Participants

The patient intervention aimed to: (1) provide patient participants with the purpose for dietary behaviour changes through knowledge provision, (2) provide constructs of how to achieve dietary behaviour change through development of skills and modelling desired behaviour and (3) provide consistent exposure to an environment that facilitates behaviour change. Bandura describes these factors as necessary preconditions for change to occur (123). It was desirable for patient participants to participate in all activities associated with the 12-week intervention. Considering the intensive time commitment of fortnightly face-to-face session, attendance to at least four out of six of the group sessions and adherence to negotiated goals was accepted as adhering to the intervention.

2.2.4. The environment

The intervention was designed to scaffold the intervention patient's development of dietary change and student participant's development of dietary behaviour to facilitate long term attitudinal change towards new behaviours amongst both

intervention patient and student participants. These elements are described by Bandura as elements of an effective program (123).

For intervention patients the environment hypothesised to facilitate the development of a change in attitude toward healthy eating consisted of an intensive Student Nutrition Service, situated within community and home settings to facilitate knowledge transfer and skill development. Individualised sessions were in the home setting. Group sessions occurred at a local community centre. This environment included the co-construction of dietary goals between the intervention patient and student participant in individualised sessions. Student-led group-based sessions were designed to provide knowledge and skill to facilitate self-management of nutritional health.

The environment that is hypothesised to facilitate student learning is a non-assessed, supervisor supported, practice-based environment from the Student Nutrition Service. Students were encouraged to develop learning goals and try tasks or strategies such as task-based observation, negotiated with their supervisor. Figure 6 displays the personal, environmental and behavioural factors considered in the intervention design for intervention patients and student participants.

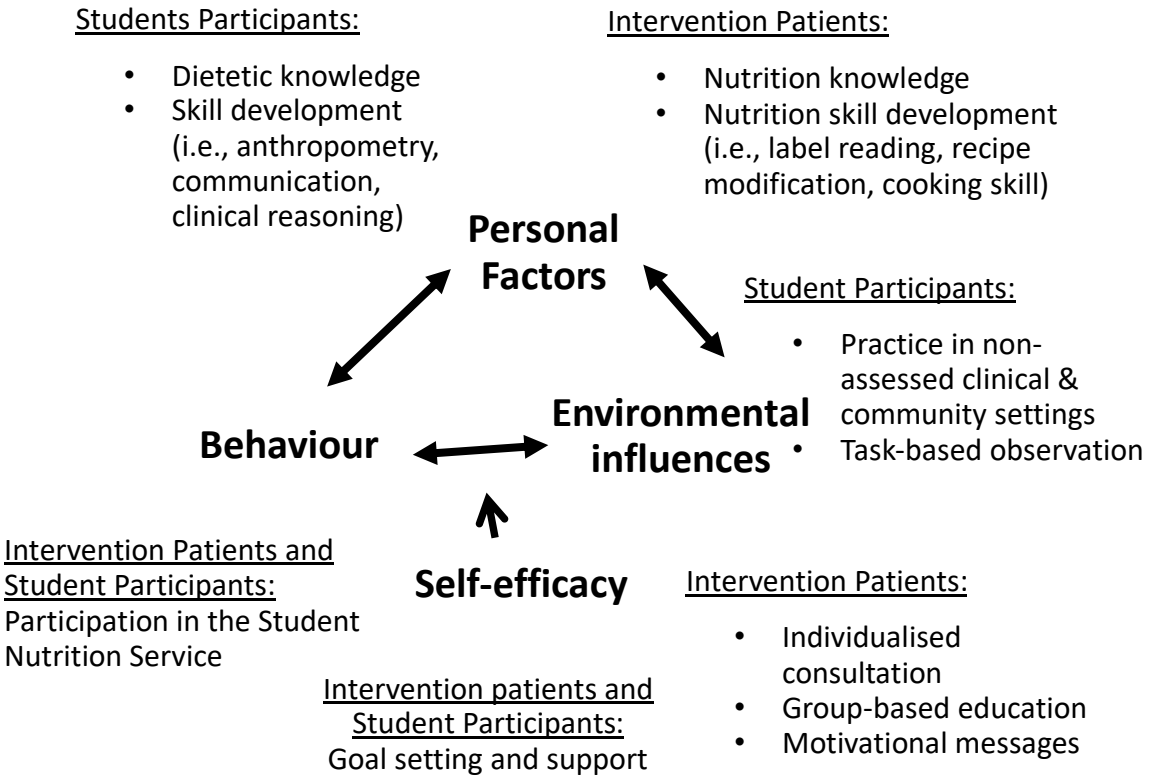

Figure 6: **Intervention Design – Bandura's Social Cognitive Theory (123)**

The next section details specific facets of the RCT and a brief description of the intervention structure.

2.3 Randomised Controlled Trial

The 12-week intervention was provided via a RCT to reduce selection bias, reduce factors that may confound quantitative markers of PAD and enable comparison to a control group so a causal relationship could be concluded. As nutrition intervention is not routinely provided to patients as part of usual care, a RCT design would be suitable to test its effectiveness. Additionally, the RCT also provided an overarching framework to enable the intervention.

2.3.1 Patient sample size

Sample size considerations for this research were based on a similar parallel 3-month dietary intervention study on patients with PAD that observed statistically significant between group improvements in flow mediated dilation (FMD) whilst using the distal arm technique after 3 months (175). FMD is a marker of endothelial function which is imperative to vascular health where an improvement in FMD is indicative of improved vascular health (176). The control group observed a reduction from 7.1% (4.0%,9.8%) to 6.8% (2.5%, 7.7%) compared to the intervention group observing an improvement from 6.7% (3.7%,8.7%) to 10.0% (6.2%,14.2%) in the intervention group (p=0.02) (175). Statistically significant between group reductions in blood triglycerides were also observed at 3 months (175). The control group observed a slight increase in triglycerides 142mg/dL (123mg/dL,181mg/dL) to 152mg/dL (116mg/dL,179mg/dL) compared to a reduction in the control group 171mg/dL (78mg/dL,262mg/dL) to 108mg/dL (79mg/dL,146mg/dL) in the intervention group (p=0.03) (175). As 2% change in FMD and 50mg/dL in triglycerides is considered clinically meaningful respectively by Corretti and colleagues (177), and Miller and colleagues (178), clinical significance was achieved through this study by Schiano and colleagues (175).

Assuming an equivalent change to FMD and blood triglycerides as markers of PAD progression to Schiano and colleagues (175), 80% power (179), 0.05% alpha error to detect a clinically meaningful change in FMD of 2% and 50mg/dl in blood triglycerides (178) in either direction, 25 per group is required. To account for attrition and mortality at 20% (180), 30 patients with PAD per group are required.

2.3.2 Ethics approval

This study was approved by the Southern Adelaide Clinical Human Research Ethics Committee for investigation, between the 24th of November 2017 until 24th of November 2020 (OFR Number: 83.17). Flinders Medical Centre (a tertiary hospital) and Marion GP Plus (a clinic site) were the South Australian (SA) Health, Southern Local Health Network sites that were approved and used for recruitment and the intervention. See Appendix 2.

2.3.3 Randomisation

The RCT included adult patients with PAD who attended the Southern Adelaide Local Health Network Vascular Surgery Outpatient Clinics at Flinders Medical Centre (FMC) and Marion GP Plus. Randomising patients to either the Student Nutrition Service intervention or usual care enabled the clinical outcomes associated with the service to be evaluated as a causal relationship and risks associated with confounding to be minimalized.

A computer-generated randomisation schedule was generated on the webpage, 'Sealed Envelope' (181) in January 2018 by a researcher not involved in the intervention. The following specifications were imputed; Treatment groups: Group A, Group B; Block size:16; List length: 132; Strata: Disease stage: Rutherford Stage 0 to 3, Rutherford Stage 4 to 6 (Table 8) which created a unique randomisation code at that timepoint. A researcher not involved in the intervention selected whether Group A was intervention and Group B was control or vice versa.

Table 8: Rutherford Classifications of Peripheral Arterial Disease (182)

Grade	Category	Clinical description	Objective criteria
0	0	Asymptomatic – no hemodynamically significant occlusive disease	Normal treadmill or reactive hyperaemia test
	1	Mild claudication	Completes treadmill exercise†; AP after exercise >50mmHg but at least 20mmHg lower than resting value
I	2	Moderate claudication	Between categories 1 and 3
	3	Severe claudication	Cannot complete standard treadmill exercise† and AP after exercise <50mmHg
II*	4	Ischemic rest pain	Resting AP<40mmHg, flat or barely pulsatile ankle or metatarsal PVR; TP <30mmHg
III*	5	Minor tissue loss – nonhealing ulcer, focal gangrene with diffuse pedal ischemia	Resting AP<60mmHg, ankle or metatarsal PVR flat or barely pulsatile; TP <40mmHg
	6	Major tissue loss- extending above TM level, functional foot no longer salvageable	Same as category 5

AP, Ankle pressure; PVR, pulse volume recording; TP, toe pressure; TM, transmetatarsal.
*Grades II and III, categories 4, 5 and 6, are embraced by the term chronic critical ischemia.
†Five minutes at 2mph on a 12% incline.

Table contents and footnotes are reprinted from The Lancet, Vol. 26, Robert B. Rutherford; J. Dennis Baker; Calvin Ernst; K. Wayne Johnston; John M. Porter; Sam Ahn; Darrell N. Jones, Recommended standards for reports dealing with lower extremity ischemia: Revised version, Pages No.519, Copyright (1997), with permission from Elsevier.

Disease severity can impact upon changes in clinical outcome and confound the clinical outcomes measured. Patients who have progressed to critical limb ischaemia (stage 4 to 5) have decreased walking distance capacity and higher risk of ulceration and amputation (157). The limited mobility that patients at stage 4 to 5 have compared to patients at stage 0 to 3 not only can affect their quality of life but

also their prognosis (183). The disease stage was stratified at randomisation to assist in balancing this confounding factor across both intervention and control groups to reduce its confounding effect.

2.3.4 Allocation

An external researcher completed the allocation. Opaque envelopes were numbered to determine the order that the envelopes should be opened. The researcher printed 'intervention' and 'control' on small pieces of paper, wrapped the allocation in aluminium foil and inserted the allocation into opaque envelopes according to the random sequence generation system, 'Sealed Envelope' (181). This process resulted in two set of randomisation envelopes, one for each stratum.

A randomisation database was created on Microsoft Excel to record the randomisation envelope used, the patient identification number, name, medical record number, date of birth and disease stage. The allocation sequence, randomisation envelopes and randomisation database were kept by the external researcher, in a locked filing cabinet and on a secure computer respectively, at Flinders University. The external researcher was the only person who had access to these items.

2.3.5 Blinding

Several procedures were undertaken to ensure that an appropriate level of blinding of the outcome data was achieved in the RCT. Outcome data was collected by a student blinded to the patients' allocation and analysed by blinded researchers.

2.3.6 Patient Outcome Measures

Based on the four research objectives, patient outcome measures included markers

of PAD and patients' perceptions of the intervention, in particular the intervention's influence on dietary behaviour change. Markers of PAD encompassed vascular health, nutritional health and quality of life as each aspect can be affected as PAD progresses to latter stages of the disease (157). Regarding vascular health, changes in blood pressures, blood lipid profile and flow mediated dilation (FMD) were selected as outcome measures of vascular health (171). Changes to each of these factors can demonstrate risk or optimal management of vascular health. For example, blood pressure within the normal reference ranges demonstrates optimal management whilst levels above the reference range demonstrate risk of CVD (49). This is also true for lipid levels (49).

FMD is an ultrasound assessment of the function of endothelial cells which line the arterial wall (177). The endothelial cells are responsible for maintaining vascular homeostasis through inhibiting oxidative and inflammatory responses while modulating vascular smooth muscle cells that result in vasoconstriction or vasodilation of the artery (183, 184). Therefore, the function of endothelial cells is imperative to vascular health where endothelial cell dysfunction promotes a pro-oxidative and inflammatory state that leads to atherosclerosis (185). Flow mediated dilation is a common technique used to assess endothelial cell function where occlusion, distal to the forearm is the recommended method (176). However, as FMD can be impacted by inflammatory status, white blood cell differentials and high-sensitive C-reactive protein (hs-CRP) were measured to account for possible confounding. White blood cell count and hs-CRP capture the inflammatory status of those with CVD (186, 187).

Nutritional health was determined by changes to anthropometric measures, blood

levels of vitamin and minerals and dietary intake. Anthropometric measures included weight, height and waist circumference. Weight and height were used to determine BMI (188). BMI and waist circumference are both markers of vascular health where optimal management or risk of CVD can be demonstrated (49). The Student Nutrition Service aimed to improve dietary quality. Food group consumption is one indicator of diet quality commonly used in practice and taught to dietetic students in the curriculum and taught to intervention patients during the group classes (189). Although diet quality has also measured by metrics such as Alternative Healthy Eating Index and Diet Quality Indicator, both are used in research rather than part of the dietetic student curriculum (189, 190). As the intervention was designed to in consideration of both the patient participants and student participant learning, food group consumption was the indicator used for diet quality.

As severity of PAD is associated with reduced walking ability it can affect the patient's quality of life. Specifically, activities of daily living, participating in society as well as emotional health such as the feeling of pain, fear, uncertainty and frustration can be affected (191). The severity of PAD has been associated with 6-minute walking distance (192) conducted through a 6-minute walking distance test (157, 193). Therefore the 6-minute walking distance test that encompasses total 6-minute walking distance and pain-free walking distance (194) was selected as quality of life outcome measures. Quality of life questionnaire that encapsulates walking distance, activities of daily living and emotional health have been used to measure intervention effectiveness amongst this population. As multiple outcome measures for quality of life (QOL) are ideal in determining a true effect occurred, a

QOL questionnaire would be an appropriate additional data collection tool. The EQ5D-5L was selected as the quality of life questionnaire used as it not only captures the quality of life characteristics that can be affected in PAD (195) but also can be compared to South Australian population norms (196) in future research.

Patient perceptions of the service and interventions, and observations of its influence of their perceptions on behaviour change were used to evaluate the service from the patients' perspective. The patients' perspectives were measured by anonymous questionnaires and participation in a focus group, that was moderated by an external interviewer to reduce reporting bias. This is considered as a high level of evaluation based on Kirkpatrick's model of evaluating training activities because all levels of evaluation described were considered (94). Kirkpatrick describes 4 levels of evaluation, where the first level assesses the participants reactions, the second assesses perceptions of learning, the third assesses the participant's application of the learning and the fourth level assesses the benefit of the training on overall patient health (94). Therefore, these findings add to existing literature on patient's perceptions of student-led interventions which only assess patient satisfaction (88-93), the first level of evaluation described by Kirkpatrick (94).

2.3.7 Student Outcome Measures

Student outcome measures included the student's perception of the Student Nutrition Service. Their perceptions of competency and professional identity development from participating were of particular interest. Perceptions of competency and professional identity development were chosen as the student outcome measures as both have been reported amongst student-led health

interventions. Perception of developing professional identity (136) and cultural competency (141-144) have been reported in pre-placement service learning amongst dietetic students. However, the perception of both outcome measures has not been reported in the same study amongst both pre-placement dietetic students and students who have experienced placement. Understanding how dietetic students perceive the development of these outcomes in both contexts are important as dietetic students undergo a programmatic assessment on each final year placements (197) and are required to continue to develop as a professional after graduation. Programmatic assessment requires students to verbalise their development of competency and illustrate with examples (197). Similarly, continuing professional development to attain Accredited Practicing Dietitian status requires the graduate to illustrate how the continuing professional development activity aligns to their learning goals and area/s of dietetic practice (198). Therefore, understanding dietetic student perceptions are of interest to student learning in the course and in their career.

2.3.8 Method of intervention provision

The community setting component of the Student Nutrition Service was designed for small groups of a maximum of 8 patients. The number of patients were determined by the occupational health and safety guidelines of the kitchen used and aim to provide patients with individual attention. Therefore, at least 7 groups containing 7 or 8 patients each were required. At least one student was present to deliver the session and one supervisor to support. The recruitment and intervention structure are depicted in Table 9.

Table 9: Recruitment and intervention structure*

2018																																										2019														
Task	**Jan**	**Feb**				**March**				**April**					**May**				**June**			**July**					**August**				**September**					**October**				**Nov**		**J**	**Feb**			**Mar**					**April**				**May**	
Day that week beginning		**4**	**11**	**18**	**25**	**4**	**11**	**18**	**25**	**1**	**8**	**15**	**22**	**29**	**6**	**13**	**20**	**27**	**3**	**10**	**17**	**1**	**8**	**15**	**22**	**29**	**5**	**12**	**19**	**26**	**2**	**9**	**16**	**23**	**30**	**7**	**14**	**21**	**28**	**5**	**13**	**27**	**10**	**17**	**24**	**3**	**10**	**17**	**24**	**31**	**7**	**14**	**21**	**28**	**5**	**12**
Recruitment																																																								
Baseline appointment [a]				1	2	2	2	3	3													4	4	5	5	5	5	5	6													7	7													
Home visit education appointment [b]					1	2 / 3																4	4			5			6	6													7	7												
Small group community classes [c]					1		1 / 2		1 / 2	3	1 / 2	3	1 / 2	3	1 / 2	3	2	3		3				4		4		4	5	4 / 6	5	4 / 6	5	4 / 6	5	6	5	6		6					7	7		7		7		7		7		
Motivational messages [d]						1		1 / 2	3	1 / 2	3	1 / 2	3	1 / 2	3	1 / 2	3	2	3						4		4		4	5	4 / 6	5	4 / 6	5	4 / 6	5	6	5	6	5 / 6				7			7		7		7		7		7	
Review appointment [b]										1		2			3																																		7							
Outcome appointment [a]																1	1	1 / 2	2	3	3															4				5 / 6	6														7	7

*Numbers 1 to 7 represent each of the 7 groups of participants and the scheduled intervention structure for the group

[a] Consisted of 1 patient participant, 1 supervisor, 1 student participant who had completed 1st semester of BND Year 3 or MND Year 1 who was trained to lead the patient participant baseline data collection and 1 student participant as an observer (optional). At outcome the student participants were different to at baseline to enable blinded data collection.

[b] Consisted of 1 intervention patient, 1 supervisor and 1 final year dietetics student participant. The same patient, supervisor and student were present for the review appointment.

[c] Consisted of student participant who was at minimum a BND Year 3 or MND Year 1 to deliver the education and cooking class and 1 supervisor for groups of 1 to 7 intervention patients (depending on attendance) . Other options were two student participants at minimum BND Year 3 or MND Year 1 to co-deliver the class or one BND Year 3 or MND Year 1 to lead and one BND Year 1 or BND Year 2 student participant to observe and assist.

[d] Supervisor delivered message to intervention patient via SMS, email or phone call based on patient's preference

2.3.9 Student sample size

Based on student tasks scaffolded to the student's year level of dietetic study, it was estimated that at least two third year students or first year masters' students and one final year student would be required for each patient group. Therefore, a minimum of 21 students were required to provide the intervention. With an estimated student attrition rate of 20% (199), 25 students were the targeted sample size. The sample size used in the intervention and analysis of a similar study by Swanepoel and colleagues had 15 students which reflected all students involved in the study (151). This study uses the same concept of capturing data on the experience of all students involved, by providing a semi-structured interview to all students involved at the conclusion of the student intervention.

2.3.10 Patient Participant Recruitment

Adult patients who attended the Southern Adelaide Local Health Network Vascular Surgery Outpatient Clinics (at FMC and Marion GP Plus) between January 12th 2018 to January 29th 2019 and those who had previously attended from July 2017 to January 12th 2018, who had a clinical history consistent with PAD were eligible as candidates for consent. Eligible candidates were referred to the research team for further discussion to determine if the candidate met the inclusion criteria. Patients who (i) had been free of arterial intervention for 1 month prior to entering the study, (ii) were competent to provide informed consent, (iii) able to understand information provided in English, (iv) lived at home and (v) able to physically participate in cooking, met the inclusion criteria.

From January 12th, 2018, health professionals involved in the care of vascular patients during Vascular Surgery Outpatient Clinics offered candidates, a study flyer

(Appendix 3) and an opportunity to speak to the research team about participating in the study. Additionally, the study doctor sent a letter to eligible candidates who attended the clinic during July to December 2017. The letter described the study and invited interested recipients to contact the research team (Appendix 4).

Through a discussion with research staff, candidates who met the inclusion criteria were provided with a verbal explanation, the written participant information sheet (Appendix 5) and an opportunity to ask questions. At the end of the discussion candidates were asked if they wished to participate as patient participants. Interested candidates indicated their decision to participate through signing consent forms. If the patient required time to consider the information presented, a contact phone number was provided. They were also informed that research staff would provide a follow-up phone call, if patients had not made contact within a negotiated timeframe (e.g., two weeks). The follow-up phone call facilitated the patient's decision to be obtained by the research team. Patient were also informed that in the event that they consented to take part, they were free to withdraw at any point in time without any consequences to their health or care provided by the tertiary hospital.

Following consent, all patient participants were assigned appointments for their baseline and 12-week outcome assessments at FMC according to their availability and personal preference of an 8am or 9am appointment.

2.3.11 Student Participant Recruitment

Adult students studying Nutrition & Dietetics at Flinders University who had met the pre-placement compliance checks required by SA Health (200) were eligible to participate. During the duration of Student Nutrition Service, the pre-placement

compliance checks required by SA Health included (i) valid criminal history screening, (ii) completion of an immunisation compliance certificate by a medical practitioner along with serology reports to confirm immunity, (iii) record of tuberculosis screening, (iv) a student statement declaring fitness to undertake placement, (v) a student statement to maintain confidentiality and (vi) a hand hygiene certificate. Criminal history screenings included Department for Communities and Social Inclusion screening for (i) child-related employment; (ii) aged care sector and (iii) vulnerable person employment and the National Police Certificate. If students had been in Australia for less than 12 months, an International Criminal History Check was also required. The Immunisation Compliance Certificate required evidence of immunity to (i) diphtheria, tetanus and pertussis; (ii) measles, mumps and rubella; (iii) chickenpox, (iv) Hepatitis B and (v) Poliomyelitis.

Flinders University Nutrition & Dietetics teaching staff were made aware of the voluntary non-assessed Student Nutrition Service placement that was available to students in December 2017. Teaching staff facilitated recruitment through providing students brief details about the study as well as the researcher's contact details during their usual interaction time with students (e.g., in lectures or tutorials) or through online announcements via Flinders Learning Online (FLO). On three separate occasions posts were made on a general course topic site to alert students to the voluntary non-assessed placement. The posts were made on the 6th of December 2017, 15th of August 2018 and 8th of January 2019 (See Appendix 6).

Through interaction with the research team, students were provided verbal or email explanation of the study, a written student participant information sheet (Appendix

7), dates and times of when the opportunity was available, along with an opportunity to ask questions. Those who required time to decide were provided time and candidate also followed-up interest if no contact had been made over two weeks.

The dates and times of the voluntary non-assessed placement provided to the students was determined by the course content that they had studied. It was also negotiated with students according to their availability determined by the student's academic timetable and extra-curricular activities (e.g., other volunteer opportunities and employment). Therefore, the minimum requirements to participate in the voluntary non-assessed placement was (i) to be studying Nutrition & Dietetics at Flinders University, (ii) have completed pre-placement checks required by SA Health and (iii) available to complete involvement required according to their year level of study at the time of consent.

No minimum involvement was specified for first year students as learning was based on the co-identification of learning goals between the student and their supervisor. Second- and third-year bachelor students or first year masters' students were required to participate in approximately 8 information gathering sessions and 3-6 fortnightly education and cooking class sessions. Final year students were required to participate in education and review appointments for 4 patient participants.

It was hypothesised that the minimum involvement described would be required for students to familiarise themselves to the experiential learning and develop learning that could impact competency and professional identity development (127,

201). For more information on the student interventions by year level of study see Student Nutrition Service (Student Intervention) section. Consent from students to participate was demonstrated by completing and signing the consent form.

2.4 Mixed Methods Data Collection

This mixed methods study embeds qualitative data collection methods within a RCT enabling both types of data to be collected and triangulated (198). This method enabled the collection of rich data on different aspects of effectiveness to be embedded through data collection points throughout the RCT. The three different aspects of effectiveness explored (i.e., patient outcomes, patient perspectives of behaviour change and student perspectives of learning and competencies development) were crucial to inform whether patients and students received benefits from this type of service and if the service facilitated learning and participation.

The aim was to answer the primary research question: 'What is the effect of the Student Nutrition Service for PAD patients on objective patient outcomes and from the perspectives of patients and students?' to meet the research objectives with a range of data collection tools to collect specific outcome measures (Table 10). The range of data collection tools used, enabled both depth in the quality of the information collected and the results to be better explained. Some data collection tools aimed to evaluate the Student Nutrition Service to promote patient-centred care and student-learning environment. These evaluative tools could also be incorporated into future clinics. Evaluative tools for patients had been piloted in a previous study (202) but not formally validated and included the Patient Clinic Satisfaction Questionnaire (Appendix 8), Questionnaire administered following the

Community Sessions (Appendix 9) and Knowledge Quiz (Appendix 10). The Clinic Satisfaction questionnaire evaluates the process of the one-to-one individualised session. The questionnaire administered following the community sessions evaluates the process of the group sessions and well as provides an outcome evaluation of the patient participants' nutritional knowledge. The Knowledge Quiz evaluates the patient participants knowledge and application of the core messages taught throughout the community sessions. For students, these evaluative tools included the Student Reflection Forms (Appendix 11) and Student Observation Sheets (Appendix 12) which were required to facilitate student learning in the Student Nutrition Service. The Student Reflection Forms are designed by Flinders University and used in placement for students to reflect upon their development of DAA competencies. The student observation sheet was designed by the candidate for use in the Student Nutrition Service to scaffold student participant learning of their observation task.

This chapter aims to provide an explanation of the data collection methods used to answer the research questions (Table 10) in sequence that they occurred as well as the intervention for both patients and students. Figure 7 details the sequence of patient involvement which is accompanied with details of the data collection processes. Figure 10 details the sequence of student involvement and is introduced after the patient data collection processes. Chapter 2 will conclude with a discussion of data management, analysis and interpretation prior to the results that will be discussed in Chapter 3.

Table 10: Data collection tools and outcomes measures

Research Objectives	Data Collection Tools	Outcome measures	Data type
Effect on markers of PAD progression	Blood tests for cardiovascular disease markers	Lipid studies, hs-CRP, FMD, BP, inflammatory markers	Quantitative
	Anthropometry, diet history and blood tests for vitamin and minerals	Weight, BMI, waist circumference, diet quality, blood vitamin and minerals	
	Quality of life questionnaire 6-minute walking test	EQ5D-5L, 6MWD, PFWD	
How the intervention influences dietary behaviour change	Patient focus group	Patient behaviour change	Qualitative
Students' perceptions of competency and professional identity development	Semi-structured interviews	Professional identity DAA competency development	Qualitative
	Student Reflection Sheets	Professional identity DAA competency development	Quantitative & qualitative
	Student Observation Sheets	Professional identity	Qualitative
Evaluation of the process of the Student Nutrition Service	Patient focus group	Patient satisfaction Patient perspective of service structure Patient behaviour change	Qualitative
	Patient clinic satisfaction questionnaire	Patient satisfaction Patient perspective of clinic structure	Quantitative & qualitative
	Patient questionnaire on knowledge and skill development	Patient nutritional knowledge Patient cooking skill development	Quantitative & qualitative
	Student semi-structured interviews	Student perspective of service structure	Qualitative
	Student Evaluation Questionnaire	Student perspective of service structure	Quantitative & qualitative
	Student Observation Sheets	Student perspective of service	Qualitative

2.5 Overview of Patient Participant Involvement

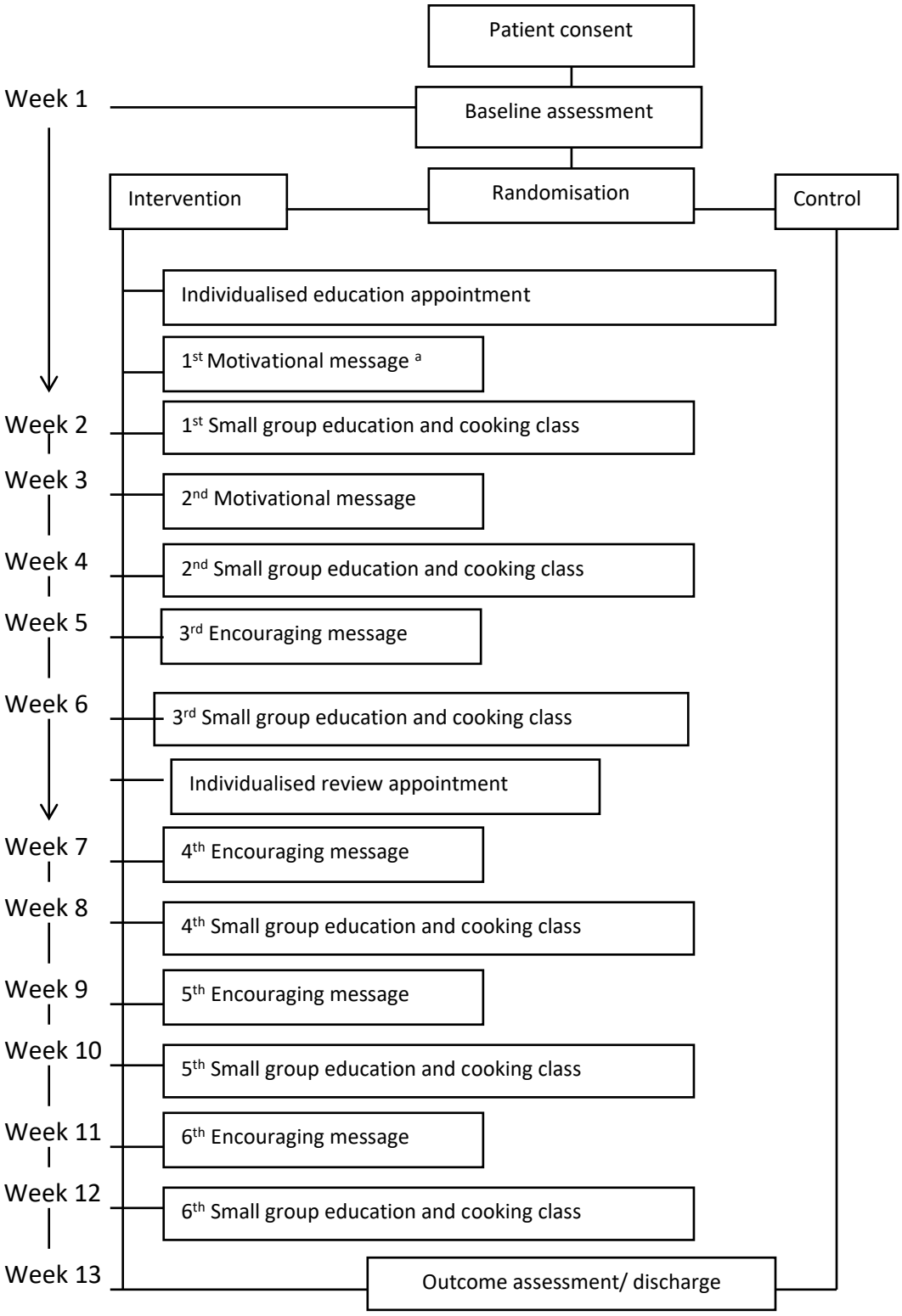

Figure 7: Overview of Patient Participant Involvement Following Consent

[a] Messages were provided fortnightly via SMS, email or phone call, according to the participants preference by the candidate . Other components of the patient participant intervention were provided by student participants.

2.6 Patient Participant Participation and Data Collection

2.6.1 Baseline assessments

Baseline appointments occurred at week 1 of each new patient participant group where medical health; nutritional health and quality of life were assessed. To complete all assessments, the appointment lasted for 2.5 to 3 hours and occurred at FMC. Baseline assessments were scheduled for 8am or 9am to enable all measures to be collected in the morning. Prior to the appointment, patient participants fasted overnight for 12 hours. Food and drink other than water, medications (if possible) and smoking was avoided during the 12-hour fast. Fasting instructions were provided to patient participants the day before the appointment through short message system (SMS) or communicated through a phone call, depending on the patient participant's preference.

The baseline assessment began with a FMD test. FMD was measured by the candidate supervised or trained to competency by a vascular sonographer. Canon Aplio 500 was the ultrasound machine used to conduct the FMD test. The technique described by Charakida and colleagues (203, 204) was used. Briefly the patient participant was asked to lie supine on a height and head adjustable bed, with their right arm outstretched into a cradle (Figure 8). Head height was adjusted to ensure the patient participant's upper body was at an elevation between 20 degrees to 50 degrees which would be comfortable for the patient participant to remain still for the duration of the test. Additionally, the patient participant's head was rested on a pillow and any gaps between the patient participant's right shoulder and the bed as well as any gaps between the right arm and the cradle were padded with towels to ensure that a comfortable position was achieved.

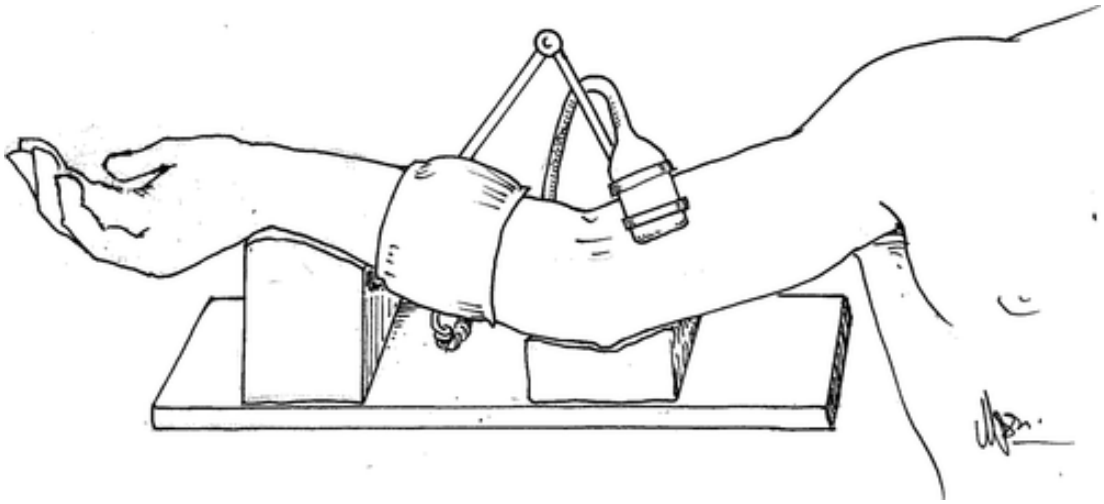

Figure 8: Measuring flow mediated dilation using the distal arm technique with transducer and arm support

Image Source: Dedichen, H.H., Skogvol, E., Aadahl, P. and Kirkeby-Garstad, I. Reduced reactive hyperemia may explain impaired flow-mediated dilation after on-pump cardiac surgery, 2017, Physiological Reports 5 (10): https://doi.org/10.14814/phy2.13274. (CC BY 4.0)

Once the patient participant confirmed that they would be comfortable enough to remain still during the test, a blood pressure cuff was firmly strapped around the right forearm, approximately 2cm below the olecranon process, ensuring the cuff sat on the skin. This is according to the occlusion of the distal forearm arm technique described by Allan and colleagues (176). The test began after the patient participant expressed that they were ready for the test to begin. To begin the test, a L transducer (14L5) was used to locate the brachial artery. Once a clear image of the brachial artery was located (Figure 9), recordings were taken at this site. Firstly a 30 second, resting baseline recording was taken. Secondly, the blood pressure cuff was inflated to 250 to 260mmHg for 5 minutes. Thirdly, three one-minute recordings of the brachial artery site were taken once the blood pressure cuff was deflated and a

clear image of the brachial artery site was located again. Generally, a clear image of the brachial artery site was located within 10 seconds of deflating the cuff. Three one-minute recordings were taken to capture peak dilation of the brachial artery and are compared to the baseline function as well as the peak dilation at outcome.

A vascular sonographer who was blinded to treatment allocation conducted the FMD analyses with the ultrasound recordings collected during the FMD test. Brachial Analyzer for Research (version 6.1.4., Medical Imaging Applications) software was used to assess the diameter of the artery pre-occlusion (Figure 9) and the diameter of the artery post-occlusion. Flow mediated dilation (%) was calculated as 100 [(peak dilation diameter – baseline diameter)/baseline diameter] (176). Baseline diameter was the mean diameter calculated from 5 frames (7 seconds at 15 frame per second acquisition). The analysis demonstrated any rise in diameter post occlusion through a graph output (Figure 10). The peak dilation diameter was identified from the diameter to time graph produced by the analysis software over the 3-minute period after the cuff was released. One hundred and five frames centred on the point of maximum dilatation was selected and the mean diameter was calculated.

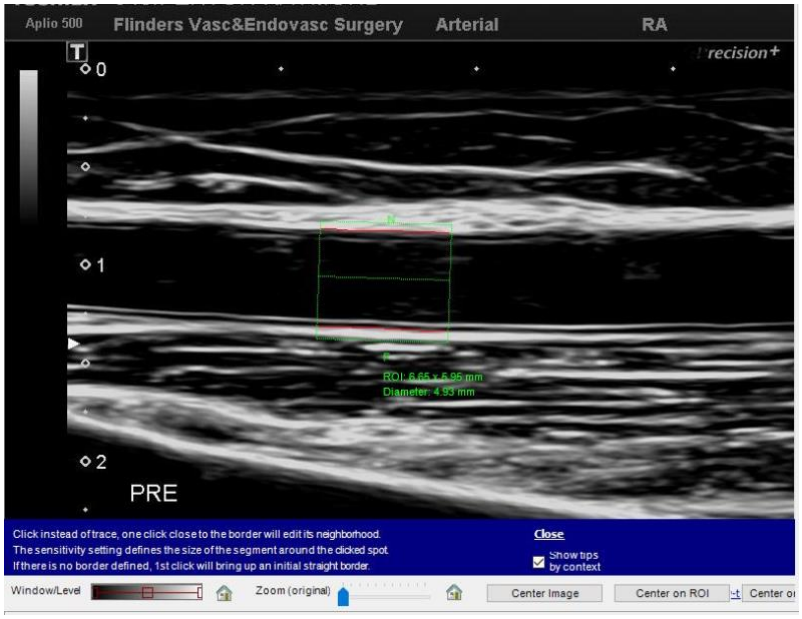

Figure 9: Brachial Artery Ultrasounds with FMD analysis software ROI

Reproduced with permission.

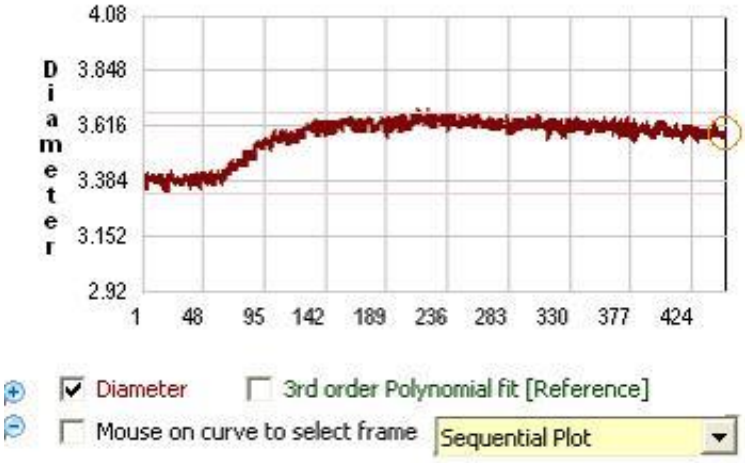

Figure 10: Analysis output demonstrating rise in diameter post occlusion.

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The patient participant was asked to sit and rest for 16-minutes prior to a resting BP measurement, to reduce error associated with stress induced to the brachial artery during FMD (205). At this point, the student led the appointment under the supervision of the candidate. During the 16-minute rest, the student participant

asked the patient participant questions about their medical history, current medications, PAD history and social history (see Appendix 13 Patient Participant's Data Collection Pack). A steel tape measure (KDS Measure 2m F10-02 by Muratec-KDS Corp.) was used to measure the circumference of the patient participant's right upper arm. The upper arm circumference determined the size of the BP cuff used for the resting BP measurement. Two HEM-CR19 blood pressure cuff sizes were available: medium cuff for 22 to 32cm and large cuff for 32 to 42cm. If the circumference measured was 32cm or greater, the large cuff was used (206).

Blood pressure was measured according to Sharman and colleagues (207) method. The patient participant was asked to sit with their feet flat on the ground, the BP cuff was firmly strapped on the right upper arm with the patient participant's right hand palm, facing up (208). Patient participants were informed that the automated BP machine (OMRON HEM-907) used would take three measurements with a one-minute break in-between. Verbal communication was prohibited during the test as it has been associated with elevating the blood pressure reading (206). The OMRON HEM-907 was set to P-set: Auto, Mode: AVG.

An average of the second and third BP measurement was calculated and used for the purpose of data analysis, as the first reading can be falsely high according to Lacruz and colleagues (208). The National Heart Foundation of Australia guidelines for diagnosis and management were used to classify the averaged SBP and DBP readings displayed in Table 11 (209).

Table 11: Blood Pressure Classifications for Adults (209)*

*Removed due to copyright restriction. Please refer to Box 2 in 'Gabb GM, Mangoni A, Anderson CS, Cowley D, Dowden JS, Golledge J, et al. Guidelines for the diagnosis and management of hypertension in adults - 2016. The Medical Journal of Australia. 2016;205(2):85-9.'

Fasting blood samples testing for CBE (absolute neutrophils, eosinophils, monocytes, basophils, white blood cell count, haemoglobin), hs-CRP, Lipid Studies (Total Cholesterol, HDL, LDL, triglycerides), Iron Studies, B12, Folate, Zinc, Selenium, cortisol, Vitamin A, C, D and E were ordered by the doctor. Samples were taken by a trained phlebotomist and analysed by a local pathology laboratory (SA Pathology) according to its standard procedures (210). Results from these blood tests were recorded for the purpose of data analysis.

After the blood test, the patient participant was provided with a light breakfast. The light breakfast consisted of food (i.e., Toast or cereal along with fruit) and a drink (i.e., fruit juice or tea or coffee). An English paper EQ-5D-5L questionnaire (Australia, version 1.0, last modified on 1st October 2014) was also administered to patient participants for self-completion along with the light breakfast, following a brief verbal explanation of the purpose of the questionnaire (195). The student participant provided assistance in the form of reading the questions on the questionnaire when required. For example, when patient participants forgot to bring their reading glasses.

Next the patient participant was asked to participate in a 6-minute walking distance test. To obtain walking distances that mimic daily life, the protocol described by McDermott and colleagues was adapted to a relatively quiet, 32 metre or 105 foot

corridor with one turn at our site (211). The patient participant was required to walk 57-66m to the walking distance test site prior to the test. The test was described to the patient participant by the student participant, during the 57-66m walk to the site. The walking distance to test site varied based on where the patient participant consumed the light breakfast provided.

The patient participant was required to walk between two natural markings on the floor of the corridor at their own walking pace for the 6-minute duration of the test. The patient participant was instructed to inform the student if they felt any pain, particularly pain in the legs and to stop if the patient felt pain that was debilitating. If the patient participant stopped during the test, the patient participant was able to resume walking once the pain subsided to capture the total distance, that the patient participant could walk in 6 minutes. During the test, the student participant followed behind the patient participant with a trundle wheel (Medalist 10km Pro, 318mm wheel Model 07500, MON: 75001) to measure the distance walked. At every minute of the test, the student participant informed the patient participant of the time and offered encouragement (i.e., “one minute has passed, well done!”) (211). Nearing the end of the 6-minute test, the student participant provided a countdown to the patient participant, to enable the patient participant to be prepared to stop walking at the 6-minute time point.

To consistently measure the total distance travelled and other distances, the trundle wheel was rolled to ensure the centre of the wheel aligned to the tip of the patient participant’s largest toe to determine the distance travelled. Total 6-minute walking distance, time and distance the patient participant began to feel pain that was debilitating were variables that were recorded for analysis. This measurement

was not taken if the patient participant was not able to walk (i.e., wheelchair bound) or unable to walk safely with walking aids (i.e., appearance of imbalance while walking with aids and thus assessed as risk of falls). If a patient participant usually walked with a walking aid, the patient participant was able to use the walking aid during the test and it was noted that a walking aid was used to ensure that the same walking aid would be used in the patient participant's outcome measure.

Anthropometric measurements including weight, standing height, ulna length, and waist circumference were measured. Prior to the anthropometric measurements, the student participant asked the patient participant to remove their shoes, heavy clothing or accessories (i.e., jacket, hat, heavy jewellery) and any heavy items in their pockets (i.e., wallet, phone, keys). Weight was measured on calibrated scales (Tanita BF-679W). This weight scale required the patient participant to stand on the scales to produce a reading, so if the patient participant was not able to safely stand on the scales (i.e., wheelchair bound or risk of falls), weight was not taken, and instead patient participants were required to report a recent weight (within the past month) which was recorded of this appointment. This pragmatic approach of collecting body weight was planned as a precaution in the event that a patient who was not able to safely stand on scales was able to physically participate in seated cooking activities and met the inclusion criteria.

Standing height was measured using a calibrated 200cm stadiometer (Surgical & Medical Products, Design No 1013522, No.26SM). The patient participant was instructed to stand straight with feet together, look forward and have their back and buttock on the spine of the stadiometer. The patient participant was also

instructed to face forward with a straight neck and eyes looking forward (212). The headboard was lowered from the stadiometer until it gained contact with the top of the patient participant's head (212). The patient participant was asked to step away from the stadiometer. The height measurement on the stadiometer was read and recorded.

To account for the possibility that patient participants recruited may not be able to stand, ulna length was additionally measured. The patient participant was first asked to remove any jewellery on their left wrist or forearm. The patient participant's left hand was then placed onto their upper right side of their chest. Ulna length was measured from the middle of the styloid process to the point of the olecranon process (213). The 'Estimating height from ulna length chart by the British Association of Parenteral and Enteral Nutrition (213) was used to record the estimated standing height (Appendix 14). Body Mass Index (BMI) was calculated using the standing height as well as height estimated from ulna length when available.

Whilst the patient participant was standing, the top of the hipbone and bottom of the ribcage was located. The waist circumference measurement was taken in between these two locations. A metal tape measure (KDS Measure 2m F10-02 by Muratec-KDS Corp.) was placed between the top of the hipbone at the iliac crest and the bottom of the ribcage at the last rib, ensuring that the tape measure was parallel to the ground and sitting on the skin (214). Next the patient participant was asked to inhale and exhale. At the point of a full exhale, the waist circumference reading was taken. To ensure accuracy of this measure, the patient participant was asked to inhale and exhale two more times to enable three readings to be taken

and thus an average to be calculated. The average measure was used to determine if the patient participant had a healthy waist circumference for adults with cardiovascular risk factors. The Heart Foundations cut off points were used for men and women at risk of CVD: Men at risk >94cm, Women at risk >80cm (215).

To assess usual food intake, a 24-hour recall followed by a 7-day diet history was used. Both a 24-hour recall, and a 7-day diet history are standard processes used by dietitians to collect food intake data (216). The process of a 24-hour recall requires the patient participant to recall the food and drinks consumed in the past 24-hours, beginning at the last food and drink item consumed prior to the interview. The student prompted the patient participant regarding the timing of the food or drink consumed, what was consumed, and the quantity consumed according to the triple pass method (217). Patient participants are additionally asked whether or not the food and beverage intake within the past 24-hours was typical compared to their usual food intake. This method enabled food and beverage consumption patterns as well as usual nutritional composition of food and beverage consumed to be identified. The additional 7-day diet history identified variations in eating to confirm typical nutritional composition of food and beverage consumed.

To form the 7-day diet history, information collected from the 24-hour recall was used as a basis to further question typical alternatives to breakfast, lunch, dinner and snacks consumed (216). Similar to the 24-hour recall, the type of food, the quantity and frequency consumed over an average week was of interest (216). To end the diet history, a food frequency checklist was completed (see Appendix 15) to check if any regular items consumed had not yet been mentioned. This method has assisted dietitians to obtain a better understanding of usual eating patterns and

thus usual nutritional intake (216). The information gathered was also used to compare each patient participant's usual food intake against the serves recommended by the Australian Guide to Healthy Eating (4).

At the end of the appointment, patient participants completed the Patient Clinical Satisfaction Questionnaire regarding their thoughts about the service. The questionnaire aimed to assess the accessibility, satisfaction and student participants' performance (Appendix 8).

2.6.2 Post- baseline assessment randomisation

Following baseline data collection and blood sample processing, an external researcher was contacted and provided with patient participant's descriptors (i.e., ID number, Full Name, MRN, Gender and PAD stage) prior to receiving the patient participant's allocation: intervention or control. As participants were not blinded, they were informed of their allocation through a phone call where the date and time of their next involvement was negotiated. Those randomised to the control group were told the date of their outcome appointment, as the date of their next involvement.

A date and time of a home visit education appointment to take place within the following week was negotiated with participants randomised to the intervention group. Additionally, a review appointment typically conducted as a home visit was negotiated whilst the date and time of the six fortnightly community sessions and a reminder of the outcome assessment appointment were provided (See Figure 7, page 93). For intervention patients, the intervention commenced within one week of their baseline appointment and began with an individualised education appointment.

2.7 Student Nutrition Service Intervention (Patient Intervention)

2.7.1 Individualised education appointment

At the patient education appointment, the intervention patient received a summary of their test results and verbal explanation of the main nutritional concern supported by a diet disease link. The main nutritional concern was determined based on clinical reasoning between the intervention patient's medical conditions, methods of pharmaceutical treatment and usual nutrient intake, balanced against recommended nutrient intakes for their age and medical conditions. A diet disease link is a simple physiological description used to explain the relationship between consuming and not consuming nutrients to the intervention patients' health and management of disease. A pictorial diagram was provided as necessary to assist the explanation of the link between the disease of concern and diet. Possible goals and strategies to assist in nutritionally managing the main nutritional concern were discussed. A written summary of the agreed upon goals and strategies was offered. Additionally, a publicly available nutrition resource that summarised the discussion points was provided (Appendix 16).

To conclude the appointment, the key points were summarised, and a reminder of the time, date and location of the community session was provided. Intervention patient were also given the opportunity to contribute to the context of the upcoming motivational messages. Intervention patients were asked to notify staff, if at any point in time, they desired to cease receiving motivational messages.

2.7.2 Motivational messaging

A total of six motivational messages were provided fortnightly throughout the 12-week intervention by the candidate (see Figure 7). Motivational messages were

tailored according to the intervention patients' goals. The first motivational message summarised the key diet-disease link message for the intervention patient's main nutritional concern discussed at the education appointment. The message also reminded the intervention patient of the possible strategies agreed upon or potential additional strategies. The second motivational message targeted secondary nutritional concerns. The message provided brief diet disease link and possible strategies to adopt.

Motivational messages were also tailored according to the intervention patients' adherence to the goals set in their individualised education appointment and their engagement with the small group community centre education and cooking program. If intervention patients were adherent to the context of the motivational message, an alternate message related to the importance of maintaining adherence or helping the intervention patient to move towards other goals that are discussed in the review appointment was provided. If the intervention patients had not attended the small group community centre education and cooking program, the context of the motivation messages summarised key points from the session and provided the intervention patient with possible strategies to meet their individual goals. See Figure 11 and 12 for a sample of motivation messages sent.

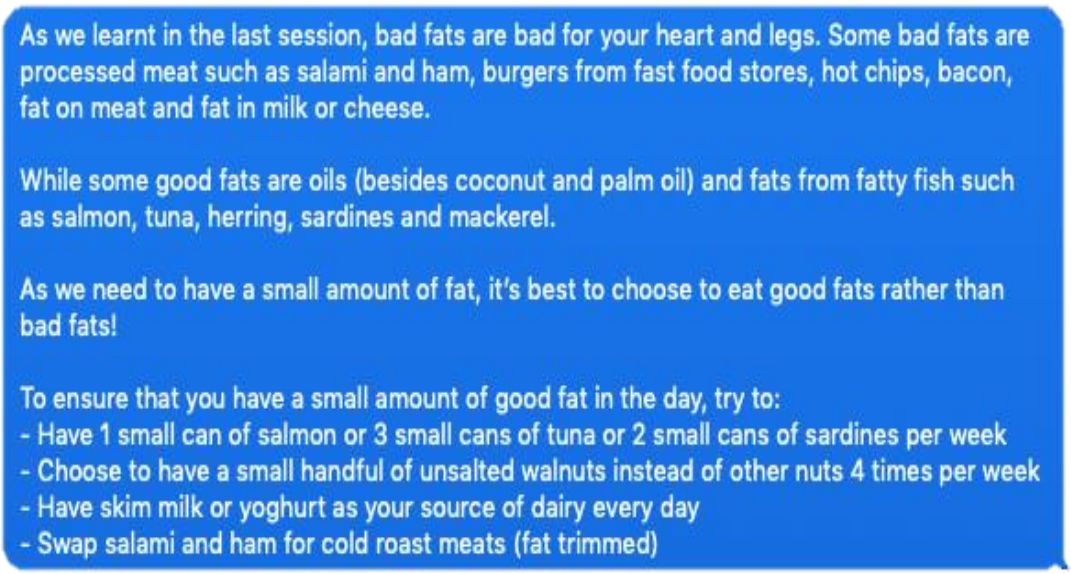

Figure 11: Motivation message on good and bad fats after Fat Session

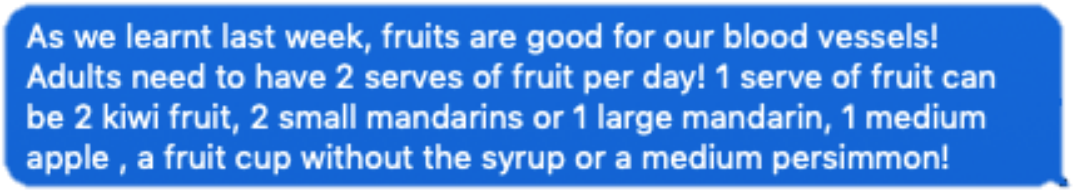

Figure 12: Motivational message on fruits

2.7.3 Individualised Review Appointment

An individualised review appointment was provided between the beginning of week 6 to the end of week 7 of the 12-week intervention. If the appointment could not be arranged during this time due to the intervention patient's availability, a review appointment was negotiated with the intervention patient up to week 12 of the intervention. These appointments lasted between 30 minutes to 1 hour and were held at the intervention patient's home unless the patient requested for their appointment to occur at FMC.

During the review appointment, the student participant measured the intervention patient's weight, blood pressure and waist circumference according to the protocol

described in the baseline and outcome assessments. Changes in medical history, medications, physical activity and diet were collected. Patient participants were provided verbal feedback on their progress in a factual yet polite and empathetic manner, which was discussed in relation to the diet disease link that highlighted the patient participant's current main nutritional area of concern. Goals and strategies related to their current main nutritional area of concern were discussed and co-constructed with the patient participant. A written summary of the agreed goals and strategies were provided along with any publicly available nutritional resource that was relevant to the discussion (Appendix 16). The patient participant again had the choice to contribute to the context of their fortnightly motivational message at this time point. To conclude the appointment key messages were summarised and a reminder of the date and time of the next community session was provided.

2.7.4 Small group education and cooking class

The community sessions occur at Woodcroft/Morphett Vale Community Centre. The sessions began with a 30-minute group education on a nutrition topic related to patients with PAD. The nutrition topics included (i) Energy balance, (ii) Fats, (iii) Sodium & Fibre, (iv) Label reading, (v) Antioxidants and (vi) Eating on a budget (Appendix 17). To conclude the group education session, an individual or group activity was provided which aimed to enable intervention patients to put their knowledge into practice. The education session was followed by a cooking session that reinforced the key education messages through application and practice. All participants were involved in cooking a main meal and dessert during the cooking session. Student participants provided intervention patients with modelling and step-by-step instruction for cooking the main meal and dessert. The group cooked

one serving for each person present and an extra serving for each intervention patient present to take home.

A small kitchen gift was provided at each session to assist intervention patients in cooking at home. The kitchen gifts provided throughout the program consisted of an apron, a lunchbox, an apple corer, a pizza cutter, a fruit parfait glass and spoon, a homemade salad dressing jar and a pie dish. A copy of the slides and recipes used in the sessions were also provided to the intervention patient. The group was encouraged to consume the main meal and dessert together where key points were summarised and discussed. Once the meal was consumed, the student participant/s directed the intervention patient to complete a short questionnaire (Appendix 9) whilst the student participant/s and supervisor began to clean up. Intervention patient assisted in the clean-up activity prior to departure as to model the cleaning process required after food preparation.

At the last community session, intervention patients were additionally asked to complete the Knowledge Quiz (Appendix 10) and participate in an audio-recorded focus group discussion. These data collection methods enabled their perceptions of the Student Nutrition Service and its effectiveness to be gathered.

The intervention patient's main food preparer (i.e., spouse, main caregiver, household member etc) was also able to participate as an additional participant in the small group education and cooking class, was able to ask questions during the education session, participate in the activities but shared the resources provided with the intervention patient. The main food preparer did not conduct the cooking for the intervention patient in the cooking session but functioned as a participant

who contributed to the group cooking activity. The concept of including the main food preparer in the group classes was to enable the main food preparer to be familiar with the healthy eating messages and recipes taught and the act as a source of motivation at home based on Bandura's SCT. Data was not collected or analysed on the main food preparer aside from any voluntary participation in the focus group.

2.7.5 Intervention patient focus groups

An experienced facilitator moderated the focus groups, guided by an interview framework (Appendix 18). The facilitator, who was a speech pathologist with a background in patient care, and was a member of the research team, had extensive experience in conducting focus groups (218). With an interest in health professional education, the facilitator had a deep understanding of the intervention design as well as education research and frameworks. Using Bandura's SCT (126) as a conceptual framework, the facilitator and candidate co-constructed the focus group interview guide based on the research questions. The aim of the questions was to capture the intervention patient's thoughts about the service structure, the student participants and facilitators or disenablers of behaviour change (Appendix 18). The interview guide was reviewed by the research team, that included experienced qualitative interviewers. Each focus group was conducted and moderated according to the framework described by Krueger and Casey (218).

Each group of intervention patients who participated in the group program together, participated in the focus group conducted at the end of their last (6^{th}) group session. Intervention patients were reminded at the 5^{th} group session, that a focus group would be conducted at their last group session. The focus group was

conducted at Woodcroft Morphett Vale Community Centre in the room used for group discussion with the door closed. The candidate and the student/s participating remained in the kitchen during the focus group. The focus groups typically lasted between 30 to 45 minutes and were recorded with Sony IC Recorder (IC Recorder ICD-PX440). The facilitator wrote memos as required during the focus group to facilitate iterative follow-up topics with the participants or themes to explore in the data.

2.7.6 Outcome assessment and discharge

The outcome assessment appointment followed the same process as the baseline assessment in data collection. Data were collected by a student who had not seen the patient participant before. Patient participants were informed not disclose their allocation to reduce measurement bias. At the end of the appointment, the supervisor discharged the patient participant, thanked them for their participation, reassured that a summary of their involvement would be forwarded to the patient participant's GP and arranged follow up assessment home visits to be conducted at 6 months. Although post intervention follow-up was conducted, the timeframe and scope were outside of the aims and research questions posed by this thesis and thus are not reported on in this thesis.

2.8 Overview of Student Participant Involvement

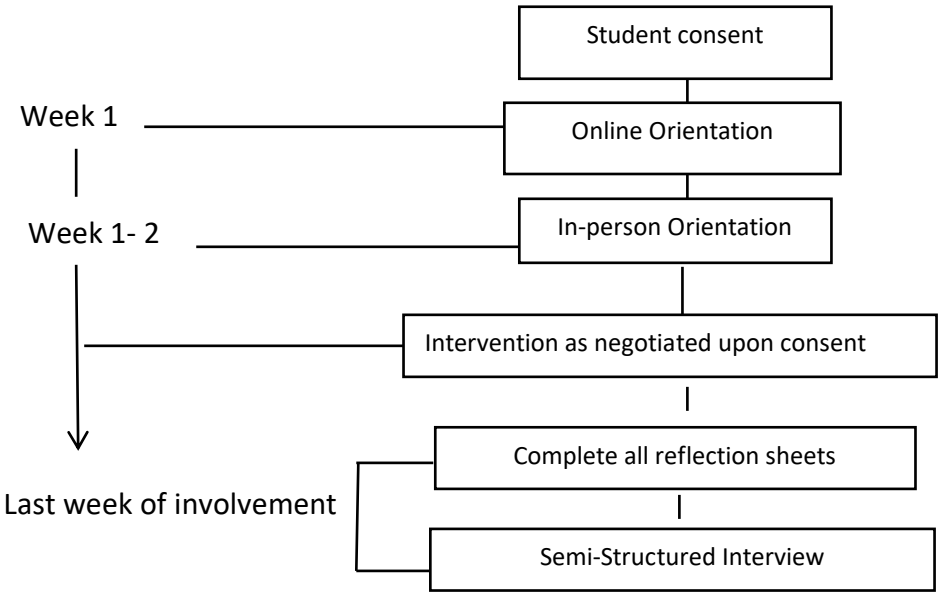

Figure 13: The Sequence of Student Involvement

2.9 Student Nutrition Service (Student Intervention)

2.9.1 Orientation

Two weeks prior to the student participant's first scheduled interaction with patient participants in the Student Nutrition Service, access to an online orientation module (Appendix 19) was provided. Access was available for the duration of their participation. The online orientation module included written, pictorial and video resources. A brief introduction to the condition of PAD, the protocols for the patient participant data collection and a copy of the materials that were to be used in the community sessions (i.e., presentation slides, recipes, session outlines and activities) were included.

One week prior to the first interaction with patient participants, student participants were provided an in-person orientation. This orientation included a tour of the key locations and a chance to practice conducting patient participant

measures on volunteers, according to the protocol. Student participants were encouraged to re-visit the online orientation module prior to each new task in the service to prepare.

After each patient participant interaction, student participants verbally reflected on their experience with their supervisor. The supervisor assisted the student participants to identify strengths and areas for improvement through the student participant's reflective responses. The supervisor then summarised the learning points from the experience and provided an example of how the learning point is appliable to future experiences (i.e., either a future session involved in the current study or to placement or post-graduate practice).

Student participants were then provided with an Individual Clinical Case form or Group Education form (Appendix 11) dependent on whether the experience was clinical or community in nature. These forms were routinely used in final year placements and adapted to the Student Nutrition Service, to enable student participants to be familiar with the reflection process and the DAA competencies identified in association with clinical or community settings. The Student Nutrition Service offered the clinical setting at the information gathering sessions and home visit appointments and a community setting at small group community session. From consultation with academic staff from the Flinders University Dietetics courses it was deemed appropriate to adapt these forms for use in the Student Nutrition Service.

Student participants reflected upon their learning experience by noting their thoughts on any development of the DAA competencies listed (Appendix 11). Other

reflective thoughts were written in the free space. The supervisor provided written feedback on the same form (Appendix 11). Student participants who completed the Individual Clinic Case forms also provided written comment on the feedback provided (Appendix 11). Whilst these forms are also utilised in regular clinical placement in the Dietetics courses to determine the summative outcome of the placement, in the Student Nutrition Service, the form was used formatively to provide a framework for student participant feedback and reflection.

2.9.2 First- and Second-Year Bachelor Student Participant

To assist student participants at this stage who were typically high-school leavers, guidance from the supervisor was provided in the observation task. Student participants were buddied with a senior student participant peer to observe the senior peer's practice in the Student Nutrition Service.

These senior student participant "mentors" had commenced participating in the service and demonstrated confidence and competency in patient communication and information gathering from patient participant/s. Student participants were asked to observe how the senior student participant communicated with the patient participant, such as (i) how they introduced themselves; (ii) asked questions to collect basic information in conversation with the patient participant; (iii) what types of questions were used to collect dietary data and (iv) what the process of collecting dietary data included. Student participants recorded their observations on an Observation Sheet (Appendix 12).

Objectives for the observation task aimed to indicate the learning that could be obtained. These objectives also aimed to help first year student participants engage in the new setting and develop familiarity in dietetic skills and practice. The

Observation Sheet also included Gibbs reflective cycle (219) to assist the student participant to co-construct learning goals for the Student Nutrition Service with their supervisor. In the subsequent observation task, the student participant discussed their learning with their supervisor to enable scaffolded reflection. Scaffolded reflection with the supervisor aimed to build capacity in the student participant to take small steps in achieving their learning goals through removing barriers and building confidence.

Learning goals tended to focus on communication. Small strategies were provided with the aim for student participants to learn at their own pace. This was important, as patient exposure and communication is reported to elicit anxiety amongst young healthcare students (220) and fear of the patient may develop. This fear may be led by uncertainty of the response to provide patients and unfamiliarity about the role of a student healthcare practitioner (221). Therefore, scaffolding and learning at the student participant's own pace to develop confidence and reduce anxiety is important.

At their own pace, student participants were provided the opportunity to obtain data from patient participants. This included anthropometric measures such as weight, height, waist circumference and medical tests such as measuring BP, walking distance test and administering a quality-of-life questionnaire. This clinical experience therefore aimed to provide student participant opportunities to work on their communication skills and data collection skills relevant to their future dietetic practice.

For community group-based experiences, student participants were paired with a senior student participant who led the community group session for intervention patients. The session included a 30-minute interactive presentation followed by a 2-hour cooking class. First- and second-year bachelor student participants supported the senior participant student through participating in food shopping as a team, setting up the kitchen at the community centre and assisting during the cooking session. In the community experience, the student participant also completed the Observation Sheet to later verbally reflect upon their learning experience, develop further learning goals and begin progress at the next session, if appropriate.

Food shopping as a team had the dual goal of purchasing ingredients for the class and teaching student participants to select cost effective healthy items that are suitable for the intervention patient group. Ingredients used therefore provided a model for intervention patients to choose to purchase the same items at home. Home-brand items and frozen or tinned vegetables without preservatives featured in the shopping list as the intervention patient group were generally pensioners or of low socioeconomic status. Student participants considered ingredients and nutrition information panels to select the food products.

To set up the kitchen at the community centre, the student participants were provided with a pictorial kitchen set up diagram. This diagram illustrated the set-up of each intervention patient's working area, the facilitators working area, the ingredients and utensils required (Appendix 20). At times, part of the kitchen set-up included pre-cooking activities to enable the recipes to be completed within the 3-hour session. If pre-cooking activities were listed, the student participant was responsible for conducting these activities during the education session.

This community experience aimed to provide students participant the opportunity to develop food knowledge, work on intervention patient engagement, cooking and sharing evidence-based nutrition information in layman's terms. Student participants were provided with opportunities to lead small portions of the group sessions such as a few steps in the cooking class, share an evidenced based nutrition fact and/or administer an evaluation questionnaire. Evidenced based nutrition facts were discussed with the supervisor before class for feedback and guidance. Before class during their self-scheduled preparation time, student participants could identify a nutrient fact or cooking skill to share in the cooking presentation and an engaging method to present this information to the group of patients and discussed this with their supervisor.

Once student participants began to demonstrate the beginnings of developing dietetic competencies based on the judgement and agreeance of the student participant and supervisor, the Individual Clinical Case Form or Group Education Form was provided to student participants depending on the setting. The student participant was also required to read the dietetic competencies and reflect about whether they had demonstrated these. Examples of actions that demonstrate competency were provided on the forms to guide student participants as they had not been previously been exposed to dietetic competencies within their course (Appendix 11). Student participants were informed that competency is achieved when actions consistently demonstrate competency despite different situations in patient participant interaction that the student participant is faced with (127). Student participants were encouraged to reflect upon examples of their actions that may demonstrate the development of the competencies listed. This task served as a

reflection of the student participants' thoughts but also aimed to assist student participants to become more familiar with dietetic competencies.

2.9.3 Third Year Bachelor or First Year Master Students Participant

Dietetic practice was introduced to third year bachelor students or first year masters' students in their course curriculum. Practice skills introduced include diet history taking skills, clinical reasoning skills and dietetic assessment. Student participants practiced these skills in the Student Nutrition Service, once they had completed the theory within the dietetics course curriculum. At Flinders University these skills were covered in the first semester 'The Nutrition Care Process' topic (222, 223) and the 'Communication and Nutritional Counselling' topic (224, 225). These topics provided students theoretical learning about communication and counselling skills and some exposure to patients in a clinical setting, in addition to learning related to designing and conducting a community presentation. The exposure to patients in the clinical setting associated with the course curriculum was generally unsupervised where students were free to practice their diet history skills on volunteer patients at their allocated clinical site. The students had a formative and summative assessment by the APD providing their clinical supervision in their placement to assess their diet history taking and communication skills. Therefore, these aspects of the curriculum provided a foundation for practice in the real-world setting of the Student Nutrition Service.

The Student Nutrition Service functioned as an extracurricular form of experimental learning related to dietetic practice and aimed to provide student participants a site to develop their skills through unassessed supervised practice. Student participants were provided with opportunities to lead the information gathering appointments,

mentor junior dietetic student participants and lead small group community sessions with outlines (Appendix 17), presentation slides, kitchen set up resources (Appendix 20) and supervision to guide them.

Additionally, student participants had opportunities to practice nutrition assessment skills through assessing the patient participant's dietary intake from the diet history collected compared to the Australian Guide to Healthy Eating and conducting a Foodworks (Xyris Software, v9, 2017) analysis. Dietary analyses which enabled food intake to be analysed against the Recommended Daily Intakes (RDI) and nutritional requirements based on predictive equations, aimed to assist student participants to develop their clinical reasoning required in nutrition assessment.

Student participants compared food intake against the appropriate energy, protein and fluid requirements calculated from predictive equations according to the patient participant's age and medical health. The Miller equation that is more accurate than the commonly used Schofield and Harris-Benedict equations amongst vascular surgery patients for predicting resting energy expenditure and physical activity factors was used to calculate energy requirements (226). Standard protein requirements for an adult are 0.8g/kg to 1.0g/kg of body weight while fluid requirements were calculated at 30ml/kg to35ml/kg of body weight (227). Student participants who required scaffolding or support to undertake Australian Guide to Healthy Eating (AGHE) and Foodworks analyses and calculation of nutritional requirements were directed by an experienced peer participant (either in the bachelor or masters' course) or by their supervisor.

2.9.4 Final Year Student Participants (4th Year Bachelor or 2nd Year Masters)

As a part of the course curriculum, students in final year had a full time workload consisting of pre-placement intensives, placements at different sites including hospitals and within the community, in government or private sectors as well as a research project (228, 229). Students completed placements in 3 to 4 different workplaces with the aim to demonstrate dietetic competency achievement by the end of each placement. Readiness for clinical placement has received attention (134). Some Flinders University students have expressed interest in supplementing the 6 to 14-month gap in patient exposure between 3rd year or 1st year masters and the commencement of clinical placement, with other extracurricular activities that offer patient exposure in a clinical setting.

Therefore, final year student participants were provided the opportunity to provide patient education and review appointments under supervision of an APD associated with the Student Nutrition Service. These appointments were usually held in the patient participant's home, which provided student participants exposure to an elderly population and the additional home setting that they could become familiar and confident with, whilst learning as a student dietitian.

Final year student participants were provided with all the information collected by the junior student participants as well as the dietary analyses. Student participants utilised this information to list the medical conditions that could be nutritional managed. Medical conditions were listed in order of priority, based on the patient participant's nutritional intake and status of the condition based on medical treatment and blood results. Nutritional goals based on the main nutritional concern were also listed. Possible strategies that might be suitable for the patient

participant were determined based on the patient participant's eating habits, likes and dislikes, time available, access to food and socioeconomic status. These tasks required clinical reasoning, clinical knowledge and food knowledge. These skills are typically achieved in placement along with supervision. If the participating final year student participant had not completed clinical placement, the Student Nutrition Service aimed to increase the student participant's familiarity and readiness for placement.

The supervisor provided the final year student participant scaffolded learning to enable them to conduct these tasks through scheduled meetings between the final year student participant and supervisor prior to the home visit appointment. The meeting prior to the home visit enabled final year student participants to share their plan with their supervisor, ask questions and to print written resources selected for their patient participant, if required. This also enabled the supervisor to identify the readiness of the student participant to conduct the patient education and shape the student participant's clinical reasoning.

The patient participant appointment was rescheduled if the supervisor identified that the student participant could benefit from more planning time following the student participant and supervisor meeting. An alternate time was negotiated with the patient participant that suited the patient participant, student participant and supervisor. The negotiated time fell within 1 week of the original information gathering appointment. The student participant and supervisor also co-constructed a plan for how to use the extra preparation time.

After the patient participant appointment, the student participant documented the home visit appointment utilising the SOAP (subjective, objective, assessment and plan) format (230) routinely used by clinical dietitians. Student participants also complete their reflection form. Both documents were provided to the supervisor for written feedback once complete.

Review appointments provided additional clinical complexity. Student participants were required to collect an update of the patient participant's condition and dietary intake as well as perform a dietary assessment based on the new information prior to providing education and co-construct dietary goals and strategies of relevance in the same home visit appointment. Therefore, student participants required preparation prior to the home visit.

Student participants prepared based on the nutrition areas of concern that appeared to be the priority based on potential changes in diet and possible acceptable strategies based on their knowledge of the patient participant. Preparation was based on potential changes as the student participant did not have access to the information about the patient participant that would be gathered from the patient participant at the review appointment (i.e., current diet history). Student participants met with their supervisor prior to the review appointment to discuss the potential changes and strategies to enable the supervisor to discern that the student participant was theoretically prepared for providing patient education.

Student participants were encouraged to excuse themselves from the patient consultation and seek the supervisor's confirmation or support to clarify their clinical reasoning or direction or strategies, if required. Student and supervisor

conversation during the patient consultation occurred in another area of the house and at a tone outside of the patient participant's listening range. This action aimed to enable student participants to maintain their confidence in providing correct nutritional advice to patient participants and maintain the role of leading the consultation.

2.9.5 Peer mentoring

Student participants had the opportunity to participate in peer mentoring. Student participants were paired with a student participant from their own year level of study and/or a student participant who was above or below their year level of study. When observing their peer, student participants were encouraged to reflect upon the observations and provide their peer with constructive feedback or verbalise points that they have learnt from the observation. Student participants were scaffolded to provide feedback through modelling their supervisor (126).

2.9.6 Student semi-structured interviews

Following the student participant's involvement in the Student Nutrition Service, each student participant was offered an opportunity to participate in a semi-structured interview. The interview aimed to capture the student participant's perceptions of their development of competency and professional identity as well as their evaluative perception of the Student Nutrition Service. At the end of their participation, student participants were provided with a completion certificate acknowledging the activities and hours spent in the service.

To reduce the risk of reporting bias, the semi-structured interviews were conducted by a researcher not involved in the study intervention nor a part of the Flinders University Dietetics course academic teaching staff. The researcher (M.P.) was a

dietitian with experience in qualitative methods including gathering data through interviews and focus groups. As a past graduate of the dietetics course at Flinders University, the researcher (M.P.) may have developed rapport with the student participants through association to past experience, a factor that aids in information power (231). The researcher was not a peer of the student participants.

As a past graduate (M.P.) of the Bachelor of Nutrition and Dietetics at Flinders University, the researcher (M.P.) also brought her own lens to the interview. She is passionate about ensuring students benefit from their dietetics course. As a result, M.P. has presented at couple of orientation sessions on studying tips and is engaged in mentoring students. She has research expertise in both qualitative and quantitative research, specifically in the field of nutrition in aged care.

A semi-structured interview guide was constructed and used (Appendix 21) to capture the student participants' thoughts on their perspective of learning attained and relevance to the dietetic competencies. To construct the interview guide, questions were formulated considering the research question (232). The guide began with general open questions to assist the interviewee to openly express their thoughts (232). Open primary questions of interest followed, and possible secondary specific probing questions were detailed for use if relevant to the conversation (232). The guide was tested and modified to ensure that the research questions could be answered. The consensus of three researchers – the candidate, her supervisor and the interviewer formed the final guide. The semi-structured interviews were recorded with Sony IC Recorder (IC Recorder ICD-PX440).

2.10 Role of the supervisor in the intervention

Throughout the intervention, the supervisor had the role of exposing the student participant to dietetic practice and promoting student participant learning of dietetic skills through co-construction of student participant learning goals (126). Specifically, as final year student participants created an education plan for patient participants, the supervisor ensured that the main nutritional concern for the patient participant was correctly deduced through asking the student participant questions that challenged their clinical reasoning. From the patient participant's perspective, the supervisor's role was to ensure that patient participants received appropriate nutritional care through facilitating quality student participant sessions and providing patient participants with motivational messages. Therefore, as an Accredited Practising Dietitian, the supervisor's role was to oversee all patient and student interactions within the Student Nutrition Service and ensure that appropriate care was provided to patients under the Dietitians Australian Code of Conduct and Statement of Ethics Practice (38) and ensure student participants were supported in their learning as a student dietitian.

2.11 Data Management

Paper based data were kept in a locked filing cabinet whilst electronic data were kept on a secure password locked Flinders University system. Paper based data contained identifiable participant data while electronic data contained de-identifiable data. Data will be stored for 5 years at Flinders University following the completion of the study and be destroyed confidently thereafter.

2.11.1 Patient Participant Data

If student participants required data from patient participant data packs (Appendix 13) to be taken offsite to conduct food analyses at their own pace, de-identified photocopies of the relevant pages were provided to student participants. Student participants were required to return the de-identified photocopies of the data to the researchers as soon as the analyses were complete. Analyses were completed within two working days. This process ensured that data were kept confidential and managed within the ethics agreement.

2.11.2 Focus group and semi-structured interview data

All focus groups and interviews were recorded with Sony IC Recorder (IC Recorder ICD-PX440). Recordings were sent to Pacific Transcription for transcription that were formatted for NVivo Basic (233). Transcripts received were checked against the recordings sent and uploaded to NVivo 12 (QSR International) for coding.

2.12 Data Analysis

There were four objectives of the research conducted. The research objectives included:

I. Test the effectiveness of the Student Nutrition Service intervention compared to usual care on marker of PAD.
II. Explore how the Student Nutrition Service intervention influences dietary behaviour change amongst participating intervention patients.
III. Determine the student's perspective of competency and professional identity development from participating in the Student Nutrition Service.

IV. Evaluate the process of the Student Nutrition Service from the perspective of participating patients and students.

2.12.1 First research objective: The effect of the intervention on markers of PAD

In considering the first research objective, three facets impacting disease progression were measured. These facets included (i) medical health, (ii) nutritional health and (iii) quality of life. The markers of medical health collected included medical history, ultrasound and radiology reports, medication history as well as FMD, BP and blood test results from lipid studies and inflammatory markers. Markers of nutritional health collected include weight; BMI; consumption of grains, meat, dairy, fruit and vegetables based on the AGHE serve sizes as well as blood test results of vitamin A, C, E, D, B12, folate, iron, zinc and selenium. Markers of quality of life included the EQ5D-5L questionnaire, the 6-minute walking distance and pain-free walking distance. These markers were collected at baseline and outcome enabling statistical analysis for comparison to determine if any changes in these facets that impact disease progression occurred.

A research assistant entered the data present on patient data packs, the food analyses and FMD analyses on a SPSS (IBM SPSS Version 25) data file that was pre-arranged and structured by the candidate. The data file was stored on an encrypted USB and on Flinders University secure systems. The research assistant also substituted original identifiers used in the data collection process (e.g., patient identification number) with randomisation identifiers to ensure the candidate who was involved in data collection, was blinded at the time of data analysis. Two deidentified SPSS (IBM SPSS Version 25) files were created. One contained intervention data and the other contained control data to enable quantitative

analyses. The results of the data analysis were reported to the research team before the group allocation was revealed.

EQ5D-5L questionnaire (196) data was entered into EQ-5D-5L Crosswalk Index Value Calculator (version 1.0) for SPSS data entry and analysis (234). FMD analyses were obtained from the vascular sonographer.

The candidate conducted the deidentified data analysis on SPSS (IBM SPSS Version 25). Missing data analysis was conducted to identify if any patterns of missing data existed. Greater than 15% of data were missing due to lost-of-follow up or inability to collect some data points from the patient participants. Therefore, multiple imputation was used to ensure that the data were analysed using intention-to-treat principles (235). Five imputations for each variable were processed, as default by SPSS (IBM SPSS Version 25).

The imputed dataset was used to conduct descriptive and inferential statistics. A range of statistical tests (e.g., independent sample t-tests, Mann-Whitney U tests, Chi-squared tests, related sample student t tests, Wilcoxon and Sign tests) were considered for appropriateness based on the data distributions assessing normality. Paired t-tests were appropriate for within-group analysis and independent sample t-tests were appropriate for between-group (236). The pooled data values were used to answer the research question. Statistical significance was set at $p<0.05$, as at this point the probability of incorrectly rejecting the null hypothesis is 5% and has been deemed appropriate according to common convention in biological research (237). To account for bias introduced by any participant non-compliant to the intervention (i.e., did not attend four out of six group classes and did not adhere to

personal negotiated dietary goals), a per protocol analysis was conducted.

Any clinically significant changes or optimal maintenance in markers of PAD along with no change in PAD stage or severity of symptoms observed was deemed to support the hypothesis that dietary intervention was associated with delaying PAD progression. Clinically significant changes in medical markers of PAD were considered to include any of the following: 2% change in FMD, 50mg/dl reduction in blood triglycerides, SBP reduction of 5mmHg, DBP reduction of 2mmHg, total cholesterol <4mmol/L, HDL >1mmol/L, LDL <2mmol/L and inflammatory markers within reference ranges. Vitamin and mineral markers within reference ranges, dietary changes to include more core foods from the AGHE serve analysis and any reduction in BMI or weight in patients classified as overweight or obese were considered as clinically significant changes in nutritional markers of PAD. Any statistically significant changes in EQ5D-5L Index Value or 6-minute walking distance or pain free walking distance which resulted in a lower Rutherford classification (182) was considered clinically significant.

2.12.2 Second research objective: Influences of the Student Nutrition Service on behaviour change

Patient participant perceptions of the Student Nutrition Service were collected through questionnaires conducted at baseline and outcome appointments to capture all patient participants perceptions (both the intervention and control group). The focus groups were conducted amongst groups of intervention patients. Focus group data was used to explain the patient participants' perception of the Student Nutrition Service reported through questionnaire data. The ability of the intervention to facilitate behaviour change from the patient participants'

perspective was also determined from focus group data. A knowledge quiz provided to each intervention participant at their last group class was also used to determine the knowledge obtained and if the knowledge obtained facilitated behaviour change based on focus group data.

Quiz and clinic questionnaire data were entered into SPSS for analysis. Quantitative data from the Knowledge Quiz and Questionnaires administered following the community sessions were inputted into SPSS (IBM SPSS Version 25). Qualitative data from the Patient Clinical Satisfaction Questionnaire were collated on Microsoft Office Word by a research assistant and uploaded onto NVivo for coding with focus group data. These sources of quantitative and qualitative data were triangulated against themes developed from focus group interview data. Focus group data was analysed using inductive and deductive coding (238) in NVivo based on the principles of Bandura's SCT (126) in additional to the conventions of the Braun and Clark (239) and in discussion and review from a supervisor. Inductive coding was used to capture themes related to the patient participants perceptive of behaviour change while deductive coding was used to capture themes from Bandura's SCT of factors associated with behaviour change. Braun and Clark describe six phases of thematic analysis: (i) Familiarising yourself with the data, (ii) Generating initial codes, (ii) Searching for themes, (iv) Reviewing themes, (v) Defining and naming themes, (vi) Producing the report (239).

In the initial phase of gaining familiarity with the data, the aim was to develop a familiarity with the depth and breadth of the content where repeated reading, transcription (if required) and noting initial ideas are suggested (239). To gain familiarity with the focus group data, the candidate listened to the recordings of the

focus groups, checked the transcriptions against focus group recordings and noted emerging patient participants' perceptions. Transcripts were uploaded to NVivo for coding. Each transcript was read, and data was collated systematically across the whole data set into codes that represented new ideas. To generate initial codes through the process of inductive coding, similar ideas in the data were grouped together (239). Where qualitative data represented more than one idea, the data was coded (or allocated) to both ideas. Ideas that were related were grouped together in categories. The candidate's supervisor completed independent coding of a section of the inductive analysis and reviewed the categories to establish in the coding technique. The candidate and her supervisor discussed the codes and categories until consensus was achieved. Once all qualitative data from was coded and no new ideas were found, no new codes were identified, phase 3 began.

Next themes were searched by sorting relevant codes and categories into potential themes (239). The patient participants' perspectives were considered at this stage of sorting (239). Visual representations of the patient participants' perspectives and main thoughts were created to identify relationships between themes as sub-themes and the overarching themes.

The next phase was reviewing these themes against the coded data extracts and the raw transcript data to determine if the theme was grounded in the data (239). The process of checking the themes against the entire data set assisted to determine if the themes accurately reflected the patient participant's thoughts and meanings expressed in the data as a whole (239). Once the themes were determined to accurately represent the data the next phase began to ensure that the themes are named and defined correctly to represent the data (239). Theme names were

clearly defined to ensure the interpretation of the data could be determined through the nomenclature. The results were written in relation to the research question and existing literature (239).

To conduct the deductive analysis, the candidate first obtained an understanding of Bandura's SCT (126) to develop a coding framework based personal, environmental and behaviour factors. Familiarity of Bandura's SCT was then used to generate initial codes (239). Data was coded and themed based on their relationship to behaviour, environmental, personal and self-efficacy influences described by Bandura's SCT (126). Therefore, deductive analysis identified the factors that participants perceived as influencers of their behaviour change.

2.12.3 Third objective: Student participant's perceptions of competency and professional identity development

Qualitative student participant data collected from reflection sheets, observation sheets and completion questionnaires were also collated in NVivo with semi-structure interview data for coding and triangulation. Themes that arose from inductive coding of all data sources and deductive coding against Bandura's SCT according to the conventions of Braun and Clarke (239) was undertaken by the candidate. Bandura's SCT (126) was used describe the relationship between the environment influences and personal factors that facilitated student participants to accept the role as a student dietitian, build upon their professional identity and career interests leading to dietetic behaviours.

Themes reported, consisted of the dominant overarching thoughts expressed by the student participants. Themes were revealed through the collation of codes that described the same thoughts and association between the thoughts described. This

process ensured that the themes represented the student participants' main thoughts. The reporting of themes revealed associated subthemes which were secondary thoughts associated with the dominant overarching thoughts (i.e., themes). Therefore, the findings are reported as themes and subthemes.

2.12.4 Fourth objective: A process evaluation of the Student Nutrition Service

2.12.4.1 Patients perspective

Data from the satisfaction questionnaire, questionnaires administered after each group session and focus group data were used to explore the patient participant's perspective of the Student Nutrition Service and the effectiveness of the service. Questionnaires were piloted prior to implementation. The five point Likert scale used in the questionnaire was informed by Steine and colleagues who developed a brief questionnaire to capture patient participant experiences from physician consultations (240). The questionnaires were also informed by a pilot study (202).

To obtain the patient participants thoughts of the Student Nutrition Service, the focus group results were based on the process of inductive coding by the candidate through the conventions of Braun and Clarke (239) described. This method of coding, the focus group design and focus group facilitation by an external researcher enabled the themes to be developed based on the patient participant's thoughts and without a lens of preconceived ideas or a framework. Therefore, this method, reduced reporting bias.

Questionnaire data were triangulated with focus group data to describe the patient participant's perspective and to obtain an understanding of the patient participant perspective. The candidate conducted the coding with support, discussion and review by a supervising researcher. The discussion included the coding process and

a review of the data presented to build consensus on the final themes produced from the data.

2.12.4.2 Students participant perspective

Quantitative data from completion evaluation questionnaires were inputted into an SPSS (IBM SPSS Version 25) data file. Qualitative data from reflection/feedback forms, observational forms and completion evaluation questionnaire were collated on Microsoft Office Word Documents by a research assistant for uploading on to NVivo for coding. Data from forms, questionnaires and semi-structured interviews were inductively coded to determine the student participant's perspective of Student Nutrition Service. Similarly, coding and theming was conducted in discussion with a supervising researcher.

2.12.4.3 Mutual perspectives between the patient and student participants

Themes from patient and student participant data were compared to identify any similarities or differences in perspective in relation to Bandura's SCT. Exploring the perspectives of patient participants, student participants and mutual perspectives between both participant groups, aims to identify processes in the Student Nutrition Service to maintain and processes that should be altered to provide a patient and student-centred service.

2.13 Interpretation

To answer the research question; 'What is the effect of the Student Nutrition Service for patients with PAD designed based on Bandura's SCT on objective patient outcomes and from the perspectives of patients and students?', the perspectives of patients and student participants (findings from objective 2 to 4) will be used to

explain the patient outcomes (findings from objective 1). The findings of each research objective will be presented in the next chapter. Chapter 4 will discuss the findings from each research objective and answer the research question through describing whether the Student Nutrition Service is effective or not based on the findings from this thesis (241).

CHAPTER 3: RESULTS

This chapter describes the results from the Student Nutrition Service intervention. Firstly, the result of recruitment and retention are reported followed by a description of the participants' characteristics. Secondly, the results gathered to meet each research objectives are reported sequentially.

3.1 Patient Participant Flow

Over the 14-month recruitment period, 136 patients from FMC and Marion GP Plus were eligible for recruitment. The eligible patients identified, provided a monthly average of 10 patients and weekly average of 3 patients. Of the 136 patients identified, 69 or 51% consented whilst 67 or 49% declined. Common reasons for declining participation included, (i) lack of time due to work or other medical appointments particularly amongst renal patients, (ii) Flinders (the tertiary hospital) and Woodcroft (the site of the cooking classes) were too far to regularly visit, (iii) had caravanning plans during the intervention times or (iv) not interested in the intervention. Following consent 27 out of 69 patients did not attend their baseline appointment and subsequently withdrew before participating.

A total of thirty-six participants completed the study either in the control or the intervention group. After the baseline appointment and participants had been randomised, five participants randomised to the control group were no longer contactable and therefore could not be followed up. After the completion of the individualised education appointment, one participant randomised to the intervention group decided to withdraw. Therefore, the attrition rate was 14%. See Figure 14 for a summary of the patient participant flow within the study.

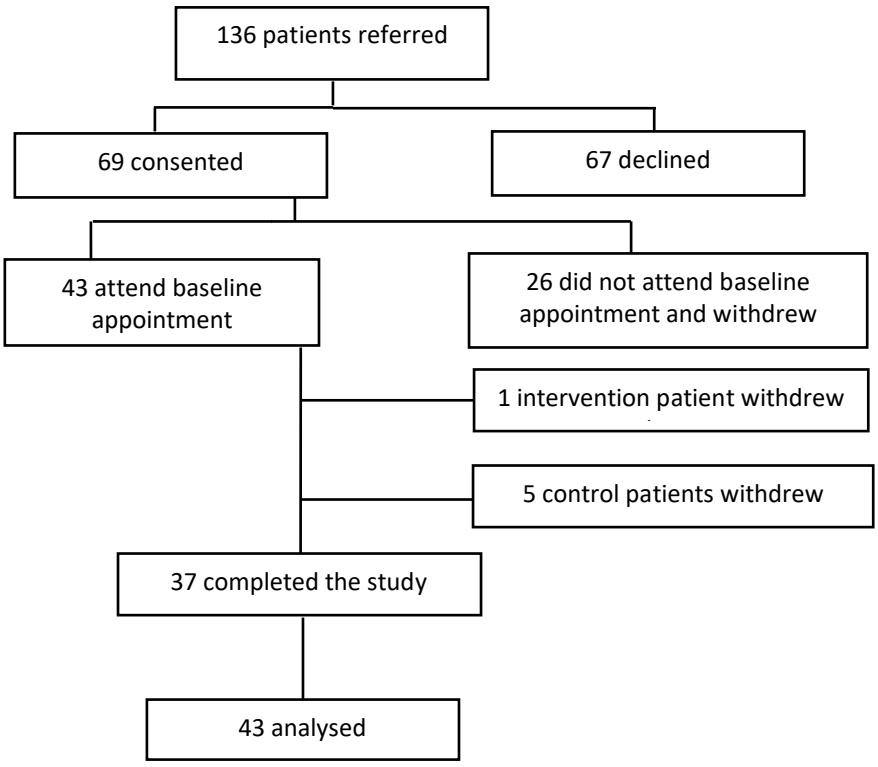

Figure 14: Patient Participant Action Summary

3.2 Student Participant Flow

In the first year of recruitment, 116 dietetic students (the entire dietetic student cohort) were sent to invited to participate. In the subsequent year, emails were sent to the entire final year cohort (59 students) and entire 3rd year bachelor of 1st year masters students (59 students). The student recruitment activities led 84 students to express interest. Overall, 56 of the 84 interested students did not consent either due to (i) unavailability on the intervention dates, (ii) not meeting the SA Health pre-placement requirements, (iii) did not responding when followed up by the research team or (iv) the intervention was not scheduled at the time that their interest was expressed. Twenty-eight students consented to participate. Following consent and allocation of patients, 5 student participants withdrew. All five students were final year students who could no longer commit to the intervention time and dates. Two students specified reasons. One reason was a change in the

date of an assessed placement for their dietetics course and the other was due to a medical procedure coinciding with the intervention. Twenty-three student participants completed the intervention. Therefore, the student attrition rate was 18%. See Figure 15 for a summary of the student participant flow throughout the study.

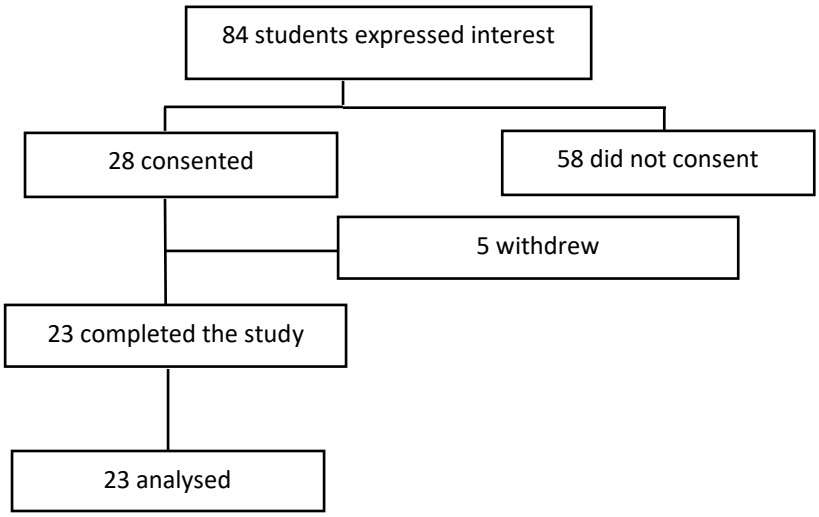

Figure 15: Student Participant Flow Summary

3.3 Participant Characteristics

Forty-three patient participants who attended the baseline appointment were randomised to the control and intervention groups. Twenty-two were allocated control and twenty-one were allocated intervention.

At baseline the participant's gender, age, living situation, employment status, smoking status, medication use, and physical activity frequency did not differ between the groups (Table 12). Generally, participants were males over the age of 65 years with CVD risk factors such as high cholesterol, hypertension and diabetes who were retired, lived at home, and undertook short bouts of physical activity each day. More than half of the participants (23 out of 43 participants) also had a

family history of CVD, where an immediate family member had died due to a cardiovascular event (mainly heart attack or stroke). The profile of medical conditions across both groups were also similar. The main difference across the groups was the types of medical conditions that patient participants had. The intervention group had more patient participants with ischemic heart disease or coronary heart disease while the control group contained more patient participants with liver disease (Table 12).

Table 12: Study characteristics of participants in randomised controlled trial

	Control (n=22)	**Intervention (n=21)**	**Between groups p-value**
Social characteristics			
Gender – Female (n)	8	7	0.84
Gender – Male (n)	14	14	
Mean age ± SD in years	67.6±9.7	68.7±10.1	0.47
Living situation			
- Home alone (n)	11	6	0.16
- Home with others (n)	11	15	
Employment status			
- Unemployed (n)	4	2	0.60
- Employed (n)	3	4	
- Retired (n)	15	15	
Current smoker	17	18	0.49
Physical activity characteristics			
Days per week that physical activity was undertaken			0.75
0 to 2 days per week	8	8	
3 to 4 days per week	4	2	
>5 days per week	9	11	
Minutes of physical activity undertaken per week			
<150mins (≤2.5hrs)	13	13	

150-300mins (2.5-5hrs)	5	4	0.84
> 300mins (≥5 hrs)	3	4	
PAD Rutherford Category			
Category 0 Asymptomatic	3	0	
Category 1 Mild claudication	7	11	
Category 2 Moderate claudication	4	3	
Category 3 Severe claudication	1	2	0.61
Category 4 Ischemic rest pain	6	5	
Category 5 Minor tissue loss	0	0	
Category 6 Major tissue loss	1	0	
Medical conditions			
Hyperlipidaemia	15	19	0.075
Hypertension	13	16	0.242
Diabetes	14	10	0.302
Ischemic Heart Disease/Coronary Artery Disease	2	**9**	**0.010**
Chronic Heart Failure	1	0	0.335
Arrythmias	4	2	0.425
Coronary Heart Disease	0	0	Not significant
Family history of CVD	10	13	0.291
Renal disease	2	2	0.962
Liver disease	**4**	0	**0.041**
Transient ischemic attack	2	2	0.962
Stroke	5	1	0.093
Deep vein thrombosis	3	3	0.952
Cancer	5	2	0.251
Medications			
Hyperlipidaemic agent	21	21	0.335
Anti-hypertensive agent	14	15	0.596
Anti-arrhythmic agent	1	0	0.335
Oral hyperglycaemic agents	10	6	0.263
Diuretics	4	2	0.425
Antibiotics	1	1	0.974
Anti-thrombotic agent	20	16	0.200
Insulin	3	3	0.952

3.4 Student Characteristics

Twenty-three students participated in the intervention. Two out of 23 students participated in two different patient participant intervention groups over the two consecutive years that the Student Nutrition Service intervention occurred. For

example, one student was a first year in a patient participant intervention group in 2018 and a second-year student in a subsequent patient participant intervention group in 2019. The other student was a third-year student in a patient participant intervention group in 2018 and a final year student in subsequent patient participant intervention group in 2019.

Student participants were generally domestic female students who began university immediately after high school or had a one-year break before beginning university. Most students were final year dietetic students who participated in the Student Nutrition Service prior to their final year clinical placement. Almost half of the student participants (10 out of 23) were also undertaking a form of paid work during their participation.

Table 13: **Student participant characteristics**

Student characteristic	N or Mean
Gender	
– Male (n)	2
- Female (n)	19
Age (Mean)	25
Domestic student (n)	14
International student (n)	7
First exposure to patients prior to placement (n)	20
Currently also working (n)	10
Year level of study	
- BND Year 1	1
- BND Year 2	2
- BND Year 3	8
- BND Year 4	7
- MND Year 1	1
- MND Year 2	5
- Straddling years*	1

*Conducting topics from the current and the previous year due to failing one or two topics from the previous year.

3.5 Research Objective 1: Effect of the Student Nutrition Service intervention compared to usual care on markers of PAD

This section describes the effect of the Student Nutrition Service on objective patients' outcomes based on changes to the patients' vascular health, nutritional health, and quality of life. Data from intervention patients are compared to control patients. A total of 22 control patients and 21 intervention patients participated and were included in the intention-to-treat analyses. One intervention patient was not compliant to the intervention (i.e., did not attend four out of six group classes and did not adhere to personal negotiated dietary goals). Compliance to the intervention is required to measure the effect of the intervention and therefore 22 control patients and 20 intervention patients were included in the per-protocol analyses. Whilst both intention-to-treat analyses and per protocol analyses are presented in the following tables, both analyses yielded similar results.

3.5.1 Vascular health

From the vascular health markers measured, intention-to-treat analysis revealed statistically and clinically significant changes in SBP and total cholesterol. Within group mean reductions of SBP ranged from 7 to 11mHg in the intervention and control group (Table 14 and Table 15). These changes were both clinically (≥5mmHg) and statistically significant ($p<0.05$). Amongst the control group, a clinically (≥2mmHg) and statistically significant reduction in DBP were observed. The change in DBP in the intervention group was not clinically nor statistically meaningful (Table 14). A statistically significant reduction in total cholesterol was observed in the intervention group and not in the control group (Table 14 and Table 15). The per-protocol analysis demonstrates a slight reduction in HDL and LDL that

may have resulted in reduction in total cholesterol.

Insignificant fluctuations were mainly seen within the control group and between both groups. For example, FMD increased amongst both groups compared to baseline, however the time taken to achieve maximum dilation did not differ significantly from baseline as the time differed by 2 to 7 seconds. All between group changes in vascular health markers were not statistically or clinically significant (Table 14 and 15). Fluctuations in the level of inflammatory markers present were within the reference ranges demonstrating a consistent inflammatory state amongst participants during the intervention period (Table 14 and 15).

Table 14: **Changes in cardiovascular markers associated with vascular health (Intention-to-treat analysis)**

Cardiovascular marker	**Control (n=22)**	**Within group[a]**	**Intervention (n=21)**	**Within group[a]**	**Between group[b]**
Blood pressure	Mean±SD	p-value	p-value	p-value	p-value
Systolic blood pressure (mmHg)					
- Baseline	148±23	<0.05	151±16	<0.05	0.673
- 12 weeks	137±16	<0.05	138±18	<0.05	0.804
- Change	7±17	<0.05	11±17	<0.05	0.409
Diastolic blood pressure (mmHg)					
- Baseline	77±9	<0.05	74±11	<0.05	0.372
- 12 weeks	74±7	<0.05	73±10	<0.05	0.641
- Change	3±7	<0.05	1±8	0.09	0.583
Vascular function	Mean±SEM		Mean±SEM		p-value
FMD (%)					
- Baseline	1.65±0.62		2.83±0.65		0.189
- 12 weeks	3.31±0.58		3.50±0.60		0.814
Time to max dilation (secs)					
- Baseline	64±5		58±4		0.280
- 12 weeks	62±4		66±5		0.604
Lipid profile	Mean±SD	p-value	p-value		p-value
Total cholesterol [c]					
- Baseline	4.0±0.2		4.5±0.3		0.11
- 12 weeks	4.0±0.2	0.88	3.9±0.7	**0.03**	0.79

HDL cholesterol [c]					
- Baseline	1.3±0.8		1.3±0.8		0.94
- 12 weeks	1.2±0.1	0.61	1.2±0.1	0.31	0.77
LDL cholesterol [c]					
- Baseline	1.9±0.1		2.2±0.2		0.15
- 12 weeks	1.8±0.2	0.75	2.0±0.2	0.23	0.63
Triglycerides [c]					
- Baseline	1.8±0.2		2.1±0.3		0.46
- 12 weeks	1.8±0.2	0.95	2.0±0.3	0.70	0.63
Inflammatory markers	Mean±SD	p-value	p-value	p-value	p-value
Neutrophils [d]					
- Baseline	5.5±0.4		4.9±0.5		0.36
- 12 weeks	4.8±0.4	0.11	5.3±0.5	0.12	0.42
Lymphocytes [d]					
- Baseline	1.9±0.2		1.8±0.1		0.57
- 12 weeks	1.9±0.2	0.91	1.7±0.2	0.63	0.52
Monocytes [d]					
- Baseline	0.6±0.03		0.6±0.5		0.81
- 12 weeks	0.6±0.04	0.54	0.7±0.1	0.14	**0.05**
Eosinophils					
- Baseline	0.2±0.03		0.3±0.1		0.78
- 12 weeks	0.2±0.05	0.68	0.3±0.1	0.84	0.50
Basophils [d]					
- Baseline	0.1±0.004		0.1±0.0		0.63
- 12 weeks	0.1±0.008	0.78	0.1±0.0	0.99	0.63
White blood cells [d]					
- Baseline	8.3±0.5		14.6±7.0		0.36
- 12 weeks	8.0±0.4	**0.05**	8.1±0.5	0.35	0.42
hs-CRP [d]					
- Baseline	4.7±1.2		5.8±1.3		0.53
- 12 weeks	2.7±0.6	0.09	4.2±0.8	0.22	0.13

[a] Paired – t-tests where $p<0.05$ is statistically significant.

[b] Independent sample t-tests where $p<0.05$ is statistically significant.

[c] Reference ranges for lipid studies: Total cholesterol≤4mmol/L; HDL cholesterol >1mmol/L; LDL cholesterol≤2mmol/L, Triglycerides ≤2mmol/L.

[d] Reference ranges for inflammatory markers: Neutrophils (1.8-7.5 x 10^9/L); Lymphocytes (1.5-3.5 x 10^9/L); Monocytes (0.2-0.8 x 10^9/L); Eosinophils (0.02-0.5 x 10^9/L); White blood cells (4-11 x 10^9/L); hs-CRP≤8mg/L

Table 15: **Changes in cardiovascular markers associated with vascular health (per protocol analysis)**

Cardiovascular marker	**Control (n=22)**	**Within group**[a]	**Intervention (n=20)**	**Within group**[a]	**Between group**[b]
Blood pressure	Mean±SD	p-value	Mean±SD	p-value	p-value
Systolic blood pressure (mmHg)					
- Baseline	148±23		151±16		0.60
- 12 weeks	137±16		138±18		0.77
- Change	7±17	0.02	11±17	**0.002**	0.40
Diastolic blood pressure (mmHg)					
- Baseline	77±9		74±11		0.38
- 12 weeks	74±7		73±10		0.70
- Change	3±7	0.10	1±8	0.38	0.57
Vascular function	Mean±SEM	p-value	Mean±SEM	p-value	p-value
FMD (%)					
- Baseline	1.65±0.62		2.99±0.65		0.13
- 12 weeks	3.31±0.58	0.01	3.75±0.54	0.280	0.40
Time to max dilation (secs)					
- Baseline	64±5		58±4		0.33
- 12 weeks	62±4	0.70	67±5	0.04	0.52
Lipid profile	Mean±SD	p-value	Mean±SD	p-value	p-value
Total cholesterol [c]					
- Baseline	4.0±0.2		4.4±0.3		0.14
- 12 weeks	4.0±0.2	0.88	3.8±0.1	**0.01**	0.40
HDL cholesterol [c]					
- Baseline	1.3±0.8		1.3±0.7		0.77
- 12 weeks	1.2±0.1	0.61	1.2±0.1	0.15	0.63
LDL cholesterol [c]					
- Baseline	1.9±0.1		2.2±0.2		0.21
- 12 weeks	1.8±0.2	0.75	2.1±0.2	0.46	0.27
Triglycerides [c]					
- Baseline	1.8±0.2		2.1±0.3		0.48
- 12 weeks	1.8±0.2	0.95	2.1±0.3	0.94	0.48
Inflammatory markers	Mean±SD	p-value	Mean±SD	p-value	p-value
Neutrophils [d]					
- Baseline	5.5±0.4		5.1±0.5		0.49
- 12 weeks	4.8±0.4	0.11	5.4±0.5	0.16	0.35
Lymphocytes [d]					
- Baseline	1.9±0.2		1.8±0.1		0.57
- 12 weeks	1.9±0.2	0.91	1.7±0.2	0.64	0.39
Monocytes [d]					
- Baseline	0.6±0.03		0.6±0.5		0.60
- 12 weeks	0.6±0.04	0.54	0.7±0.1	0.04	**0.19**

Eosinophils [d]					
- Baseline	0.2±0.03		0.3±0.1		0.65
- 12 weeks	0.2±0.05	0.68	0.3±0.1	0.85	0.72
Basophils					
- Baseline	0.1±0.004		0.1±0.0		0.57
- 12 weeks	0.1±0.008	0.78	0.1±0.0	0.93	0.38
White blood cells [d]					
- Baseline	8.3±0.5		15.1±7.0		0.33
- 12 weeks	8.0±0.4	**0.05**	8.1±0.5	0.34	0.48
hs-CRP [d]					
- Baseline	4.7±1.2		6.1±1.3		0.41
- 12 weeks	2.7±0.6	0.09	4.7±0.9	0.23	0.15

[a] Paired – t-tests where $p<0.05$ is statistically significant

[b] Independent sample t-tests where $p<0.05$ is statistically significant

[c] Reference ranges for lipid studies: Total cholesterol≤4mmol/L; HDL cholesterol >1mmol/L; LDL cholesterol≤2mmol/L, Triglycerides ≤2mmol/L.

[d] Reference ranges for inflammatory markers: Neutrophils (1.8-7.5 x 10^9/L); Lymphocytes (1.5-3.5 x 10^9/L); Monocytes (0.2-0.8 x 10^9/L); Eosinophils (0.02-0.5 x 10^9/L); White blood cells (4-11 x 10^9/L); hs-CRP≤8mg/L

3.5.2 Nutritional health

Amongst the nutritional health markers measured, there were no significant differences in anthropometric measures and blood markers observed. Weight, BMI and waist circumference were not clinically or statistically significantly different between the intervention and control group. Two participants allocated to the control group were not able to be weighted on standing scales but reported no weight change or changes in nutritional status over the intervention period. On average, participants had a clinically acceptable blood level of vitamins and minerals. Clinically insignificant changes within the reference ranges were observed. Although some changes were statistically significant (e.g., vitamin E and C) (Table 16 and Table 17), this was not clinically significant.

Food intake measures demonstrated dietary changes within both the intervention and control groups (Table 16 and 17). The intervention group increased their

consumption of vegetable, fruit, meat, and dairy serves whilst decreasing their discretionary and grain serves. These changes amongst the intervention group were statistically significant and on average brought the intervention group closer to the food serve guidelines provided by the Australian Guide to Health Eating (AGHE) (4). The mean serves of discretionary food consumed amongst the intervention group reached the guideline of 0 to 2.5 serves per day (Table 16 and Table 17) (4). The control group also increased the serves of vegetables; grains and dairy consumed and reduced the serves of discretionary serves consumed. Dietary changes within the control group were not statistically significant and did not meet the AGHE food serve guidelines (Table 16 and Table 17).

Table 16: **Change in nutritional health markers in PAD patients post intervention (intention to treat analysis)**

Nutritional health marker	**Control (n=22)**	**Within group**[a]	**Intervention (n=21)**	**Within group**[a]	**Between group**[b]
Anthropometry	Mean±SD	p-value	Mean±SD	p-value	p-value
Weight (kg)					
- Baseline	88.3±4.4		83.8±4.0		0.45
- 12 weeks	85.2±3.0	0.34	83.9±3.6	0.97	0.78
BMI (kg/m^2)					
- Baseline	29.5±1.1		29.8±1.1		0.85
- 12 weeks	28.2±0.9	0.17	29.5±1.0	0.63	0.47
Waist Circumference (cm)					
- Baseline	105.3±3.3		102.8±3.7		0.61
- 12 weeks	102.3±2.8	0.24	104.7±2.8	0.40	0.54
Blood profile	Mean±SD	p-value	Mean±SD	p-value	p-value
Vitamin A [c]					
- Baseline	2.2±0.2		2.37±0.18		0.52
- 12 weeks	2.2±0.2	0.94	2.39±0.17	0.91	0.53
Vitamin D [c]					
- Baseline	73.8±6.3		75.1±5.6		0.89
- 12 weeks	70.7±6.2	0.27	70.6±5.7	0.46	0.99
Vitamin E [c]					
- Baseline	29.8±2.4		38.5±3.5		**0.04**
- 12 weeks	30.8±1.3	0.66	35.8±2.9	0.37	0.12

Vitamin C [c]					
- Baseline	28.3±4.5		44.1±6.1		**0.04**
- 12 weeks	26.2±5.6	0.56	34.4±4.3	0.08	0.25
Folate [c]					
- Baseline	32.6±2.1		30.3±2.5		0.46
- 12 weeks	25.3±2.0	**<0.01**	28.2±2.2	0.34	0.33
Vitamin B12 [c]					
- Baseline	451.1±56.6		360.9±29.1		0.16
- 12 weeks	436.6±49.6	0.76	377.1±60.5	0.78	0.45
Iron [c]					
- Baseline	12.8±0.9		15.4±1.1		0.07
- 12 weeks	14.6±0.7	0.25	14.8±1.1	0.57	0.55
Zinc [c]					
- Baseline	12.6±0.5		12.9±0.7		0.78
- 12weeks	11.7±0.4	**0.05**	12.6±0.4	0.73	0.09
Selenium [c]					
- Baseline	1.3±0.1		1.3±0.1		0.86
- 12 weeks	1.3±0.1	0.60	1.3±0.1	0.31	0.70
Dietary intake	Mean±SD	p-value	Mean±SD	p-value	p-value
Vegetable serves					
- Baseline	2.5±1.3		3.1±1.8		0.17
- 12 weeks	3.2±1.4	0.08	3.8±3.2	0.21	0.37
Fruit serves					
- Baseline	1.4±1.4		0.9±0.7		0.12
- 12 weeks	1.4±1.9	0.92	1.5±1.0	**0.03**	0.90
Grain serves					
- Baseline	3.0±1.4		4.6±3.4		0.02
- 12 weeks	3.4±1.9	0.21	3.8±1.4	**0.01**	0.43
Meat serves					
- Baseline	2.5±1.4		2.2±1.1		0.41
- 12 weeks	2.2±1.4	0.33	2.7±2.5	**0.01**	0.34
Dairy serves					
- Baseline	1.7±1.9		1.3±1.4		0.44
- 12 weeks	1.8±2.4	0.73	1.8±1.1	**0.01**	0.99
Discretionary serves					
- Baseline	4.8±4.2		4.4±3.2		0.78
- 12 weeks	3.2±3.3	0.18	2.4±1.8	**0.01**	0.22

[a] Paired – t-tests where $p<0.05$ is statistically significant

[b] Independent sample t-tests where $p<0.05$ is statistically significant

[c] Reference range for vitamin and minerals:

Table 17: Change in nutritional health markers in PAD patients post intervention (per protocol analysis)

Nutritional health marker	**Control (n=22)**	**Within group**[a]	**Intervention (n=20)**	**Within group**[a]	**Between group**[b]
Anthropometry	Mean±SD	p-value	Mean±SD	p-value	p-value
Weight (kg)					
- Baseline	88.3±4.4		85.4±4.0		0.64
- 12 weeks	85.2±3.0	0.34	85.5±3.6	0.98	0.97
BMI (kg/m^2)					
- Baseline	29.5±1.1		29.8±1.1		0.85
- 12 weeks	28.2±0.9	0.17	29.8±1.0	0.92	0.49
Waist Circumference (cm)					
- Baseline	105.3±3.3		103.7±3.7		0.69
- 12 weeks	102.3±2.8	0.24	105.8±2.7	0.37	0.45
Blood profile	Mean±SD		Mean±SD		
Vitamin A					
- Baseline	2.2±0.2		2.32±0.18		0.68
- 12 weeks	2.2±0.2	0.94	2.40±0.18	0.63	0.60
Vitamin D					
- Baseline	73.8±6.3		72.4±5.2		0.89
- 12 weeks	70.7±6.2	0.27	69.3±5.9	0.62	0.84
Vitamin E					
- Baseline	29.8±2.4		38.4±3.6		**0.05**
- 12 weeks	30.8±1.3	0.66	36.3±3.1	0.52	0.09
Vitamin C					
- Baseline	28.3±4.5		42.6±6.1		0.07
- 12 weeks	26.2±5.6	0.56	33.0±4.0	0.09	0.33
Folate					
- Baseline	32.6±2.1		29.5±2.4		0.33
- 12 weeks	25.3±2.0	**<0.01**	27.5±2.1	0.38	0.50
Vitamin B12					
- Baseline	451.1±56.6		360.1±30.6		0.17
- 12 weeks	436.6±49.6	0.76	313.2±26.0	0.05	0.06
Iron					
- Baseline	12.8±0.9		15.6±1.2		0.05
- 12 weeks	14.6±0.7	0.25	14.9±1.1	0.55	0.44
Zinc					
- Baseline	12.6±0.5		12.9±0.7		0.74
- 12weeks	11.7±0.4	**0.05**	12.6±0.4	0.70	0.07
Selenium					
- Baseline	1.3±0.1		1.3±0.1		0.92
- 12 weeks	1.3±0.1	0.60	1.4±0.1	0.20	0.57
Dietary intake	Mean±SD	p-value	Mean±SD	p-value	p-value
Vegetable serves					
- Baseline	2.5±1.3		3.0±1.8		0.26
- 12 weeks	3.2±1.4	0.08	3.8±3.2	0.17	0.28

Fruit serves					
- Baseline	1.4±1.4		0.9±0.7		0.13
- 12 weeks	1.4±1.9	0.92	1.4±0.9	**0.03**	0.61
Grain serves					
- Baseline	3.0±1.4		4.7±3.6		0.03
- 12 weeks	3.4±1.9	0.21	3.9±1.3	0.33	0.24
Meat serves					
- Baseline	2.5±1.4		2.2±1.1		0.49
- 12 weeks	2.2±1.4	0.33	2.7±2.5	0.35	0.45
Dairy serves					
- Baseline	1.7±1.9		1.4±1.3		0.48
- 12 weeks	1.8±2.4	0.73	1.8±1.1	0.25	0.95
Discretionary serves					
- Baseline	4.8±4.2		4.2±3.1		0.66
- 12 weeks	3.2±3.3	0.18	2.2±1.8	**0.02**	0.25

[a] Paired – t-tests where $p<0.05$ is statistically significant

[b] Independent sample t-tests where $p<0.05$ is statistically significant

3.5.3 Quality of life

Markers of quality of life (i.e., 6-minute walking distance, pain free walking distance, EQ5D-5L questionnaire) were not statistically or clinically significant between groups. A statistically significant within group improvement in 6-minute walking distance was observed amongst the control group yet improvement in pain-free walking distance and quality of life on a scale of 0 to 100 (i.e., EQ-VAS within the EQ5D-5L questionnaire) was not statistically significant. Overall quality of life index (i.e., EQ5D index within the EQ5D-5L questionnaire) decreased from baseline amongst the control group but baseline and outcome were similar**.**

Table 18: Change in quality-of-life markers post intervention (intention-to-treat analysis)

Quality of life marker	Control (n=22)	Within group p-value[a]	Intervention (n=20)	Within group p-value[a]	Between group p-value[b]
Pain-free walking distance					
- Baseline	275.3±24.4		299.8±21.5		0.45
- 12 weeks	298.6±21.8	0.38	296.4±23.7	0.876	0.95
6-minute walking distance					
- Baseline	306.9±21.0		337.3±14.5		0.24
- 12 weeks	338.7±16.2	**0.05**	336.0±15.6	0.898	0.90
EQ-VAS					
- Baseline	69.1±4.2		72.1±4.2		0.62
- 12 weeks	73.1±2.9	0.18	75.2±3.4	0.422	0.64
EQ5D-5L					
- Baseline	0.751		0.769		0.68
- 12 weeks	0.693	0.16	0.799	0.30	0.18

[a] Paired – t-tests where p<0.05 is statistically significant

[b] Independent sample t-tests where p<0.05 is statistically significant

Table 19: **Change in quality-of-life markers post intervention (per protocol analysis)**

Quality of life marker	Control (n=22)	Within group p-value[a]	Intervention (n=20)	Within group p-value[a]	Between group p-value[b]
Pain-free walking distance					
- Baseline	275.3±109.1		303.0±100.2		0.43
- 12 weeks	298.6±97.5	0.38	302.2±104.7	0.97	0.95
6-minute walking distance					
- Baseline	306.9±93.9		336.8±67.1		0.27
- 12 weeks	338.7±72.5	**0.05**	332.2±71.6	0.65	0.85
EQ-VAS					
- Baseline	69.1±18.8		72.0±19.7		0.67
- 12 weeks	73.1±13.0	0.18	76.6±14.8	0.19	0.51
EQ-5D-5L Index					
- Baseline	0.751		0.782		0.47
- 12 weeks	0.693	0.16	0.811	0.32	0.15

[a] Paired – t-tests where p<0.05 is statistically significant

[b] Independent sample t-tests where p<0.05 is statistically significant

3.5.4 Effect of Student Nutrition Service on Patient Outcomes: Key Findings

- No between group differences were observed.
- Positive dietary changes were observed amongst intervention patients particularly a reduction in discretionary foods that met the AGHE guidelines.
- Dietary changes amongst the intervention patients resulted in statistically significant within group reductions in SBP and total cholesterol, thereby reducing CVD risk.
- Participation in the study appeared to lead to a change in eating habits amongst both control and intervention patients.

3.6 Research Objective 2: Explore how the Student Nutrition Service intervention influences dietary behaviour change for intervention patients

This section presents the patients' perceptions of factors that facilitated dietary change. Quantitative data collected from the Satisfaction Questionnaire; Knowledge Quiz are presented first. Qualitative data from the Satisfaction Questionnaire and focus groups are then presented as themes and subthemes. Themes and subthemes are based on factors that facilitated dietary behaviour change from of deductive analysis from the framework derived from Bandura's SCT (126).

3.6.1 Satisfaction Questionnaire

One question in the questionnaire assessed the intervention patients' level of confidence to make dietary changes following the education and review appointments. Based on Bandura's SCT (126), confidence is part of developing self-

efficacy that is required for behaviour change where the development of confidence can depend on environmental, personal and behaviour factors. Therefore, this question can help identify if confidence was a facilitator of dietary behaviour change from the Student Nutrition Service intervention.

Eighteen patient participants completed the clinics questionnaire (10 at the education appointment and 8 at the review appointment). Most patients (9 out of 10 at the education appointment and 8 out of 8 at the review appointment) reported confidence to make dietary changes after the education and review appointments (Table 20 and 21).

Table 20: **Education appointment**

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel confident to go home and make changes to my diet	0	0	1	5	4

Table 21: **Review appointment**

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel confident to go home and make changes to my diet	0	0	0	5	3

3.6.2 Knowledge Quiz

At the end of the small group community sessions, intervention patients completed a 'Knowledge Quiz'. Based on Bandura's SCT (126), providing nutritional knowledge and a place to enact the desired behaviour in the Student Nutrition Service, was hypothesised to assist cognitive development (i.e., knowledge) that would facilitate dietary behaviour change. Therefore, the effectiveness of nutrition knowledge

provision to facilitate behaviour change was evaluated by the Knowledge Quiz and focus groups.

Thirteen patient participants completed the quiz. Intervention patients correctly answered 48 to 87% of the questions and achieved a mean score of 69% (SD 13), passing the Knowledge Quiz. Overall, all patient participants demonstrated knowledge of high fibre sources such as oats, baked beans, and nuts. Two out of 13 patient participants incorrectly identified cornflakes as a high fibre option and three out of thirteen were 'not sure'. Similarly, most patient participants (11 out of 13 patient participants) demonstrated knowledge of the role of antioxidants. Four out of thirteen patient participants incorrectly identified the role of antioxidants as being able to 'raise the good cholesterol' but through selecting a positive answer, these patient participants demonstrated knowledge that antioxidants are beneficial.

The main reason patient participants lost points through question 7, 8 and 9 of the Knowledge Quiz was from not identifying all foods from the list that were high in antioxidants and all alternate names for fat and sugar. Patient participants demonstrated knowledge of the AGHE recommendations, food sources that are high in fibre, antioxidants, saturated fat and omega-3 fatty acids on the Knowledge Quiz. Knowledge of strategies to reduce bad fats in foods and good fats compared to bad fats were also demonstrated by patients but they may not have learnt every source of fat or sugar or answered every question.

3.6.3 Focus group

Some questions and prompts within the focus group guide aimed to determine new dietary behaviours amongst intervention patients and facilitators of dietary behaviour change. This section firstly presents the dietary behaviours reported by

intervention patients. Secondly, the main factors that facilitated dietary behaviour change based on environmental, cognitive and behavioural influences within the intervention reported by patient participants are presented are themes and subthemes to answer the question: how does the intervention facilitate dietary behaviour change?

3.6.3.1 New dietary behaviours

The dietary changes observed from the first research objective, were supported by codes identified in the focus group data. Intervention patients reported new behaviours such as a change in their attitude towards food and cooking as well as a change in the type of food purchased and consumed. Label reading skills that patient participants learned during a group session were reported to influence their choice of packaged food purchased. This new behaviour demonstrating how awareness motivates action. The focus group data supported food intake data collected from diet histories which identified a lower consumption of discretionary foods that are high in salt, fat and sugar, and a higher consumption of core nutritious foods.

Patient #1: I was a big bacon eater, so I cut back to a reasonable amount. I cut back on butter, which I love. Got on to the plant sterol stuff, stayed on that."- 73-year-old male, married, wife food preparer.

Patient #2: "I used to eat a lot of dark chocolate with almond and dark chocolate. I used to love that…, but now I can have one bar of chocolate, just the normal size, 350 grams, that will last me two weeks." – 48-year-old male, single, food preparer.

3.6.3.2 Facilitators of dietary behaviour

The main facilitators of dietary behaviour reported by intervention patients, aligned with the triadic domains of Bandura's SCT (126) are summarised in Figure 16. The interaction between these facilitators is presented as themes and subthemes (Table 22). Themes represented the main environmental, personal and behavioural facilitators reported by intervention patients. Subthemes further explain the core factors within the environmental or cognitive or behavioural facilitators that were important to the patient participant to encourage behaviour change.

Intervention participants reported that the individualised nature of the program across its components facilitated behaviour changes and motivated them to share their learning with family and friends. Additionally, setting realistic achievable goals was perceived as a facilitator to continual self-directed dietary change. Intervention patients also reported an increased awareness and knowledge of food that changed their perception of food as a core facilitator of dietary change. They perceived that structural components including scaffolding, perceived outcomes and holistic care.

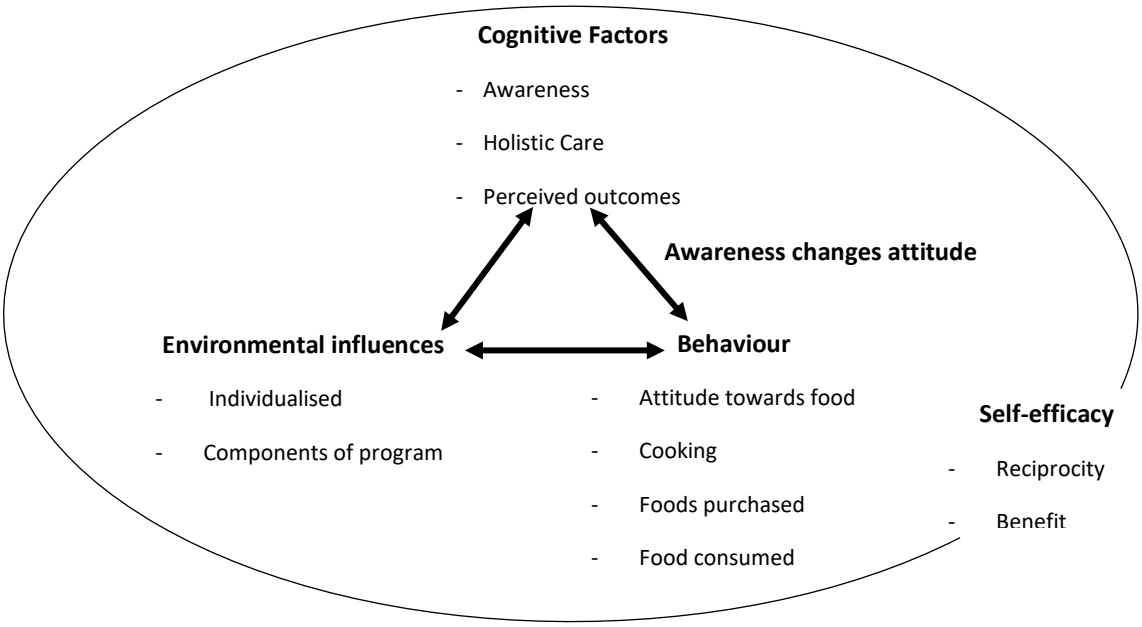

Figure 16: Themes emerged based on Bandura's Social Cognitive Theory (126) to describe factors influencing behaviour change

Table 22: Factors perceived to influence new dietary behaviour

Facilitators	Themes	Subthemes
Environmental influences provided by the intervention	The intervention was provided in meaningful environments that facilitated knowledge and skills transfer to promote behaviour change	Support provided enabled patient participants to share their new behaviour with family and friends
		Practical activities in the group sessions brought patient participants joy when enacting healthy behaviours because the students made it fun
Cognitive influences that resulted	Awareness and knowledge of food and alternate cooking methods	Scaffolded knowledge provision led to behaviour change
		Patient participants perceived that adopting the new behaviour would lead to beneficial outcomes
		Awareness and support promoted self-efficacy and positive views of simple health and lifestyle changes leading to dietary changes
Behavioural influences that resulted	Reaching initial goals motivated patient to continue the intervention and make more dietary change	

3.6.3.3 Environmental influences

3.6.3.3.1 Theme 1: The intervention consisted of individualised support, group sessions and reminders that promoted behaviour change

From the intervention patients' perspective, as an individualised program, the whole program facilitated dietary changes and clinical outcomes. Intervention patients perceived benefit from each component of the program. Individualised appointments provided were reported as an opportunity for intervention patients to understand their health in more detail through the various clinical tests conducted. The individualised intervention was a prominent facilitator reported amongst most intervention patients in the focus group data. Individualised goals, outcomes, tasks, recipes and resources to suit their preferences were valued amongst intervention participants and viewed as a key environmental facilitator provided by the Student Nutrition Service. These individualised supports provided direction and facilitated self-efficacy. Supports provided realistic direction to follow to reach their goal which to enabled intervention participants to perceive that attaining their goal was achievable.

Quotes from focus groups demonstrated that the whole Student Nutrition Service intervention was important to intervention patients:

Patient #3: "It was a combination of all of it, I think."- 59-year-old male, food preparer

Patient #4: "I think, for me, it's the whole program, overall, covering all of the different aspects."- 78-year-old male, food preparer

Patient #5: "Yeah, I think if you only did one thing, if it was only this class, for example, I think most of the information would be lost. There's that reconfirmation

of information that makes it good."- 82-year-old male, married, wife food preparer

Intervention patients further described how the individualised support, reminders and group sessions, situated within the community kitchen and their home-based contexts were key environmental components of the Student Nutrition Service intervention that facilitated their behaviour change.

Individualised support

The program's individualised strategies provided a holistic approach where intervention patients felt cared for but also provided with information that extended their ability to apply the nutrition knowledge learnt.

Patient #3: "You're not teaching me basic nutrition, because I already know that. Yeah, it's almost like you need to individualise it, and they have done that. Either our contribution to them is they need to look at it with a holistic approach because we're not all the same."- 59-year-old male, married, food preparer

Patient #5: "Well because I'd lost this weight and I didn't know how to do anything about it and had they not made the visits and told me what to do, especially in the dairy area, and from that I've learnt, myself, that I must eat more and I've been doing that and it's obviously helped me because I've regained that five kilograms since April."- 82-year-old male, married, wife is food preparer

Reminders

One intervention patient described these text messages as being received at the right time. Text messages were sent on alternate weeks when cooking classes were

held but the day and time of the message was not known to the intervention patients. This environmental support when provided at the right time, prompted a one intervention patient to discard old habits or behaviours to maintain their goal of establishing healthy eating behaviour. The motivational messages were reported to aid intervention patients in their situations away from, for example, in their homes, when intervention patients were most vulnerable to reverting to behaviours associated with unhealthy eating practices.

Patient #2: "You can have a time where you can start feeling relaxed - maybe I can have a little - I should be all right. Then next minute you get a text. It's, like, yeah, it's the right time. …A text does help you at the right time. We have a bit of a break with doing this course - we're going away for a couple of weeks - but that text message does help you. You think about - oh, shit, this is what I learnt in class, so I've got to say no to this. It does help you. I agree 100 per cent."- 48-year-old male, single, food preparer.

<u>The group sessions</u>

Intervention patients reported that the group sessions provided an important routine that they wanted to sustain. Intervention patients also described it as a place where they developed camaraderie with other intervention patients facing the same or similar problems, and a setting to learn more about nutrition and health for themselves. Intervention patients provided a model and support for each other to develop confidence in enacting nutritional strategies. Although their individualised goals were different, intervention patients had a common medical

condition (i.e., PAD) and common goals to improve their condition through healthy eating practices. These commonalities united the intervention patients and provided a context for them to share goal attainment, their successes and failures, and ultimately to support each other in changing their dietary behaviours. Learning in a group setting provided motivation. Motivation developed through knowledge from the group setting as well as awareness of their own diet.

Patient #4: "It's not just the idea of coming and cooking, is it? Yeah, and it makes you more aware."- 78-year-old male, single, food preparer.

3.6.3.3.1.1 Subtheme 1: Supports enabled intervention patients to share new behaviours with family and friends.

Intervention patients demonstrated that they valued their learning through sharing new knowledge with family and friends. Specifically, intervention patients reported cooking the recipes from the group sessions, at home. Some intervention patients also reported sharing the meal from these recipes with friends and family. This demonstrates that the group sessions promoted behaviour change and also influenced the intervention patients' cognitive value of healthy eating. Intervention patients demonstrated that they could maintain healthy eating practices learned in group sessions at home, amongst family and friends who can be an environmental obstacle for dietary choices (126).

Patient #6: *"The turkey one was delicious. We've done that at home a few times." We have the turkey burgers. And salmon burgers. We get together with friends quite often, but we made them one night" – wife of Patient #1.*

Patient #2: "It was absolutely smack on. I've not had a hamburger since. To be

honest, I've not had one since. I've had the turkey ones at home. I've made them for me and a couple of friends. They're really, really good. I made some for my son and his mates. …this is really good… Since doing this - it's taught me about my highs and me lows and mediums. I've learnt all that in six weeks. I've been passing on to my kids." – 48-year-old male, single, food preparer.

3.6.3.3.1.2 Subtheme 2: Practical activities in the group sessions brought intervention patients joy when enacting healthy behaviours as the students made it fun

Intervention patients described the group classes particularly the cooking activity as a fun environmental influence that brought them joy from preparing healthy food and working as a team with students as well as peers.

Patient #7: "It's been fun. They've made it fun. Cooking's never been fun to me..it's a chore as I don't like to eat. I have to eat dinner because I've got to take an insulin needle, but I'm not really hungry. I don't want to cook dinner, but I have to ... they actually brought some fun into the experience that now makes me not quite as grumpy about cooking." - 55-year-old female, single, food preparer.

Patient #9: "We've had lots of laughs in the kitchen and it's been really good." – 63-year-old female, married, food preparer. Patient#1: "We've had fun in the kitchen." – 73-year-old mean married, wife food preparer. Patient #6: "Yeah, we've had a good time with that."- wife of Patient #1. Patient#2: "It's been a laugh. There were no disagreements from the start. We all help one another out like a team when there are certain things to do. We all helped one another, so there was no, get

away, or look at you. There was none of that. It was all teamwork."- 48-year-old male, single, food preparer.

Overall intervention patients reported that the whole program provided the support and individualisation they required to develop self-efficacy required to change their dietary behaviour. The Student Nutrition Service was a real-world authentic environment, where intervention patients reported that the support of peers and students who made the intervention informative and fun to enact desired healthy eating behaviours. Both individualised support from education sessions as well as motivational message and group support from classes helped knowledge of basic nutritional messages and skills as well as confidence to carry out behaviour change. The development of skills, knowledge and confidence was evident from questionnaire and focus group data. Bandura describes knowledge and skills as personal factors that influences behaviour change (126). The next section further describes the themes associated with cognitive factors that facilitated behaviour change from the intervention patients' perspective.

3.6.3.4 Cognitive factors

3.6.3.4.1 Theme 1: Awareness and knowledge of food and alternate cooking methods

Awareness of the impact of consuming good and bad food within each intervention patient's current diet, foods to include or limit, food quantities to consume, and alternate cooking methods helped intervention patients to change their attitude towards food. A change in attitude lead to conscious changes in the food that they

bought, prepared, ate and shared with others. Knowledge that a certain type of food is good for the intervention patient resulted in a willingness to try and explore new foods that they otherwise would have not chosen to eat or include based on previous attitudes toward food.

Patient #5: "I'm just paying more attention to eating more and not saying no to everything. Avocado I think are terrible, but my wife put some on my sandwich today and it wasn't too bad. So, I'm accepting all of these things that I would not have accepted to do had I not come here."- 82-year-old male, wife main food preparer

Knowledge of what constitutes a variety of core foods, that should be consumed to achieve a healthy diet enabled patients to expand on their dietary changes by making choices that were not specifically suggested to them in their individual sessions. New knowledge led to the development of new skills. Aside from learning what core foods are recommended, intervention patients also reported their new knowledge as an enabler of healthier foods choices when food shopping, preparing, and cooking. Many intervention patients reported that they applied the label reading skills learnt in the group session, whilst food shopping. Intervention patients also reported that they utilised knowledge obtained to reduce the quantities and types of food consumed despite advancing age. These actions demonstrate how cognitive features such as knowledge and skill development promoted the intervention patients' behaviour change (Figure 1).

Patient #1: "Well a lot of the foods I've been buying, it's a start, and, as I said, making me more aware of what I eat and also the quantities - trying to cut down on

the quantities."- 73-year-old male, married, wife food preparer.

Patient #8: "But it takes a lot longer to shop now because you've got to read the labels."- 76-year-old male, married, wife food preparer.

Patient #7: "The educational sessions have been very beneficial. I actually think about that wheel when I go shopping now. They're going to send me mad. No. I'm actually thinking more when I shop now" - 55-year-old female, single, food preparer.

These examples demonstrate that the intervention patients increased dietary awareness coupled with provision of knowledge and skills of how to act upon the awareness, enabled behaviour change. The use of knowledge reported from attending community classes is supported from the Knowledge Quiz data that demonstrates patients had a knowledge of the AGHE recommendations, food sources that are high in fibre, antioxidants, saturated fat and omega-3 fatty acids that facilitated dietary change. From the intervention patients' perspective, presentation of nutritional knowledge brought about awareness, but knowledge was achieved through revision from the quiz and practice in context.

3.6.3.4.1.1 Subtheme 1: Scaffolded knowledge provision led to behaviour change

Intervention patients noticed that they learnt new nutrition information from participating in the small group community sessions. For example, from the intervention patients' perspective the quiz provided a means of new knowledge revision to consolidate information that would help them apply their learning.

Patient #1: "I knew a little bit about most of the stuff but it's nice to have it laid out a bit more clearly. Even now trying to answer the questionnaire, I'm getting mixed

up without going back and having a re-think about it of which ones are good for antioxidants."- 73-year-old male, married, wife food preparer.

Knowledge and awareness helped intervention patients to realise and reflect on their own dietary actions which lead to positive dietary behaviours.

Patient #5: "I would say in the last couple of days I've actually gone to the tap and got some more water, just because I realised, I need it, but I don't drink enough water and a lot of people I know don't drink enough water and you just should."- 82-year-old male, married, wife food preparer.

The intervention patients who had a basic understanding of nutrition, prior to the intervention, still felt perceived that they learnt more nutritional information and were also able to make dietary changes. Learning, particularly specific realistic dietary changes enabled intervention patients to adopt healthy eating practices.

Patient #1: "…. I knew a fair bit about it before I agreed to take part in it, but even with the information that I had, I've learnt stuff and changed my diet to some degree, to include more of the things that they've suggested." -73-year-old male, married, wife food preparer.

Additionally, elaborating on the concept such as the fruit and vegetables as healthy foods through introducing the knowledge of the presence of antioxidants amongst these foods, facilitated self-efficacy through providing additional reasons why foods are labelled as healthy.

Patient #7: "I have learned things in the education sessions as well. A lot of it I

already knew, it's added to knowledge. I'm really big on antioxidants at the moment and we had a session on that last week, and I did go, oh, okay I didn't know that point." – 55-year-old female, single, food preparer.

3.6.3.4.1.2 Subtheme 2: Intervention patients developed a positive view of dietary changes

Intervention patients reported an altered attitude and view of food from awareness and knowledge developed from attending the Student Nutrition Service. From the intervention patients' perspective, they appreciated food more and developed positive views of new eating behaviours from the intervention as it provided awareness and support, and also facilitated intervention patients to self-manage their healthy eating practices.

Patient #2: "I've learnt to appreciate food more than what I used to. Before, Homer Simpson, that was me. Don't see food now as a junk food. I see it as more healthy way to eat…Food, I appreciate it a little more where before I didn't appreciate food. I ate it because it was there to help me live and that, but now I've found a better way to eat and get active and be better."- 48-year-old male, single, food preparer.

*Patient #1: "I was a big eater. I ate anything - I didn't give a shit what I ate. Since I've been doing this, it's given me a lot of different points of view. I did all the maintenance on houses and drove a truck and all that. A year ago, I'd go ah f*** this course. I would have said straight out. No, I don't do this shit. But to be honest,*

this has done me well. It makes you think about what you do…Very much so. It really does…About the things you do, and you don't realise. - 73-year-old male, married, wife food preparer.

Aside from developing an appreciation for food and healthy eating practices, intervention patients reported benefits from adopting dietary changes. The perceived beneficial outcomes reported by intervention patients included a healthier life and a potentially longer life.

Patient #7: "…because I'm interested in this and feel it is a beneficial project, I did go home and read those notes and made some notes of my own to ask questions at the following session."- 55-year-old female, single, food preparer.

Patient #1: "It's made me aware because I'm probably one of the older ones in this thing. I had the opinion before that when you're young you can't have this it's bad for you, but as I've got older, I thought, really, it's a bit late to worry about those things. If I like it, I'll have it. But it has pulled me back a bit to be a little bit in the middle, so cut down the bad things a bit and have a bit more of the good things. It hasn't really made any hardship, so that might keep me going a bit longer."- 73-year-old male, married, wife food preparer.

Patient #5: "As far as food and eating goes, it's only now, I think during this course, that I've said to myself, come on. I've never eaten broccoli, but I'm going to now. I've never eaten Brussels sprouts and I am now. I'm not just saying, I'm not eating that,

well I'm going to because I know it's going to be good for me." – 82-year-old male, married, wife food preparer.

In addition to developing awareness, knowledge and skills to understand the benefits of dietary behaviour change and how to achieve dietary behaviour change, intervention patients reported that achieving their initial goals facilitated continued behaviour change.

3.6.3.5 Behavioural factors

3.6.3.5.1 Theme 1: Reaching initial goals motivated intervention patients to continue the intervention and make more dietary changes

Reaching their initial goals during the program enabled intervention patients to see the benefit of dietary strategies which enhanced their motivation to attend classes and to continue making dietary changes.

Patient #8: "But, yeah. It's been useful to me because the overall benefit that I've gotten from it is it's reduced my hang over… Lost a bit of weight. About two and a half kilos. Unfortunately, I missed a couple of sessions because I had a knee operation."- 76-year-old male, married, wife food preparer.

Participant #71: "I don't want to fall back into not worrying about what I eat or how I eat or how much I eat."- 82-year-old male, married, wife food preparer.

Cooking in the group session provided some intervention patients with alternative easy simple recipes to use and alternative meal preparation ideas. The intervention

patient below reported that the intervention provided her with new ideas that enhanced her self-management of her long-term condition.

Patient #7: "I'm a long-term diabetic so I've eaten a healthy diet for a very long, long, long time…what this has provided for me, it's given me some more information and …the cooking sessions have provided me with alternative ways of preparing a meal."- 55-year-old female, single, food preparer.

Patient #3: "I did make a point…, one of the things I hoped to get out of this course was knowing how to use more different types of vegetables …. We did make a stir-fry using bok choy, which I hadn't used before. I learnt how to use that vegetable." - 59-year-old male, married, food preparer.

Intervention patients have learnt what to look for when selecting food for consumption. The group classes also exposed intervention patients to the importance of healthy eating and to the taste of simple easy meals. Some intervention patients tried certain vegetables or fruit for the first time. Learning and modelling dietary behaviours in a safe group setting enabled intervention patients to be supported by peers to adapt to the behaviour of selecting healthy food, consuming more healthy foods, reading food labels and appreciating cooking simple healthy meals outside of the structured intervention time.

3.6.4 Intervention Patients' Perspective: Key Findings

- Intervention patients reported change in dietary behaviour and attitude towards eating
- Intervention patients adopted a healthier eating pattern by consuming less discretionary foods and more core foods, applied their label reading skill in food shopping, the knowledge of healthy food in making food choices and skill of cooking simple healthy meals to their life. Some intervention patients also shared the information and the food with their family and friends.
- Individualised support, group sessions and reminders promoted dietary change through enabling intervention patients to gain awareness, knowledge and confidence and ability to develop achievable goals which they were able to further through self-assessment and management of eating behaviours with information learnt in group sessions.
- The environment provided by the Student Nutrition Service motivated intervention patients as it enabled intervention patients to enact desired behaviours through interactive fun activities with peers and students. The real-world environment enabled patients to transfer skills learnt to their home environment.
- Intervention patients were motivated by other intervention patients as well as a new appreciation for food and healthy eating practices gained from new knowledge and increased awareness of healthy eating.

3.7 Research Objective 3: Determine the student participant's perceptions of competency and professional identity development from participating in the Student Nutrition Service

To determine the effect of the Student Nutrition Service on the development of DAA competencies and professional identity for the student participants, student participant perspectives from the student evaluation questionnaire, reflection and observation sheets as well as semi-structured interview data were collated in NVivo coded and triangulated against Bandura's SCT. Bandura's SCT (126) was the framework used to describe the relationship between the environmental, cognitive and behavioural influences that facilitated student participants learning. This relationship is illustrated in Figure 17. Specifically, students perceived that the Student Nutrition Service provided a real-world environment, camaraderie with peers and support from supervisors which aided the development of cognitive factors which facilitated dietetic behaviours associated with the dietetic competencies (Figure 17). Additionally, student participants perceived that the behavioural ability to lead patient interaction as a dietitian was facilitated by support from supervisors, camaraderie with peers led to professional identity development. Some students reported this experience to impact their career interest (Figure 17). These core threads from the student participants' perspectives are presented as two themes and seven subthemes in Table 23 and further described.

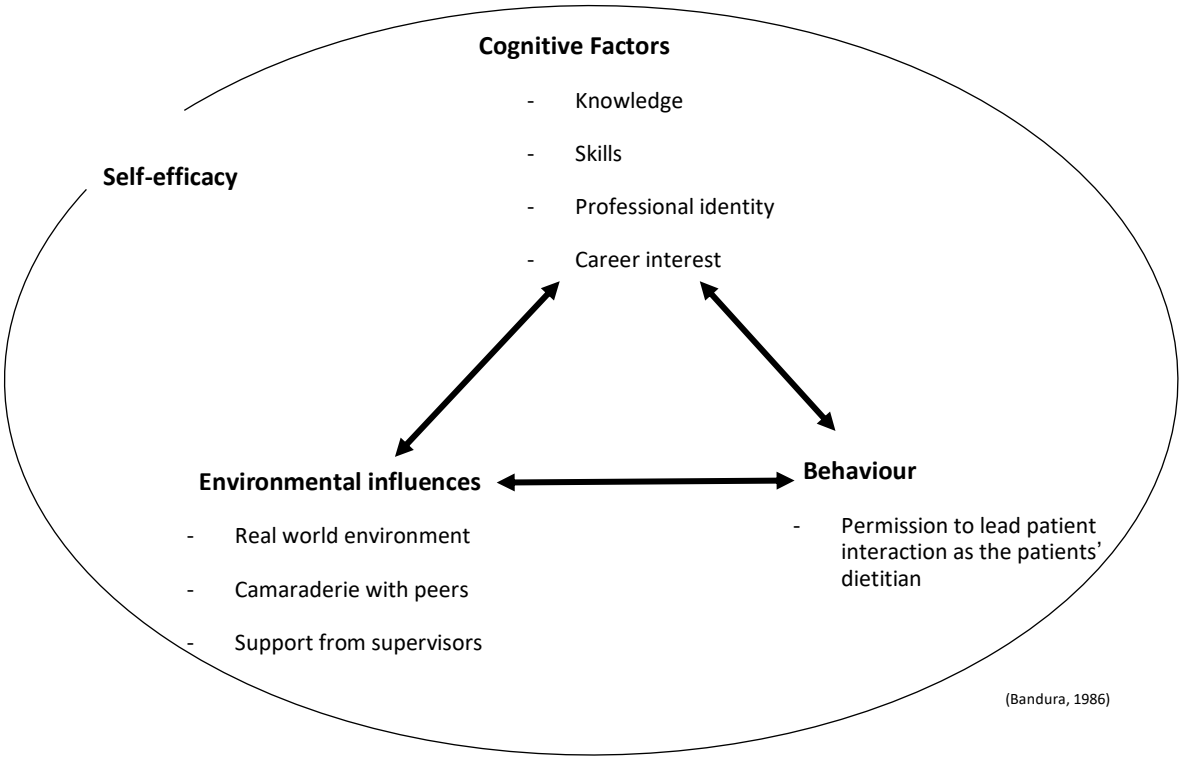

Figure 17: Factors within the Student Nutrition Service that enable student participants to demonstrate dietetic behaviour

Table 23: Student participant perspectives of competency and professional identity development

Themes	Subthemes
Student participants had opportunities to experience the DAA competencies	Supervisor support contributed to a safe environment and fostered new learning and behaviour
	A supportive real-world setting
	Peer mentoring contributed to the supportive environment and built self-efficacy amongst student participants to develop personal skills and knowledge
	Permission to lead, facilitated by respect from patient participants and behaviour change amongst intervention patients prompted dietetic behaviour
	Structured reflective tasks promoted the develop of self-reflection required to continue learning
Student participants developed professional identity as an emerging dietitian	The Student Nutrition Service enabled student participants to build confidence in performing dietetic activities
	Patient participants and permission to be the patient's dietitian assisted student participants to develop professional identity

3.7.1 Theme 1: Student participants had opportunities to experience the DAA competencies

Student participants reported that the experience provided exposure to DAA competencies within each of the 4 domains. Exposure to competencies were reported to enable dietetic practice, further knowledge of a dietitian's role and develop dietetic skills specific to PAD patient treatment. Student participants reported that PAD was a condition that was not covered by coursework. Student participants particularly elaborated on the development of practical skills including skills in anthropometry, diet history taking, clinical reasoning, and reflection as well as communication. Interpersonal skills and the "Australian communication style" were specific communication skills mentioned.

Practical skills

Although many student participants reported learning anthropometry measurements as part of coursework, for all student participants, it was the first time they had measured waist circumference on patients. Whilst this measure appeared to be simple, many student participants found this measurement challenging. The location of the lower ribs and upper hipbone was less evident amongst some patient participants due to different body compositions amongst different age groups in comparison to the student participants' peer cohort that they had practiced with during their coursework.

Student participants expressed that the clinic improved their diet history skills through learning how to conduct a 24-hour recall. Foodworks analyses were reported as an enabler of reflection on areas of uncertainty within the diet histories

collected to self-regulate their practice.

Student #1: "I picked up how to do 24-hour recall, because that was not taught at all in our course. So how to incorporate 24-hours recall into a diet history collection. That was totally new to me and now I know how to do it now. I used the FoodWorks software there to do a food work analysis as well. Well, this information…I would use that to enhance my clinical reasoning skills… Sometimes I reflect on those analysis, to see if I done the proper job in the diet history collection- 1st year masters' domestic student.

International students reported that participating in the Student Nutrition Service helped them to better understand the types of food that Australian's eat. One student participant observed the contrast between the food consumed by older Australians and the food from their cultural background. Participating in the cooking associated with the small group community sessions also improved food knowledge amongst international students.

Student #2: "In terms of food knowledge wise, having actually communicated with patients themselves, I get a better understanding of the type of foods that Australians eat. Because initially some are actually pretty foreign to me. But as the session goes along, I actually get to understand different types of foods."- 3rd year international BND student.

Student #3: "I didn't know that older Australians like to eat roasts and salads, like salads are not very common in Singapore. So that was pretty cool. I think the eating habits are a bit different as well. I think they eat less in general, because of their age." –1st year international BND student.

Student #4: "Then for the cooking, I definitely increased my food knowledge with the recipes that we did, because there were some foods that I was not previously acquainted with - for example, a strudel. I didn't really know what that was. But we made one of those for one of the sessions." – 3rd year international BND student.

Communication skills

For many students, participating in the Student Nutrition Service was their first exposure to explaining the relationship between the patient's diet and disease as well as negotiating dietary goals and strategies during patient education. Student participants reported that they valued applying clinical reasoning based on the unique medical and social status that existed amongst each patient participant in the real-world setting. Student participants also valued that this first exposure was an unassessed supervised learning experience. Student participants from all year levels identified that they developed communication and interpersonal skills.

Student #5: "I feel the majority of my learning was in my communication skills and how I taught the content to the individuals. So how I approached breaking it down, saying it in simpler forms, providing examples and asking them questions so that I knew that they got a good understanding. One thing that I would do is I would give the content and then provide an example and then ask them a question to see whether they understood what I was saying. We would then try and aim to bring that back into the cooking class again to make sure they would take the message home. Yeah, it was definitely my communication skills that were mainly developed."- 3rd year BND rural student.

Student #2: "I felt that it helped me communicate with patients better. Because

ultimately what we learn theoretically, we need to put that into practice in terms of communicating with them. Initially, the type of questions that I asked would be more sort of closed questions. But as the session goes along, I kind of have a better understanding of how to structure certain kinds of questions, so that patients themselves don't feel like I'm judging them. Yeah, so I think that point is very helpful." -3rd year BND international student.

The Australian Communication Style

International students who made up one third of student participants, perceived that the Australian communication style for patient counselling was patient-centred whilst the Singaporean style was direct and prescriptive with less negotiation.

Student #6: "A lot of my Singapore friends are saying that the way that the Singapore people communicate with the patients is very different from the Australian, because Australians are more about client-centred. It's like you have to be really gentle, be very nice but when we did our job shadowing in Singapore…I think Asians just generally want things to be like, so okay, just tell me what I need to do, just tell me what I need to change, and stuff like that. We generally want things to be quite straightforward, whereas I think for the Aussie style, it's more like the client-centred and gentler." – 4th year international BND student.

International student participants reported, exposure to patient participants through the Student Nutrition Service was reported to improve communication skills with patients as well as their confidence to communicate with patients. Students learnt the difference between client-centred counselling skills and non-client centred prescriptive dietary goal and strategies through the Student Nutrition

Service. Participating in the intervention was reported to result in realisation of a need to develop client-centred counselling skills as part of the dietetic competencies. The intervention fostered skill development that the student participants were concurrently learning about in their coursework. Therefore, student participants reported a complementary effect of participating in the Student Nutrition Service to their coursework learning. The service assisted to identify skills to improve as well as providing an environment where they had the patient participant contact required to practice.

Student #2: "The way I communicate with the patient also improved…I know how to use their language to communicate with them rather than using the way I initially talk to patients." – 3rd year international BND student.

Student #4: "So I think before the experience, I was not very confident in communicating with the patients, my peers and supervisor. At the start of the experience, I was quite shy and timid, so I kind of just wanted to sit back and observe how things go first and then pick things up on the way. So, after every subsequent session, the experience helped me to gain the confidence to communicate with the patients and with my team."- 3rd year international BND student.

Student #4: "So, I remember with the clinic sessions, for my first session, the way that I did it was, it was a very prescriptive on this kind of manner, so I was just asking questions and trying to check things off my list, instead of making it more conversational with the patient, which the patient would prefer…that was something that I did not realise I tended to do…the clinic experience gave me that

insight… it really made me think about how I conduct myself with the patient. So, with that experience, when I went into ward placement, I did have that in the back of my mind. Then on top of the motivational interviewing that we learnt in the communication topic, the experience definitely gave me the insight that I needed to work on this area. I tried with every experience to develop that more conversational manner; but I still struggle with it. But yeah, the experience definitely pushed me to work on that."- 3rd year international BND student.

In addition to adapting for the Australian communication style, one student participant reported the need to adapt to a different population group compared to the age group that she tended to communicate with. This highlighted a perceived communication barrier due to differences in conversational style and language used in the different generations.

Student #3: "I think it was a bit hard at first. Because back in Singapore, I wasn't used to talking with people outside of my age group in general. Then coming to Australia, it's like talking to a whole new population group. That was quite challenging. But I feel like the people here and the patients were very friendly and very nice in general. It was easy to work with them, even though we might not have a lot of small talk, topics to talk about. But a lot of them made me feel comfortable enough, to initiate the conversation."- 1st year BND international student.

Perceptions of factors that facilitated development

Student participants reported that environmental influences were a strong motivator of perceived development of dietetic competencies through learning new dietetic behaviours. Specific environmental influences included (i) the supervisor

support, (ii) the supportive real-world environment and (iii) peers. Behavioural influences included the permission to lead patient interactions as the patient participant's dietitian. The impact of these specific influences on dietetic behaviour are described below as subthemes. A brief description is provided, as these subthemes are also aspects student participants also described as their perception of the intervention process which is associated with Research Objective 4.

3.7.1.1 Subtheme 1: Supervisor support contributed to a safe learning environment and fostered new learning and behaviour

Student participants perceived the development of a strong professional relationship with their supervisor that consisted of trust based on a willingness to listen to their thoughts, a non-judgemental response and the provision of constructive feedback. Student participants reported confidence development from the provision of structured time with their supervisor as well as encouragement and reassurance. Feedback provided was perceived to be considerate and encouraged them to target their learning with specific individualised strategies rather than focus on the mistake made. Feedback consisted of concepts that were new to the student participant with the aim to scaffold their learning by highlighting one or two areas of learning to work along with negotiated strategies. Therefore, the constructive feedback focused on factual learning areas based on how student participants learnt and developed rather than a focus on the student participant's ability to perform the activity.

Student#7: '…one thing that I definitely want to be said is that [supervisor] really gives feedback in a really nice way. It doesn't feel like she's putting you down. It doesn't feel like you've made a mistake and that's the be all and end all. It's like

okay, you made this little thing. What are we going to do to improve it? It's not such a huge thing. It makes you want to go home and actually improve on it instead of some feedback I received before and it just made me say, that's it. You know, like, I didn't want to do it anymore.'- 4th year domestic BND student

Student participants perceived that the supervisor assisted them through constructive feedback and the development of their reflective skills through scaffolding. Verbal reflection with the Gibbs Cycle (219) followed by written reflection against the DAA competencies were scaffolded. Student participants, whose reflective skills required development focused on their weaknesses and found it difficult to identify strengths of their practice and create an action plan in verbal reflection. Student participants who needed to develop written reflection skills against the competencies viewed each observable task as a tick box activity which made it difficult for them to identify examples of evidence to demonstrate how they achieved or worked on achieving the observable task. The student participants reported that the supervisor scaffolded the development of verbal communication skills by asking student participants questions to balance their reflection of weaknesses with strengths. Students also reported the development of written reflection skills through supervisor scaffolding with the provision of providing examples and probing questions to assist student participants to identify evidence of how they have contributed the development of competencies they identified.

Student #2: "I think it's good. Because after I get all the reflection itself and actually make a comparison, I do identify differences from when I first started to the last one that I have done, and the difference in terms of like filling out the different types of

boxes and identifying the competencies that I have met. Initially, there wasn't much. But then as the session goes along, I do see where I did apply the types of competencies that I need to actually achieve by the end of the fourth year."- 3rd year BND international student

Student #11:" With [supervisor], when I say, I think I did that really bad, she would say something like, I think you did that pretty well, actually. If I reflected by myself, I wasn't able to see really what I needed to improve on because I didn't have that professional perspective. I think the reflection I did with [supervisor] was more influential to change my behaviour than… by myself. Reflecting with [supervisor] allowed me to build on skills that I already had and then as she provided me with more and more independence, I felt like I was able to take the lead in the clinic sessions. Also, with that, when I was talking to the student I was mentoring, I felt like I was able to transfer that knowledge to her." – 3rd year BND domestic student.

The first-year student participant perceived that reflection was an important task for students to progress from observation to practice. The student participant reported reflection that was scaffolded by the supervisor assisted the identification of strengths and limitations and prompted continual learning at the next session through identifying learning and possible learning opportunities. The student participant and supervisor were then able to co-construct learning goals and strategies enabling the student participant to learn at their own pace.

Student #3: "Having reflections as a compulsory part of the program is a first for me. I think it was really good because it keeps bringing me back to the objectives of the session and how I can improve next time. So, before I go for the next session, I read

my reflection and then practice whatever I wanted to improve on before I go, so that helps me prepare better for my next session. I think it's very important. My growth wouldn't be as significant if I did not reflect."- 1st year BND international student.

New or unexpected situations occurred as part of patient participant interactions. One student experienced a participant arriving during the cooking session of the small group community session she was leading, missing the entire group education component. Another student participant who was afraid of dogs experienced seeing a dog during her home visit education at a patient participant's house. Another student participant conducted a patient education over the phone instead of at the patient participant's home which was what she had originally been exposed to and expected. Most student participants who experienced unexpected situations reported that they benefited from the support of the supervisor either to generate a contingency plan or to reflect on the circumstance for future practice.

Support provided not only demonstrates possible solutions but also encouraged student participants to develop professional identity. During unexpected situations, student participants were reminded to think about the key aspects of their role as a dietitian. Student participants were encouraged to focus on providing client-centred nutritional and priorities for their patient participant, to assist student participants to identify a solution and acting upon it.

Student #7: "Yeah, phone call consults is another thing that when you do it, that I need to improve on. I did do one and that was very stressful. I struggled with …not being able to see how the patient or client was reacting to it. Because it's much easier to sit there and see whether they're actually saying oh yeah, yeah, yeah, and

build that communication skill where I think over the phone, it was so much harder and it just put so much more pressure. "-4th year domestic BND student

3.7.1.2 Subtheme 2: A supportive real-world setting

Most commonly, student participants reported benefits from working in an authentic setting, where they could interact with patient participants with medical conditions in a clinical or community setting. These environmental factors assisted them in understanding their role as a student dietitian. Particular aspects of the Student Nutrition Service as a real-world setting facilitated behaviour amongst student participants. Students identified that the friendliness of the patient participants, their ability to participate without their competency development being formally assessed as enablers for adapting to the intervention setting. These aspects facilitated learning new knowledge and skills and thus a further development of the cognitive factors described by Bandura (126) that facilitated the student participants to demonstrate dietetic behaviours.

Student #8: "It also made you feel a bit more like a dietician, that you've learned something here, but you're actually putting it into practice." 3rd year BND domestic student.

Student #7: "…it's given me an insight to how actually it is in the real world. Because I feel like at uni it's very textbook... In reality it doesn't work like that…I think just the real-world experience …that's really quite beneficial and just being able to see how everything links together."- 4th year BND domestic student.

Student #5: "They were just really lovely to work with and it was good for a first placement in that it wasn't so serious, like I wasn't being graded on anything, there

was not a lot of pressure. Whilst I was very nervous, I had in the back of my head this is just a good opportunity, it's not something that my overall grade is going to be - that was definitely a major thing. I feel like when I would get on and do that placement, that confidence I will have will definitely help me when I'm actually graded on something."- 3rd year BND rural student

3.7.1.3 Subtheme 3: Peer mentoring contributed to the supportive environment and built self-efficacy amongst student participants to develop personal skills and knowledge

Student participants with same year level peers supported one another to develop and demonstrate and also provided support for each other with their first exposure to patient participants. Additionally, peer mentoring enabled peer mentors and mentees to step back to reflect upon their actions whilst watching another student participant model the student dietitian role. Through observation, student participants learnt different working strategies and communication styles. Peer mentors also developed satisfaction from helping another student participant. The reflection, observation, teaching and learning aspects of peer mentoring built self-efficacy amongst both mentees and mentors. Student participants built self-efficacy through motivation to demonstrate or teach or encourage correct practices that both the mentor and mentee were striving to achieve in the Student Nutrition Service.

Student #9: "at that stage, I did have help of a mentor who was in fourth year because I had never done any of that stuff, so it was great to have them to help."- 3rd year BND domestic student

Student #3: "Oh it's very helpful because I got to work with different senior students, and I got to see the different working styles which was very interesting. All of them had different ways of communicating with the patient. I liked it a lot and they always gave me good advice and they supported me when I felt really lost."- 1st year BND international student.

Student #10: ""… having her there really helped because she was quite good with public speaking as well, and so it made me more confident speaking because she was." -3rd year BND international student.

3.7.1.4 Subtheme 4: Permission to lead facilitated thorough patient participant respect and behaviour which prompted this dietetic behaviour

Student participants were provided with permission to lead the small group sessions, which motivated them to take the lead in the session. Student participants looked for ways to assist patient participants in their behaviour change through self-driven pre-session preparation as well as reflection and action during the session. One student participant was motivated by the role of dietitians to assist patients in behaviour change. Changing her focus away from specific self-learning goals such as improving upon patient communication to focusing on assisting in patient participant's behaviour change assisted her to act as a student dietitian and naturally demonstrate dietetic behaviour including personal skills such as communication.

Student #5: "Well, I'm very used to being the student and not the teacher… so... the presentation …I have the full attention and that for me was like, wow, I'm actually in charge here. So that was a very big step for me and a bit wow factor for me. I learnt from that… I'm really going to have to pull my finger out here and work on actually

getting these messages across because … it was so new to me. So, communication-wise I would reflect …with our supervisor and peer and we spoke about the next week…. We came up with a list…we wanted to engage the audience instead of just throwing a tonne of information at them, we wanted to make sure that they were engaging as well instead of just sitting there and probably zoning out. So, we thought we would add in some more questions." – 3rd year BND domestic student

3.7.1.5 Subtheme 5: Structured written reflective tasks promoted the develop of self-reflection required to continue learning

The presence of structured written reflective tasks in the student intervention was an environmental facilitator of self-examination on learning goals. Students reported improvement in self-reflection from participating in the Student Nutrition Service. Structured written reflective tasks provided student participants experience in reflection that assisted reflective tasks required in coursework.

Student#4: "Yeah, and to be honest, I take quite a lot of time to reflect and put my thoughts down on paper or do a written reflection…. with each new experience I do find that I still need time to really think critically about my performance… but compared to from the very start of the experience, there's definitely much more improvement. So, if I hadn't done all those clinics and cooking experiences, all the reflections that I did, I don't think that I would be able to do my reflections for the communication topic where we had school presentation, ward placement and all those experiences that we had to write reflections for. So, I think if I hadn't done this clinic and cooking experience, I would have struggled a bit more with the reflections on those." – 3rd year international BND student.

3.7.2 Theme 2: Student participants developed professional identity as an emerging dietitian

Amongst most student participants, the intervention environment consisted of a new patient group, dietetic practice in both a clinical and community setting, and observation of how dietetic research occurs. Exposure to these three different factors enabled student participants to develop new interests related to their future career. One student participant mentioned developing an interest in working with people with diabetes due to the diabetes education she provided in the clinic. Another student participant reported her interest in working with people aged 65 years and over as a result of working with this population group. Other student participants expressed an interest in community or clinical practice.

Student #7: "I found that I really enjoyed …teaching about diabetes and I think that would be something that I would like to continue. Maybe do like a diabetes educator course after uni or something along the lines of that." – 4th year BND domestic student

Student #8: "I loved the community side of …speaking to people, tutoring…older people." – 4th year BND domestic student

Additionally, student participants perceived the experience to not only assist in their current and future dietetic study but also facilitate early patient exposure. Student participants envisioned that early patient exposure would be beneficial for dietetic students.

Student #8: "...it's enabled me… when I go on placement - which starts next week - to go okay, these are my weaknesses. This is where I really need to focus….it helps me to understand how, I can improve on my weaknesses and going forward… and

also meeting with other dietitians and being able to say to them this is my weakness."- 4th year domestic BND student.

Student #12: "I always feel like it would be really good if I can volunteer a year ago, because I can learn much more from that instead of learning through the placements…even for observational experience, it will be very valuable because being familiar with the settings, familiar with how a dietitian should talk to the patients, familiar with what the kinds of questions that they will usually ask. It can give me more preparation on my placements." – 2nd year MND international student.

Visualising future dietetic practice and developing skills in dietetic practice assisted student participants to build upon their professional identity as an emerging dietitian. Student participants reflected about their communication style and also began to consider their professional identity including self-care that are required to care for others. A student participant recognising the importance of self-care to enable them to perform their best in caring for their patients was a new area of learning.

Student #1: "So I had two hours sleep…my brain was not working at all. I learnt …I wouldn't be able to give my patient a proper education. So, I learnt from that session that I need to look after my health first"- 3rd year domestic student.

Student #5: "… this experience has 100 per cent taught me how to approach certain things. So, if someone is really not that interested in changing their diet, I've learnt how to maybe sit down with them and chat with them and level with them a little bit. Then it's also taught me how to be encouraging and I feel like this will definitely

help when I go out on my other placements." – 3rd year domestic student.

Many student participants identified that prior to enrolment, they did not know the difference between a nutritionist and dietitian. Student participants envisioned dietetic work to be more general nutrition rather than individualised to disease states and lacked awareness about research dietetics. A few student participants reported that final year placements would help them decide on which area of dietetics to pursue, but many reported that participating in the Student Nutrition Service had helped them to shape and reinforce their career pathway. From working with the PAD patient group some student participants reported a resulting interest in working in preventative health through working with communities, working with older people or working with the PAD patient group. From the awareness built and the career interest shaped and reinforced amongst the participating students, this experience was reported to solidify their interest in dietetics.

Student #3: "…it has definitely given me more confidence in what to expect, and I'm just more excited now for the next three years because this has helped solidify my interest in nutrition and dietetics. It's like oh, yes, I've chosen the right course." – 1st year BND international student.

3.7.2.1 Subtheme 1: The Student Nutrition Service enabled student participants to build confidence in performing dietetic activities

Although the student participants did not view themselves as a competent dietitian following this experience, they viewed the Student Nutrition Service as an enabler to develop skills, knowledge and confidence related to dietetic practice. They

identified developing skills such as problem solving, adaptability, communication, interpersonal skills, peer mentoring skills and clinical reasoning skills. Additionally, student participants who had not experienced final year placements developed a better understanding of the dietetics competencies and how to reflect upon their actions from a clinical scenario against the dietetic competencies, to gauge their progress on each competency.

Student #13: "although I did do a variety of things, I didn't do them as much. Like I only did two education sessions, two review sessions. I think if we did have more practice with those, then maybe I would have increased skills and then built confidence to say yes, I did achieve this competency." – 2nd year MND domestic student.

Conversely, final year student participants who had completed final year placements gained a different setting and patient population in which they could demonstrate dietetic competency, namely working with patients with PAD and conducting education via home visits. As PAD was not specifically taught within the course curriculum, students gained exposure to this condition and knowledge of the manifestations, medical treatment and nutrition management.

Student #12: "although it's at the end of my degree, it's still a good practise for me… It helps maintain my skills and also, understanding myself more. Although …I do have clinical, group education, cooking experience …it's a different experience…it's a different target audience and it's in a different setting…it gave me opportunity to get exposed to more settings or people…. I think it helps with my degree." – 2nd year MND international student.

3.7.2.2 Subtheme 2: Patient participants and permission to be the patient participant's dietitian assisted student participants to develop professional identity

Additionally, other students reported that feeling a sense of respect from patient participants and observing or hearing reports about behaviour change amongst their patients, motivated them to 'do better' at demonstrating dietetic behaviour to assist their patients to achieve dietary changes. Therefore, the patient participants' reaction to the student participants' actions as a dietitian motivated student participant to use their permission to lead, to improve their actions as the patient participant's dietitian to benefit patient outcomes.

Student #5: "I was like, oh, who wants to listen to a young 20-year-old that's not even a dietitian yet? So, I feel like this group were amazing and they would sit down, give full attention… that made me want to better their learning and better their health a lot more… I definitely was driven by their respect to better their outcome." – 3rd year BND domestic student.

Student #7: "… with the clients that I saw… I could see that they were really wanting to make a change and it was nice to see that. It was nice they tried …it was nice to… they really valued your feedback. I think …seeing the patient from when I first saw them to when I last saw them, … I wanted to put in that extra effort to help them as much as I can." – 4th year BND domestic student.

Permission to lead assisted the student participant to develop professional identity as a dietitian which caused a student participant to describe their satisfaction of the Student Nutrition Service as a 'love' and 'worth it'.

Student #8: "…it made me feel like I was actually being a dietitian. You don't feel like that when all you're doing is studying, so having some practical experience and actually feeling like a dietician, this I love…The study is really hard, but the end result is definitely worth it."- 4th year domestic BND student.

3.7.3 Effect of the Student Nutrition Service on DAA Competencies and Professional Identity: Key Findings

- Exposure to a safe learning environment that mimicked dietetic practice access both clinical and community settings assisted student participants to gain a range of dietetic skills and demonstrate the active development of competencies across all four competency domains specified by the DAA.
- Student participants developed confidence and professional identity as an emerging dietitian that assisted some student participants in some daunting clinical coursework examinations.
- International student participants particularly developed an understanding of their communication style and food knowledge skills through a better knowledge of Australian food products.
- The Student Nutrition Service provided student participants with a supportive, relaxed, non-assessed environment that promoted dietetic behaviour through exposure in a safe environment.
- The supportive student learning environment consisted of supportive patients, peers and supervisor with an authority to lead and reflect on dietetic practice.

3.8 Research Objective 4: Evaluate the process of the Student Nutrition Service from the perspective of participating patients and students

As the Student Nutrition Service was developed and tested in this thesis as an alternate service delivery model, the patient and student participants' perspectives from participating was captured to evaluate the service. Patient participants' perspectives were obtained from the satisfaction questionnaire, questionnaires after each community session and focus groups. Student participant perspectives were obtained from the Student Evaluation Forms and semi-structured interview data. This section firstly presents the patients and student participant data from questionnaires. Secondly, the patient and student participant perspectives are triangulated from the qualitative data reported via the focus group interviews and semi-structured interviews. Lastly, key aspects of the Student Nutrition Service described by the patient and student participants as areas important for the service to function are reported.

3.8.1 Patient data

The results presented represent the perspectives of 43 adults with PAD who participated in the Student Nutrition Service. Sixty-seven satisfaction questionnaires, ninety-one after community session questionnaires and four focus groups were collected. Data from the questionnaires administered are reported first and later triangulated with focus group data to capture the main perspectives of the patients.

3.8.2 Satisfaction questionnaire

Out of the 67 completed this questionnaire capturing the intervention and control patients' perspectives about the Student Nutrition Service. Twenty were completed

at initial education, 11 at education appointment, 9 at review appointment, 25 at outcome appointments and 2 questionaries were not marked according to which stage of the study the questionnaire data was collected (Table 24-28).

Table 24: **Patient Participant Satisfaction Questionnaire - Initial appointment**

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N/A
The student-led clinic was accessible (location, time)	0	0	0	11	9	0
After this experience, I feel confident coming to a supervised student dietitian for individualised nutrition advice	0	0	1	10	8	1
I felt like the student understood the information they were giving me	0	0	0	8	12	0
The student was professional	0	0	1	5	14	0

Table 25: **Patient Participant Satisfaction Questionnaire - Education appointment**

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N/A
The student-led clinic was accessible (location, time)	0	0	0	2	9	0
After this experience, I feel confident coming to a supervised student dietitian for individualised nutrition advice	0	0	0	4	7	0
I felt like the student understood the information they were giving me	0	0	0	4	7	0
The student was professional	0	0	0	3	8	0

Table 26: **Patient Participant Satisfaction Questionnaire - Review appointment**

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N/A
The student-led clinic was accessible (location, time)	0	0	0	5	4	0
After this experience, I feel confident coming to a supervised student dietitian for individualised nutrition advice	0	0	1	2	6	0
I felt like the student understood the information they were giving me	0	0	0	4	5	0
The student was professional	0	0	0	2	7	0

Table 27: **Patient Participant Satisfaction Questionnaire - Outcome appointment**

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	N/A
The student-led clinic was accessible (location, time)	0	0	1	34	30	0
After this experience, I feel confident coming to a supervised student dietitian for individualised nutrition advice	0	0	2	15	8	0
I felt like the student understood the information they were giving me	0	0	3	30	32	0
The student was professional	0	0	2	12	11	0

Table 28: **Patient Participant Satisfaction Questionnaire - Likeliness of attending student-led service in the future**

Question	Baseline			Education		Review		Outcome	
	Yes	No	Not sure	Yes	No	Yes	No	Yes	No
From this experience, I would attend a student-led clinic in the future	16	0	1	9	1	8	0	22	0

3.8.3 Questionnaire after the community session

Six questions within the questionnaire administered after each community session were aimed at evaluating the intervention patients' perspective of the session. The community group program consisted of 6 sessions where the questionnaire was administered after each session to the intervention patients who attended. Results of the 6 questions at each the 6 sessions are reported in Tables 28 to 33 below.

Table 29: **Questionnaire after the community session - Session one questionnaire findings**

Question	Findings	n
How satisfied are you with today's nutrition education and cooking session?	Very satisfied Satisfied	13 6
How would you rate the quality of the information presented at the nutrition talk?	Excellent Good	9 8
How useful was the information presented at the nutrition talk?	Very useful Useful	13 4
How would you rate the student's responses to questions from the audience?	Very useful Useful Fairly useful Missing	7 6 1 3
Was the length of the event too long, too short, or about right?	Too Long About right Too short Missing	2 13 1 1
Do you think the resources provided will help you at home?	Yes No Undecided Missing	14 1 1 1

Table 30: Questionnaire after the community session - Session two questionnaire findings

Question	Findings	n
How satisfied are you with today's nutrition education and cooking session?	Very satisfied	12
	Satisfied	4
	Missing	1
How would you rate the quality of the information presented at the nutrition talk?	Excellent	10
	Good	6
	Missing	1
How useful was the information presented at the nutrition talk?	Very useful	13
	Useful	3
	Missing	1
How would you rate the student's responses to questions from the audience?	Very useful	9
	Useful	5
	Fairly useful	1
	Missing	2
Was the length of the event too long, too short, or about right?	Too Long	2
	About right	11
	Too short	4
Do you think the resources provided will help you at home?	Yes	15
	Missing	2

Table 31: Questionnaire after the community session - Session three- How satisfied are you with today's nutrition education and cooking session?

Question	Findings	n
How satisfied are you with today's nutrition education and cooking session?	Unsatisfied	1
	Very satisfied	12
	Satisfied	3
How would you rate the quality of the information presented at the nutrition talk?	Excellent	11
	Good	5
How useful was the information presented at the nutrition talk?	Very useful	9
	Useful	5
	Missing	2
How would you rate the student's responses to questions from the audience?	Very useful	9
	Useful	5
	Missing	2
Was the length of the event too long, too short, or about right?	Too Long	2
	About right	13
	Missing	1
Do you think the resources provided will help you at home?	Yes	14
	Missing	2

Table 32: Questionnaire after the community session - Session four questionnaire findings

Question	Findings	n
How satisfied are you with today's nutrition education and cooking session?	Very satisfied Satisfied	13 2
How would you rate the quality of the information presented at the nutrition talk?	Excellent Good	12 3
How useful was the information presented at the nutrition talk?	Very useful Useful	14 1
How would you rate the student's responses to questions from the audience?	Very useful Useful Missing	12 2 1
Was the length of the event too long, too short, or about right?	Too Long About right Missing	1 13 1
Do you think the resources provided will help you at home?	Yes Missing	12 3

Table 33: Questionnaire after the community session - Session five questionnaire findings

Question	Findings	n
How satisfied are you with today's nutrition education and cooking session?	Very satisfied Satisfied	13 1
How would you rate the quality of the information presented at the nutrition talk?	Excellent Good	10 4
How useful was the information presented at the nutrition talk?	Very useful Useful	13 1
How would you rate the student's responses to questions from the audience?	Very useful Useful Missing	9 4 1
Was the length of the event too long, too short, or about right?	Too Long About right Missing	1 12 1
Do you think the resources provided will help you at home?	Yes Missing	12 2

Table 34: Questionnaire after the community session - Session six questionnaire findings

Question	Findings	n
How satisfied are you with today's nutrition education and cooking session?	Very satisfied Satisfied	14 2
How would you rate the quality of the information presented at the nutrition talk?	Excellent Good	13 3
How useful was the information presented at the nutrition talk?	Very useful Useful	13 3
How would you rate the student's responses to questions from the audience?	Very useful Useful Missing	9 6 1
Was the length of the event too long, too short, or about right?	Too Long About right Missing	1 14 1
Do you think the resources provided will help you at home?	Yes Missing	14 2

3.8.4 Themes from questionnaire responses and focus group data

Each focus group included 2 to 3 intervention patients and represented a total of 10 out of 12 adults who participated in community education and cooking classes. The two participants who did not participate in the focus group did not attend the community education and cooking class on the day the focus group was scheduled. Most of the adults (7 out of 10) that participated in the focus group were men representing the associated male gender risk factor of PAD (242).

Based on the patient participant data, patients reported two different themes related to the satisfaction demonstrated from quantitative Satisfaction Questionnaire data from participating in the Student Nutrition Service. These are: 1) A patient-centred environment achieved good overall patient participant satisfaction and 2) The value that some intervention patients placed on the program assured their attendance and recommendation to others. Patient participants described the environments as feeling cared for, particularly due to the

individualisation and care provided by student participants. These thoughts are presented as subthemes: 1) A patient-centred environment provides patients with an individualised intervention and 2) Student participants provided the patient-centred environment. Patient participants viewed the Student Nutrition Service as accessible and attended the sessions contributing factor to Theme 2 is presented as a subtheme: The program was accessible despite some inconveniences. These core patient perspectives are presented as themes and subthemes in Table 31 and further described with supporting evidence.

Table 35: **Patient perspectives – Themes and Subthemes**

Themes	Subthemes
A patient-centred environment achieves good overall patient participant satisfaction	A patient-centred environment provides patients with an individualised intervention.
	Student participants provided the patient-centred environment.
The value that some intervention patients placed on the program assured their attendance and recommendation to others	The program was accessible despite some inconveniences

3.8.4.1 Theme 1: A patient-centred environment achieves good overall patient participant satisfaction

Patient participants described the reason for their overall satisfaction with the clinic to result from the patient-centred environment described as interpersonal actions, communication and a warm, relaxed and friendly atmosphere. Patient participants from both the intervention and control group describe this environment provided by the students and staff, as the reason for their satisfaction. In baseline, education and review appointments, satisfaction questionnaire data identified that patient participants wrote about the interpersonal skills of student participants and

supervisor as the element they enjoyed the most from the appointments. Communication, attention and compassion provided from student participants and supervisor created a warm, positive and relaxed atmosphere, where patients felt comfortable at their first appointment. One patient enjoyed the validation of their current nutrition practice provided at the education appointment. Patient participants' reported feeling compassion from student participants at their review appointment and appreciated that nutritional advice was given in a positive manner. Patient participants also listed professionalism and genuine care as values that they enjoyed the most from the appointments.

Satisfaction questionnaire data:

Patient #10: "The way the student shown compassion" – 76-year-old male, food preparer

Patient #9: "Friendly, kind, supporting" – 63-year-old female, food preparer

Although both the questionnaire and focus group data demonstrated that patient participants were satisfied with the service, the focus group data provided more information to about the reasons underpinning patient participant satisfaction as demonstrated through the themes and subthemes captured below.

Focus group data:

Patient #4: "I'm quite satisfied with it. It made me a lot more aware of food, in general. Good food and then today we've covered antioxidants and all of your fats - the good and bad fats and everything else. Even though I was probably aware of a lot of it, but it's just made me more aware now of extra foods that are available." – 78-year-old male, food preparer

Satisfaction questionnaire data:

Patient #11: "No negative feedback about any of this" – 53-year-old female, food preparer

3.8.4.1.1 Sub theme 1: The program was accessible

According to 44 out of 45 participants to the Satisfaction Questionnaire (Appendix 8), the location of the tertiary hospital and the time of the clinic appointment was accessible. One participant had a neutral response on accessibility of the appointment at the outcome time point. Focus group data demonstrated that some patient participants enjoyed the breakfast provided and the early 8am appointments due to the availability of parking spots. Most patient participants reported enjoyment from receiving new knowledge about their health from participating.

All 20 patient participants agreed that the location of the initial education and review appointment at their home was accessible in terms of location and time. Two patient participants did not prefer the idea of a home visit due to the perceived need to clean or tidy up their home for the home visit. However, these patient participants reported that they agreed to the home visits because the group program benefited them and preferred not to drive to the tertiary hospital due to difficulties finding a parking spot. Suggestions for improvement included more signage to indicate location of the clinic.

Additionally, no intervention patients reported a concern with the location of the community centre, and all agreed that 3 hours for the session was an appropriate amount of time. Intervention patients were not concerned about parking their

vehicle at the community centre nor the time required to drive to the community centre.

Patient #3: "I drive a vehicle that's 6.3 metres long and trying to park it anywhere is a nightmare. Here, I can - there's a couple of places I can park it. If it was somewhere else, that would make me look at whether I could do the course or not." – 59-year-old male, married, main food preparer.

Patient #12: "Easy parking and…because we just come up the freeway too, yeah. Ten minutes."- 74-year-old female, married, husband is main food preparer.

Two patient participants reported that they disliked the blood test and the associated requirement to fast as well as the walking associated with the walking test when asked what they did not like about the clinic. Patient participants also reported that they disliked early 9am appointments, finding a park at FMC, the room temperature and the student participant speaking softly. These comments were associated with baseline and outcome appointments. Some patient participants suggested that all student participants should undergo the FMD test to achieve a better understanding of the pain and discomfort associated with the test. Other suggestions for improvement at outcome included increasing the number of home visits and adding 'sugar' level to the blood test.

The early appointment time, discomfort in tests such as FMD test, blood test and walking test and fasting requirement may have been structural aspects of the clinics that reduced satisfaction slightly amongst participants.

3.8.4.2 Theme 2: Intervention patients' value of the program motivated their participation

The value that some intervention patients placed on attending the program meant that they prioritised attending despite travel and location commitments. The intervention patients perceived the intervention to be beneficial for them. This perception motivated their attendance.

Patient #1: "It's irrelevant to us really. We could have fitted in with whatever time it was." – 73-year-old male, married, lives in rural suburb, wife main food preparer.

Patient #2: "I work my way around this. I knew I was going to do this cooking class, so I work my way around. I set programs out for myself and goals. …I can get around - I go, I don't want to work around me. I want to work around them - gives me more up here in my brain to concentrate. You've got this, now you've got to focus on here to get healed. That's why it's on my mind. With that being on my mind so is food, a healthy way, so it works out well." – 48-year-old male, single, food preparer.

The community sessions were highly valued, and intervention patients often expressed regret for sessions missed due to emergency situations such as surgery.

Patient #8 "My only regret about this situation is me going into the hospital and missing two sessions…I've got all the information for the sessions that I missed, and I read it but…it breaks the continuity a bit."- 76-year-old male, married, wife main food preparer.

The accessibility of the community centre and the value placed on the sessions by the intervention patients motivated their participation. The clinic appointments and home visits added value and reinforced the patient's progress, which also

encouraged attendance.

3.8.4.2.1 Sub theme 1 - More or different people could provide more ideas

Some community group sessions included small groups of 3 or 4 intervention participants instead of the anticipated 8 intervention patients per group. Intervention patients within these small groups identified that including more participants would enable more viewpoints and also more people to benefit from the experience. Intervention patients reported that the dietary changes helped them with their health and quality of life and could benefit others too. Intervention patients reported younger people with heart conditions and others with PAD could benefit from participating.

Patient #5: "But more people would have made it better...I'm a bit disappointed there aren't many age varieties in the group. I think that would probably have helped… I just probably wish that they could get more people attending their class. Yeah. There should have been a lot more people in their 30s, 40s and 50s, just to get different ideas. People our age basically think the same way, but if we'd had a more general population here or more people to add I think that would have helped."- 82-year-old male, married, wife main food preparer.

3.8.4.3 Theme 2: Warm, friendly, positive and relaxed nature of the individualised intervention enabled intervention patients to feel cared for

The community classes were a place that many intervention patients reported feeling heard, cared for and respected. Intervention patients' reported feeling cared for as an individual because the content and delivery was tailored to their personal needs. Intervention patients noticed that written messages provided in the form of text messages or emails were personalised to their goals.

Patient #7: "...we go home happy and you go home feeling that you've been treated as an individual and that they care. I think that's the important part, you go home believing that those two people in their care. [supervisor] with her SMS messages and emails and that, because they're personalised you walk away thinking, they care. I'm not just a number on a piece of paper." – 55-year-old female, single, food preparer.

Some intervention patients reported that the information offered as suggestions rather than mandatory actions to undertake, assisted them to direct their own actions and take ownership of the intervention activities. Suggestions were provided at individual consultations through written messages (i.e., SMS, email and paper), in addition to the community classes.

Patient #1: "Once you start trying to tell people you've got to do this and do that, they're liable to drop out and walk away." – 73-year-old male, married, lives in rural suburb, wife main food preparer.

The service was described as organised and one intervention patient was surprised that this type of attentive and intensive follow-up could be provided in the health care system.

Patient #1- "I found it very good. It keeps your mind on it, and it's been so easy to do because there are no loose ends. You know what's going on, the interviews and everything. All well organised and quite helpful." – 73-year-old male, married, wife food preparer.

Patient #5: "My wife and other people have been quite surprised that it actually happens. As a follow up - I've had to go to exercise classes when I had a heart attack many years ago and that's all I expected this time…But this is a follow up I never

expected. I don't know whether you had it 10 years ago, you probably didn't." – 82-year-old male, married, wife main food preparer.

Additionally, intervention patients reported that the small groups environment facilitated individualised and manageable sessions. Many intervention patients reported preferring small groups of two to five participants, as they were able to ask more personalised health related questions to the students and staff.

Patient #7: "Being the small group, that's allowed us to almost drive it in a direction that you need to cater to us, because we're not just vascular people we're diabetics." - 55-year-old female, single, food preparer.

However, intervention patients from the smaller groups of two perceived that four people would be a good maximum.

Patient #3: "….it would have been better if maybe there were four or six" – 59-year-old male, married, main food preparer.

An intervention patient perceived that larger groups could be difficult for the students involved to manage particularly in the cooking activities in the kitchen and individualise the information provided.

Patient #8: "I think it would be much more difficult to have more than four people in the kitchen." – 76-year-old male, married, wife main food preparer.

Therefore, the view of how many intervention patients should be in a group differed yet the concerns were similar. All intervention patients wanted individualised sessions where they can ask questions, have people benefit from the sessions and be possible for the student participants to manage.

This demonstrates the importance of a patient-centred environment to achieve

patient satisfaction during a clinic appointment, despite some areas of the clinic appointment that they did not enjoy. Feeling cared for was particularly important in enabling active participation specifically through individualisation.

3.8.4.4 Theme 3: Student participants added to the program

Amongst the data from the Satisfaction Questionnaire, in sixty out of sixty-five instances, patients agreed or strongly agreed to being confident to attend a supervised student dietitian for individualised nutrition advice in the future. Four had a neutral response and 1 not applicable to this question (Table 24-28, page 187 to 189). Based on all time points (i.e., baseline, home visit education, review and outcome), 55 would attend a student-led clinic in the future from their experience (Table 28, page 189).

Satisfaction questionnaire example response:

Patient #4: "Pleased with the overall venture" – 78-year-old male, food preparer.

Focus group example response:

Patient #5: "I'm quite happy with it, overall."- 82-year-old male, wife food preparer.

Most patient participants reported that the students were excellent at demonstrating empathy and holistic communication skills (Table 36). The services provided by the student participants were well received in the clinic appointments where patient participants felt that the student participants were professional, understood the information they were providing, were positive and provided clear explanations.

When the student participant was required to help the intervention patient take

ownership and construct a plan of action as prescribed by the intervention, the intervention patients perceived that the student participant was either good, very good or excellent at these tasks. Patient participants reported that the students generally displayed patient-centred practice through agreeing that they made them feel at ease, letting the patient participant tell their story, really listening, fully understanding the patient participant's concerns and showing compassion and care (Table 36).

Table 36: Patient' participants perspective of student's ability to demonstrate empathy and holistic communication skills from post clinical satisfaction questionnaire data

	Poor	Fair	Good	Very Good	Excellent	Does not apply
Making you feel at ease	0	1	2	15	46	0
Letting you tell your "story"	0	1	0	21	42	0
Really listening	0	1	1	17	45	0
Being interested in you as a whole person	0	0	4	14	46	0
Fully understanding your concerns	0	0	3	14	45	2
Showing care and compassion	0	0	1	13	49	0
Being positive	0	0	2	9	52	1
Explaining things clearly	0	0	1	15	48	0
Helping you to take control	0	2	5	13	34	9
Making a plan of action with you	1	1	3	14	29	14

From the focus group data, intervention patients reported that during the group sessions the student participants explained things clearly, were informative, and addressed intervention patient responses and questions well.

Patient #13: "Look, they're new at it, so they're more in-depth into what they're doing. If I had an older person, they would probably talk at me without too much thought about what they were actually saying, because they've done it for so many years. Yeah, from a student's perspective, that's probably better." – 59-year-old male, married, main food preparer.

Intervention patients enjoyed the thoughtful detailed knowledge and enthusiasm provided by the student participants.

Patient #5- "I haven't found any students yet that have taught me the wrong way at all. They've all been very pleasant, they're knowledgeable, so it's been good." – 76-year-old male, married, wife food preparer.

Student participants delivered the information regarding behaviour change well, which made the intervention patients think about how to action the behaviour discussed.

Patient #1 – "Changing those habits is sometimes very difficult. When they're talking about a specific subject and I'm going in my head, oh…, what am I going to do now. They handle it. They handle it well."- 73-year-old male, married, wife main food preparer.

The intervention patients could rely on the information student participants provided as they observed the student participant asking the supervisor when the student participants were not sure of a question asked by intervention patients.

Patient #4 – "If we've asked them a question and they don't know, they've always gone to [supervisor] and got the right answer."- 78-year-old male, single, main food preparer.

Overall, the intervention patients reported that "the students added to the program". From the intervention patients' perspective, student participants added their own personality and perspective as well as a friendly, happy and welcoming attitude to the service.

Patient #2: "They're very nice happy students, which is good. They smile, have a giggle and a laugh with you."- 48-year-old male, single, main food preparer.
Patient #3: "I think they did in terms of personality and so forth"- 76-year-old male, married, wife food preparer.
Patient #7: "They did really add to the program. They look at things from maybe a different perspective to us." – 55-year-old female, single, food preparer.

Intervention patients described students as approachable, friendly and lovely.
Patient #1: "I've found them all very approachable and also helpful as far as the program is concerned."- 76-year-old male, married, wife food preparer.

Patient #4: "…very approachable too, you can discuss just about anything with them." – 78year old male, single, food preparer.

Patient #12: "They're always friendly, lovely. Yeah. Welcoming. I've enjoyed having them." – 74-year-old female, married, husband food preparer.

Therefore, from the intervention patient's perspective, student participants were an integral part of the program. Student participants provided the intervention and also assisted in fostering an environment where intervention patients felt cared for, safe to ask questions and engage in the intervention, yet also receive the correct information. Intervention patients also enjoyed the perspective and presence of the students and admired their ability to lead the Student Nutrition Service and handle situations that arose.

3.8.5 Patient Participants Perspectives of the Student Nutrition Service: Key Findings

- A patient centred environment, particularly with an individualised approach achieved good overall patient satisfaction and participation.
- Value placed on the program assured attendance and recommendation to others.
- Student participants added warmth, humour, enthusiasm and a friendly approach to the program that fostered an environment that enabled patients to safely engage and feel cared for.

3.8.6 Student Participant Perspectives

3.8.7 Student Evaluation Questionnaire

The Student Evaluation Questionnaire administered to student participants contained 8 questions that aimed to evaluate the student participants' perspective of the Student Nutrition Service intervention. Results from these 8 questions are presented in Table 37 below. Questionnaire findings were triangulated with semi-structured interview data and used to inform the themes and subthemes presented.

Table 37: **Student Evaluation Questionnaire Findings**

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Missing	N/A
Working in the clinic increased my understanding of the issues that need to be considered when working with vascular patients, such as mobility, food preference, access and availability to healthy foods	0	0	5	13	0	1	0
Working in the Vascular Nutrition Clinic/Cooking Program helped my confidence in communicating with patients	0	0	0	5	13	1	0
Working in the Vascular Nutrition Clinic/Cooking Program helped my confidence in communicating with patients	0	0	0	4	14	1	0
Working in the Vascular Nutrition Clinic/Cooking Program improved my skills in communication	0	0	0	4	14	1	0
Working in the Vascular Nutrition Clinic/Cooking Program	0	0	1	3	8	2	5

increased my skill in doing nutritional assessment (if relevant)							
Working in the clinic increased my understanding of working in an inter-professional (multi-D) team	0	1	6	7	3	1	1
The clinic increased my confidence in communicating with other health professionals (e.g. research staff, clinic staff, doctors, nurses, surgeons etc)	0	1	9	3	3	3	0
I felt I received constructive feedback from my supervisor and/or peers (if relevant) on my performance in the Vascular Nutrition Clinic/ Cooking Program	0	0	0	3	15	1	0
Overall, I found the experience in the clinic valuable in reinforcing the skills I learnt on placement	0	0	0	3	13	3	0

3.8.8 Semi-structured interview data

The perspectives of the 21 out of 23 participating students were captured from semi-structured interviews. Two student participants did not attend their scheduled

semi-structured interviews due to change in study commitments associated with their coursework. Regarding the structure of the Student Nutrition Service, all students commonly reported how much they valued the learning experience provided. The value that students placed on their learning was demonstrated by reports of managing time to participate. Specifically, students reported that they valued the non-assessed student patient interaction and the learning achieved in the environment. Table 38 presents the theme and subtheme of the student participants' perspective.

Table 38: Student participant perspectives – Theme and Subtheme

Theme	Subtheme
Student participants valued their learning experience in the Student Nutrition Service	The Student Nutrition Service is a safe environment that enables student learning, the development of knowledge and skills as well as a place to put them into practice

3.8.8.1 Theme 1: Student participants appreciated their learning experience in the Student Nutrition Service

Student participants reported that they prioritised participating in the experience because the learning was 'worth it'. Some student participants changed their study or working schedule to complete the requirements for the learning experience.

Student #3: "…I learnt a lot in every session…I'm still learning a lot and every session was an opportunity for me to improve. That's why I wanted to go for as many sessions as possible." -1st year BND international student.

Student #9: "… sometimes when I had to go to the community session or go to the clinic, I was like oh, I could be doing so much uni work and it would kind of make me

stressed. But once I got there, I loved every minute of it. So, once I got there, I was kind of like it's so worth it and I'm learning so much that other people who don't have this experience won't have going into next year." – 3rd year BND domestic student.

These responses demonstrate that the learning achieved made it 'worth it' to the student participants to spend their extracurricular time participating. Three student participants reported that the time commitment differed from their initial expectations. Out of these three student participants, two reported that the experience was longer than expected but "worth it".

Student #11: the time allocated…was a bit more than I expected but was still worthwhile."- 3rd year BND domestic student.

Other student participants reported that time commitment was manageable and didn't affect their studies. These student participants were (i) willing to catch up on 4 to 5 lectures online instead of attending in person or (ii) were prepared for a long-time commitment. A couple student participants did not initially anticipate the time they required for learning requirements of the Student Nutrition Service such as reflections and dietary analysis.

Student #19: "I didn't have any expectations as to how much time I need to commit. So, I was open to the experience itself rather than having to allocate time for it. So, I would be shifting my personal schedule to suit what has been given to me, and to take up the opportunity whenever it comes by." – 3rd year BND international student.

Student #7: "I think that would have been a lot more helpful [to have a clearer outline] because when I was first planning things, I also have a job on the side and placement and everything else, so I was kind of structurally trying to plan everything. Then as soon as the first one took six hours, you know, we did the three hours in clinic and then we had to write it all up and it took a while and everything else that went with it, I realised it's a lot larger time commitment than what I actually expected."- 4th year BND domestic student

Some student participants identified that a clearer outline of the intervention activities and time required would have provided more structure for their learning. Whilst student participants offered different perspectives about the commitment and overall learning activities, overall, they participated because they valued the experience.

Student participants perceived the Student Nutrition Service to be of most beneficial in the earlier years of the dietetic course. Student participants reported that early exposure through the Student Nutrition Service would reduce their learning load and stress during assessment in the course. Student participants perceived that participating in the Student Nutrition Service early in the course assisted with anxiety management of patient interactions and new environments and supported students to develop confidence from experiencing patient interactions in a real-world setting. These student participants also perceived that the patient interactions that they completed during the Student Nutrition Service may have assisted them to pass their summative oral viva assessment in the 3rd year of their bachelor course. Student participants reported that the Student Nutrition Service assisted them to build clinical reasoning and communication skills that was

assessed in the oral viva.

Student #10: "…. with my summative, I passed first time, and I was one of the few that did, and I think this definitely made a difference to … how I felt, feeling quite comfortable and feeling organised when I like got a patient's background, and … knowing what I was going to say…it kind of helped because I knew how to handle it and talk a bit better to them…. I think it's given me good experience for placement that I think a lot of people might … not feel as prepared for than I do because I've had this experience. So, I would definitely recommend it - especially to third year. I think for first year it's really good because if I'd got that experience earlier on it may have helped earlier."- 3rd year BND domestic student.

3.8.8.1.1. Subtheme 1: The Student Nutrition Service is a safe environment that enables student learning, the development of knowledge and skills as well as a place to put them into practice

Student participants viewed the clinic as a valuable place to skills into practice through working with real people in an authentic work setting, compared with simulation activities or theory embedded into the dietetic curriculum.

Student #7: "I really hope they continue with this. I think that it is such a valuable thing to be able to do. I think, number one it's valuable for the patient, but I also think it's such a valuable learning tool that we can actually put into practice what we learn. We don't have to try and practice in a room getting recorded by someone and have to then watch it back." – 4th year BND domestic student.

Student #14: "There were lots of things that stood out for me in terms of things that I would do in the research, both in clinical setting and also in the cooking and

education session that I could then relate back what I was doing in my classes…that made me realise how big of an impact this research had made on my knowledge. Well, one major thing for example, being able to do some of the medical history in the clinical, so being exposed to different medications has been very beneficial because for third year we aren't really taught many of the medications, it's sort of like in the quizzes that we do. So, it was good to get that exposure to it beforehand, so that I'm more aware of it. -3rd year BND domestic student.

Therefore, real world experiences and exposure to patients were valuable to student participants as a learning environment when provided concurrently with the related theory taught in coursework. Specifically, student participants reported the concurrently practice of communication skills in the Student Nutrition Service with theoretical learning of communication in coursework was beneficial. Student participants perceived the Student Nutrition Service as a beneficial to their development of communication skills and coursework when their communication skills were assessed. Participation in the clinic appointments in the Student Nutrition Service and concurrent learning of clinical nutrition in coursework assisted students to have a better understanding of information taught in coursework.

3.8.9 Student Participant Perspectives of the Student Nutrition Service: Key Findings

- Student participants valued this learning experience because it enabled them to develop and/or practice skills and learn in a safe environment, which increased their confidence in assessed environments.
- Student participants valued the exposure to patients and real-world scenarios, particularly when the practical experiences in the Student Nutrition Service related to the theory that they were learning in their course.

3.8.10 Key aspects of the Student Nutrition Service from both the Patient and Students' Participant Perspectives

From the analysis of the student participant interview data and intervention patient focus group data, there were several similar responses provided by student participants and intervention patients that demonstrate a reciprocity of perspective, between both participant groups. That is, intervention patients and student participants reflected similar ideas but drawn from their own perspectives and world-lens. This section presents the themes that described this connection between the student participants, intervention patients and the Student Nutrition Service that fostered behaviour change, as analysed through concepts from Bandura's SCT (123).

Student participant interview data and intervention patient focus group data were deductively coded according to three elements of the SCT: namely, environmental, cognitive and behaviour factors. The themes and subthemes describe the interaction between intervention patient and student participants in the Student Nutrition Service that were perceived to promote behaviour change amongst both groups of participants.

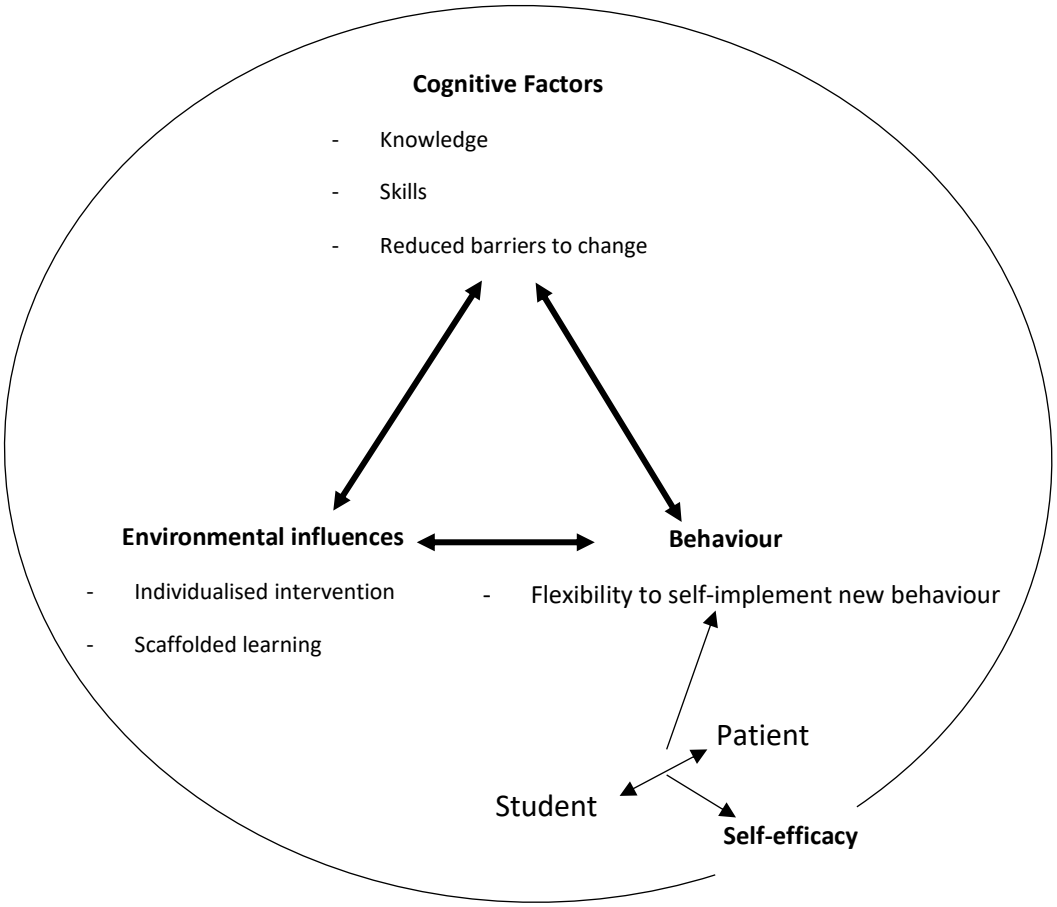

Figure 18: Duality between Intervention Patient and Student Participant Perspectives – Social Cognitive Theory (123)

3.8.10.1 Theme 1: A supported environment for intervention patients and student participants that facilitated knowledge and skill development whilst reducing barriers to change

Student participants and intervention patients reported that the environment supported their learning and nutritional goals. Individualised and scaffolded learning were reported as key factors that characterised the supportive environment that promoted behaviour change.

Individualisation of the intervention patient's nutritional goals according to their eating pattern, medical conditions and food aversions assisted intervention patients. Intervention patients reported that this support empowered intervention

patients to change their eating behaviour. As described by Bandura, existing personal value, social structure and belief systems can present obstacles to behaviour change (126). Individualisation worked on each intervention patient' obstacles to dietary change through considering these personal aspects when negotiating dietary goals. Obstacles to change could include personal thoughts about the food based on intervention patient knowledge, dislike and aversions or absence of cooking ability or lifestyle limitations such as a busy work setting that limits time to consume food.

Whilst the personal goals were individualised, flexibility to self-implement additional dietary goals or strategies were provided through the small group community sessions. The group session promoted behaviour change, through providing scaffolded awareness of additional nutritional knowledge along with its associated health benefits and the guided enactment of cooking simple easy healthy meals that incorporated the foods discussed in the session. Similarly, the guided enactment of cooking simple healthy meals enabled behaviour change through bringing down barriers associated with cooking time, unfamiliar ingredients, unfamiliar cooking techniques and taste, lowering the perceived 'risk' of deciding not to adopt the new action (126).

Amongst student participants the tasks were scaffolded to the course material taught in their year level. This provided student participants with a mixture of tasks that were individualised to their skills and knowledge, as well as early exposure to skills and knowledge to be taught within the study year or following study years according to student ability. Individualised learning goals and flexibility for further exposure to situations or tasks upon request, were factors that were reported to

enhance learning and development of professional identity.

Verbal and written reflections were reported to enhance learning and development. As these self-regulatory and self-reflective behaviours (126) were set out in the structure of the program, students not only improved their reflective skills but also enhanced their ability to self-identify their progress on the learning goals enabling them to negotiate tasks suitable for their goals with their supervisor.

Goal setting according to Bandura, facilitates motivation through forethought of how the anticipated action can lead to a positive outcome, even if current conditions are not conducive to action (126). Additional individualised negotiated goals enable reciprocal causation allowing people to exercise some control (126). Control exercised over the new behaviour provides people with ownership over the management of their own situation (126) and provided intervention patients and student participants with confidence to self-manage.

3.8.10.2 Theme 2: Reciprocity as a motivating force between intervention patient and student participants which empower self-efficacy amongst both groups

Intervention patients recognised that they were not the only participants learning in the Student Nutrition Service, as they observed student participants learning to be dietitians too. The intervention patients also enjoyed watching the student participants learn and particularly enjoyed watching the student participant's public speaking skills improve as they acknowledged public speaking as a difficult skill to develop. Intervention patients reported that they helped the student participants by providing positive responses.

Patient #1: "You can see they're learning too … I know with me it helps you want to try and help them. You want to help - public speaking is something that takes a bit of getting used to... It is not easy. You could see them getting better…you can see them relaxing more with us, more confidence… I don't know how much they've had to do before. Public speaking is always hard. If you get asked questions outside your field it's always a bit awkward, but as I say, they didn't hesitate. They asked each other and discussed it to see if they could come up with an answer." - 73-year-old male, married, wife food preparer.

Intervention patients also fostered student learning by being themselves and by focusing on their individuality. As a result, student participants learnt that each intervention patient was unique and not one strategy may be helpful for every intervention patient. Through teaching the student participants about individualised care, intervention patients encouraged the student participants to provide individualised messages and responses that met the intervention patients' needs to facilitate behaviour change.

Intervention patients acknowledged that the Student Nutrition Service was an experience for student participants to develop and demonstrate empathy, communication and interpersonal skills. Intervention patients viewed their participation to enable student participants to further develop these skills through conversing with student participants and sharing their thoughts about their food choices. Intervention patients believed that these insights would help student participants to better care for future patients. Intervention patients perceived, home visits as an opportunity for student participants to obtain a better

understanding of their patients' situation and to better personalise dietary suggestions. It was therefore important for intervention patients to convey their values of individualised care to student participants and that they were considered an individual to the health professional providing their care.

Patient #5: "It's an experience for the students too. That's another good thing for the students. They probably don't associate with seniors in general, but their read of what we do and how we think improves their ability to communicate with more people. They learn pretty quick, that what's right for me is right for everybody, it's not the correct way to do it. I think that's something that the students have learnt too. Because …when we get a bit older our behaviour is habitual. We don't think a lot about it. They have noticed that, and we have talked about it there and I think it's been a benefit to them." - 76-year-old male, married, wife food preparer.

Patient #1: "I suppose it also gives them, as a student, a good scope of seeing how other people live, because as a dietitian you probably need to know that. They can get an idea of something they're trying to tell people to do might be impossible due to the situation." - 73-year-old male, married, wife food preparer.

Patient #6: *"From my end, and I'm not a dietitian, the home visit stuff is quite important." – Patient #1's wife.*

Most intervention patients were more experienced than student participants at cooking; yet no intervention patients perceived that it was their place to belittle the student participants or their lack of experience. Instead, intervention patients enjoyed watching the student participants work in the kitchen with their own method and provided suggestions when students required the intervention patient's help. As such, the intervention patients assisted and encouraged the

student participants to partake in knowledge and skill development that student participants were not as familiar with. Through this method, patients demonstrated respect, fostering a community that facilitated learning amongst student participants and intervention patients; both young and old.

Patient #6: "The other thing, a lot of them haven't done a lot of cooking. I have done quite a bit. You try not to push your way in, so suggest things. Because they're reading from recipes and in all recipes there's a way around certain things if you don't want to do this or that. You could see it was really nice. It's just nice to be with young people. It really is."- Patient #1's wife.

Patient #3: "The problem I see is that I have too much information. I know enough already. I know how to cook. I know what foods to cook and all that sort of stuff. So, the cooking side of it, for someone that's running classes so young, I've taught them stuff in relation to cooking…and prepare stuff. A lot of the stuff that they - that I do in the kitchen, I just stand there and watch them. They're doing it. Today I watched them - one of the girls cut up nuts and she was having a lot of trouble doing it. I could have showed her an easier way, but I felt like I was impeding if I went over there and said here, this is how you do it. I'm not here to educate, I'm here to learn." – 59-year-old male, married, food preparer.

Patient #12: "We sort of have a chuckle when they have to measure everything. That's a chuckle, because we're not used to that. They measure everything."- 74-year-old female, married, husband food preparer.

Although student participants were learning, and the intervention patients were helping the student participants to learn, the intervention patients reported that

the learning was reciprocal.

Patient #5: "They helped us in more than one way. They helped us more ways than one. …some things they weren't too sure on where we knew but they helped you more. Yeah, they helped me more."- 76-year-old male, married, wife food preparer.

Intervention patients valued the direction provided by student participants in the kitchen, as well as the student participants' perspective and knowledge in explaining new information. The intervention patients reported that they valued the student participants' personality as it gave intervention patients permission to be humorous. A minority of intervention patients were unimpressed at the lack of experience amongst student participants who led the kitchen activities. These intervention patients perceived the student participants' method to lack efficiency. However, these intervention patients still allowed the student participant to provide direction and participated accordingly. It was important to note that this minority were not aware at the time, that the cooking task was not about efficiency of producing meals but rather to reiterate key nutritional messages and if required, teach basic cooking or meal preparation skills.

Patient #3: "If we went into the kitchen without the educators there, and had to perform the tests, or the things we were cooking for the day, I'd probably fumble through it."- 59-year-old male, married, food preparer.

Student participants and intervention patients reported their perception of the alternative group as 'friendly' and 'nice'. Whilst student participants took interest in their intervention patients through their own goals to improve their communication

skills and provide patient centred care, intervention patients enjoyed the attention and thoughtfulness of the student participants. The professional relationships built through rapport and empathy motivated intervention patients also to be attentive to student participants and work with them. Student participants viewed attentive intervention patients as valuing the feedback provided by the student participants which motivated the student participants to 'put in extra effort to help them as much as' they could.

Student #16: "…especially with the clients that I saw… they were really wanting to make a change and it was nice to see that. I understand that that doesn't always happen, but it was nice to have that and they really valued your feedback… I wanted to put in that extra effort to help them as much as I can." – 3rd year BND domestic student.

From the student participant's perspective, through taking responsibility over the tasks assigned and viewing the intervention patient as 'their patient', the more that they enacted their role as a dietitian and developed their professional identity. The respect provided by intervention patients to the student participant was demonstrated by the value they placed on the intervention activities and engagement with the student participants. Intervention patients engaged through questions and comments, helped student participants to gain confidence to act as a dietitian in leading the consultation and group sessions. These actions assisted student participants to reduce their anxiety associated with communicating, working with intervention patients and develop self-efficacy to perform these new activities. Student participants commonly reported nervousness yet support from intervention patients assisted student participants to be comfortable in the new

learning environment.

Additionally, student participants aimed to create an environment that fostered learning and behaviour change amongst intervention patients. They perceived that a positive and comfortable environment would assist intervention patients and aimed to provide it.

Student #5: "I was hoping that by having that enthusiasm it creates a positive environment which means they want to make positive changes to their health."- 3rd year BND rural student.

Student #14: "I feel I am comfortable with the patient. So, I think that would provide an environment that they would benefit from, perhaps learn more, feel comfortable." – 3rd year BND domestic student.

This demonstrated that the environment of the Student Nutrition Service also promoted intervention patients to demonstrate behaviours that foster a supportive learning environment for student participants. As student participants and intervention patients motivated each other, they co-constructed the supportive environment of the Student Nutrition Service that fostered learning and behaviour change for both groups.

3.8.11 Evaluation of the Student Nutrition Service: Key Findings

- Both intervention patients and student participants were satisfied with the Student Nutrition Service and viewed it as a valuable learning experience where they helped each other to learn and develop desired behaviours (i.e., healthy eating amongst patients and dietetic practice amongst students).
- Both groups of participants reported that (i) the supported environment that focused on providing knowledge and skills while reducing barriers to change and (ii) reciprocity between patients and students were the motivating factors that promoted self-efficacy and were key enablers of an effective Student Nutrition Service.
- Both intervention patients and student participants reported that the Student Nutrition Service could include more participants.

CHAPTER 4: DISCUSSION

Student-led models of care have demonstrated beneficial outcomes to patients with CVD risk factors (243) and learning amongst health professional students (113). This innovative model may enable patients to receive management for chronic conditions such as CVD amongst underserviced or inaccessible community health services. As dietetic services are amongst the health services for patients with chronic conditions that are underserviced and inaccessible, this thesis explores the effectiveness of a Student Nutrition Service as a student-led model of care. It was hypothesised that the Student Nutrition Service provided for patients with PAD, as an underserved population within the CVD population would reduce markers of PAD progression amongst intervention patients. As the Student Nutrition Service for patients with PAD was designed based on Bandura's SCT (126), it was hypothesised that the environment provided by the Student Nutrition Service would positively influence cognitive and behaviour factors leading to learning and actions related to the desired behaviour in both intervention patient and student participants. The effectiveness of the Student Nutrition Service to elicit these outcomes will assist to determine if this alternate service delivery model is appropriate for underserviced or inaccessible community health services.

This chapter discusses the results of the four research objectives to answer research question of this thesis: 'What is the effect of the Student Nutrition Service for patients with PAD designed based on Bandura's SCT on objective patient outcomes and from the perspectives of patient and student participants?'. First, the findings will the discussed against existing literature. Next the strengths and limitations of the findings will be considered. The chapter will then conclude with the key findings

on the effectiveness of the Student Nutrition Service.

4.1 Patient Outcomes

Intervention patients demonstrated statistically significant and clinically meaningful changes in blood pressure and lipid studies and consumption of discretionary foods. On average the intervention reduced their discretionary serve intake by 2 serves at outcome (4.4±3.2 to 2.4±1.8 serves, p=0.01) which met the AGHE guidelines for serves of discretionary food that are recommended (4). SBP amongst the intervention group reduced by 11mmHg from baseline to outcome (151±16mmHg to 138±18mmHg, p=0.002) and were also clinically meaningful (104) as this resulted in an average SBP within optimal targets at outcome (SBP<140mmHg) (209). Whilst DBP was managed within optimal reference ranges of <85mmHg (209). Total cholesterol within the intervention group had a statistically significant reduction from 4.5±0.3 to 3.9±0.7 (p=0.03) whilst the control group had no change in total cholesterol (4.0±0.2 to 4.0±0.2, p=0.88). The change in TC observed within the intervention group was clinically significant as this brought the average TC at outcome to be within optimal targets (<4mmol/L) (49).

As discretionary foods are high in fat, salt and sugar, a reduction in these foods has been associated with improved blood pressure and cholesterol profile (4) and healthcare cost savings (244). The behaviour of consuming less discretionary foods within the AGHE serve guidelines also appears to be a comparable strategy to implementing a low sodium diet. A reduction in sodium intake has been associated with a 3 to 10mmHg reduction in SBP (245-248). Therefore, the reduction in blood pressure observed amongst the intervention group as a result of a reduction of

discretionary foods to meet the Australian Guide to Healthy Eating is the same, if not more compared to low sodium diet intervention studies (245, 246).

As the participants of the Student Nutrition Service were mainly older adults and/or obese, this further supports the knowledge that these patient groups are more sensitive to the blood pressure lowering effects from a reduced salt diet (247) and salt reduction can be achieved through reducing discretionary food consumption. This reduction in SBP observed is also a significant finding as the mean age of participants are 67 or 68 years of age, where SBP is less frequently controlled by pharmacological therapy to meet the target of $\leq$140mmHg (249). Additionally, older persons are at a higher risk of cardiovascular complications due to pulse pressure augmentation and increased pulse pressure as a result of SBP and aging (250). Therefore, the ability for dietary changes to improve SBP observed is clinically significant.

The 0.6mmol/L reduction in total cholesterol was similar to the 0.7mmol/L reduction in total cholesterol from The American Heart Association Hyperlipidaemia Diet (AHAHD) amongst patients with PAD (251). This demonstrates that dietary modification from the Australian Guide to Health Eating is comparable to the use of AHAHD in patients with PAD.

The changes in both SBP and TC are consistent with the effect of reducing the consumption of discretionary foods observed in the literature (252). Additionally, dietary analyses revealed improved diet quality according to the Australian Dietary Guidelines amongst both groups, particularly the intervention group. In the intervention group, statistically significant within group improvements to fruit,

grain, meat, dairy and discretionary serves (Table 16 and 17, page 142-145) demonstrated an improvement in the consumption of core foods and reduction in the consumption of non-core foods. This is clinically significant as data from the Wellbeing Eating and Exercise for a Long Life study demonstrated an overall reduction in the consumption of core foods amongst Australian adults aged 55 years and over particularly from those with low SES (253).

Patients with vascular disease are traditionally reported to have poor diets that include excess fat, cholesterol and sodium coupled with a sub-optimal micronutrient intake particularly fibre and antioxidants (254, 255). Whilst the feasibility of this population group to make dietary change when provided nutrition supports has been questioned (256), this program of research demonstrates that patients with PAD can make dietary changes that improve the nutritional quality of their diet. Dietary changes were observed amongst both groups, reflecting the ability of this patient group, who commonly have nutrient-poor diets, to improve their diet quality.

Both groups demonstrated poor dietary quality through consuming excess discretionary serves at baseline and inadequate core nutritious foods through inadequate serves of vegetable, fruit, grains and dairy foods at baseline. Meat consumption amongst both groups was the only core nutritious food group that was adequate at baseline. However, the dietary changes observed emphasised the need for dietary support to ensure that the outcomes are optimised as the intervention group demonstrated greater dietary change.

Increased understanding of the relationship between healthy eating and vascular

function, appeared to lead control patients to adopt commonly recognised healthy eating practices such as consuming more fruit and vegetables and consuming less 'junk food'. The control group adopted common healthy eating practices that led to the dietary change observed. However, the intervention group were closer to meeting the dietary guidelines than the control group at outcome. This suggests that the dietary supports provided during the intervention, in addition to self-implemented dietary changes are important to produce outcomes for this population. The changes observed are supported by the most commonly reported outcome of dietary interventions amongst patients with CVD, which is the improvement in overall dietary habits followed by reducing fat intake and increasing the intake of fruit and vegetables (257).

Additionally, the intervention group achieved a healthy dietary pattern from improvements in fruit, grain, meat, dairy and discretionary foods. This healthy dietary pattern achieved could reduce cardiovascular mortality amongst patients with PAD as a similar dietary pattern reduced risk and mortality amongst patients with CVD (258). The dietary pattern included higher intakes of fruits, vegetables, wholegrains, low-fat dairy, fish and poultry, which is associated with reduced CVD risk especially CVD mortality (RR estimate, 0.89;95% CI 0.75-0.87) and lower risk of all-cause mortality (RR estimate, 0.76; 95% CI, 0.68-0.86) from a meta-analysis of 13 prospective cohort studies (258).

Although there were no statistically significant changes within other arterial and nutritional markers of vascular disease progression observed, these markers either remained within the reference ranges or small clinical improvements were observed. Markers within the lipids were maintained close to the recommended

reference ranges for HDL (≥1.0), LDL (<2.0) and triglycerides (<2.0) (Table 14 and 15, page 139-141) (49), demonstrating optimal lipid control amongst both the intervention and control group. As inflammatory markers, all the white blood cells were within reference ranges at outcome suggesting no infection. However, at baseline the intervention group had a white blood cell count higher than the reference range. Higher white blood cell count along with higher neutrophils, eosinophil and monocytes has been associated with impaired endothelial dependant dilation facilitated by nitric oxide in healthy middle-aged and older adults (259). Therefore, this factor could have affected FMD and the results demonstrate that the average FMD observed in the intervention group was higher than the control group. Therefore, the slightly higher than normal white cell count may not have been high enough to impact flow mediated dilation at baseline as suggested by Walker and colleagues (259).

FMD had small non-significant improvements across both groups. Similarly, when consuming the DASH diet, no changes in FMD were observed in 27 adults aged 25 to 60 years, with a BMI between 20 to 40kg/m^2 with no diabetes or disorders in lipid metabolism for 30 days (171). However, FMD statistically significantly improved by 4.3% (p=0.02) after 3 months of 1g omega-3 supplementation twice a day (171). These differences in FMD observed amongst dietary studies including the FMD in this thesis, may display the impact of age, smoker status and CVD on FMD where diet has different effect sizes on FMD (171, 260, 261).

The nutritional markers tested from blood samples, demonstrated that the intervention group had higher levels of vitamin E and vitamin C than the control group at baseline (p=0.04 respectively). There were also statistically significant

within group reductions in folate (32.6±2.1 to 25.3±2.0, p<0.01) and zinc (12.6±0.5to 11.7±0.4, p=0.05) from baseline. Despite these statistical differences amongst the intervention and control group, the blood vitamin and minerals test remained within their reference ranges. This demonstrates that both the habitual diet as well as the intervention were not associated with dietary nutritional deficiencies. The intervention intended to improve diet quality and manage risk factors. Weight change was not expected as it was not a goal targeted for all intervention patients. Improvements in activities of daily living (ADL) were measured as a proxy indicator of the quality of life were also not anticipated as PAD is a progressive condition (242). These outcomes were measured to determine if adverse outcomes including weight gain and reduced ADL occurred during the study. As expected, there were no statistically significant changes in anthropometric markers measured such as body weight, BMI and waist circumference and quality of life (Table 18 and 19, page 145-146).

These observations amongst the arterial health and nutritional health markers of vascular disease progression, demonstrate that dietary change led to small improvements or optimal maintenance in arterial health and nutritional health. This is a key finding from this program of research. To the authors knowledge this is the first result from a student-led model of dietetic care for patients with PAD. Findings indicate dietary change amongst intervention and control patients had no statistically significant changes between groups. Interestingly, the intervention group met AGHE discretionary serves and control group did not. Additionally, both intervention patients and students reported new learning that led to the adoption of new behaviours from the same Student Nutrition Service setting. Intervention

patients adopted new behaviours associated with healthy eating practices. Student participants adopted behaviours associated with dietetic practice.

4.2 Influences of patient behaviour change

Focus group data gathered from the intervention participants identified that they consumed less discretionary foods, consumed more core foods and made healthy swaps which was in line with quantitative data that depicted change in their dietary patterns to be closer to the AGHE (4). A change in the foods that they consumed was related to the behaviour changes in both food shopping and cooking. New behaviours within the food shopping activity included (i) thinking about the AGHE (4), (ii) reading food labels and (iii) choosing not to purchase foods that were not acceptable according to the AGHE or food label guidelines. Similarly, interventions that provided patients with cooking skills were associated with improved attitudes to food (262). Use of label reading skills in food choice has also been associated with the purchase of healthier food products based on analysis of RCT data (263).

Our findings were also similar to a qualitative evaluation of a community nutrition intervention providing similar group nutrition class components (i.e. ,short interactive lecture, small group discussion and interactive cooking activity) for citizens of a low SES community, that was also conceptualised using SCT and the health belief model (264). Participants also reported the use of the food selection and preparation skills that they acquired from the intervention outside of the class (264). This demonstrates that understanding the facilitators of behaviour change that are required by the population through SCT (126) and providing the population with these facilitators can lead to behaviour change outside of the intervention. Both interventions aimed to provide tailored information and practical skills to

improve self-efficacy of food selection and preparation. Similar intervention strategies considering Bandura's SCT (126) included label reading activities and use recipes with affordable ingredients and new foods where new cooking methods could be introduced whilst considering participant preference, culture and skills (264). While Andrews and colleagues (264) focused on group-based learning, the Student Nutrition Service also provided individualised one-to-one learning.

In addition to attending the intervention sessions, these new behaviours reported amongst the intervention patients as part of their usual life routines, demonstrates that the Student Nutrition Service had successfully facilitated behaviour change amongst patients who habitually consume a poor-quality diet.

4.3 Student behaviours and influences

Whilst some students reported new behaviours in their usual life, as the expected behaviour change related to enacting practice as a student dietitian, most student participants reported new behaviours to occur within the Student Nutrition Service. In the students' usual life there were scarce opportunities to demonstrate their new dietetic behaviours (137). Hence for most student participants, the Student Nutrition Service was the primary site where they demonstrated their new behaviours.

New dietetic behaviours amongst student participants are the product of learning dietetic skills (126, 127, 134). New behaviours demonstrated amongst student participants during the Student Nutrition Service consisted of dietetic behaviours such as empathy, public speaking skills, engaging patients, gathering nutrition information, clinical reasoning, reflection and dietetic practice amongst patient

participants with PAD. These new behaviours were also reported amongst other studies where student participants were exposed to service learning opportunities (137, 141) which supports the Student Nutrition Service as a site for dietetic learning. Service-learning opportunities similarly provided students with placement opportunity to perform dietetic behaviours in a real-world setting (137). However, service learning opportunities were either based on developing clinical skills (141) or community group education skills (137), whilst the Student Nutrition Service provided opportunities to develop clinical and group education skills.

In addition to perceived competency development, demonstrating these new behaviours enabled students to perceive progress on forming their professional identity by undertaking and practicing the role of a dietitian and through the observing of models of dietetic practices (126). Similarly engaging in dietetic activities has previously been associated with the development of professional identity amongst dietetic students in curriculum-based university clinics (151), with exposure to different dietitians (265) and the course-curriculum (266). Students commonly reported that they were more confident in dietetic practice from participating (151) and patient exposure (267). Increased confidence from participating in dietetic practice was also common in the literature (151). Confidence and professional identity when developed early can assist students in placement and as a dietitian, who are considered the leading experts in evidence-based nutrition(268, 269). As student participants are able to model new behaviours, they develop confidence from demonstrating to themselves that they are able to perform the behaviour, thereby developing self-efficacy to perform the desired behaviour (126).

Within the student participant's coursework, some students specifically reported the transfer of confidence gained from participating in the Student Nutrition Service to the student participants' coursework and course-related placement contexts. The new behaviours of information gathering skills were reported to translate to increased confidence in gathering information in assessed oral viva examinations as a part of the course curriculum. Student participants also reported that communication with patient participants were conducted with more confidence due to exposure to patient participants in the Student Nutrition Service and the development of patient-centred communication skills and interpersonal skills. The lack of transfer between other new behaviours developed from the Student Nutrition Service and the student participants' coursework reported by student participants could be associated with the lack of other placement experiences aside from the Student Nutrition Service.

Reports of learning transfer between the Student Nutrition Service as a placement site and the student coursework is important as these reports suggest coherence between the Student Nutrition Service and the curriculum. From a recent study, the coherence between placement and the curriculum demonstrated a direct positive impact on student knowledge, general competency and skill development on placement (270). These reports suggest that if the Student Nutrition Service was built into the dietetic curriculum, it may serve as a suitable pre-placement aid for dietetic students that may reduce the learning load that students experience during their clinical placement (151). Additionally as, clinical placement educators have described the learning load experienced to include anxiety and confidence in a new environment and cultural food differences for culturally and linguistically diverse

students (269), the Student Nutrition Service could be particular important pre-placement learning site for enhance placement preparedness. Reducing these learning barriers for students through pre-placement preparation could also reduce the supervisory burden for placement educators (269). Morgan and colleagues also demonstrated that dietetics graduates similarly valued real world learning to develop preparedness as a graduate dietitian(271). Therefore, the findings from the Student Nutrition Service and existing literature support the provision pre-placement dietetic student-patient learning interactions.

Therefore, from participating in the Student Nutrition Service, student participants perceived the development of the competency and professional identity through conducting new dietetic behaviours that increased their skills, knowledge and confidence. This demonstrates that student participant opportunities to practice as student dietitians is perceived to facilitate the development of these two outcomes. Some students reported coherence between the Student Nutrition Service and the curriculum that aided their performance in the curriculum and supports recent literature that suggests coherence could also assist with clinical placement.

4.4 Evaluation of the Student Nutrition Service

Both intervention patients and student participants valued the intervention as it assisted them to adopt their respective new behaviours. The satisfaction reported by intervention patients aligns with existing literature where patients have commonly reported satisfaction with student health interventions (88-93). To the author's knowledge this is the first research study to identify the patient's perspectives about the effect of a free voluntary student dietetic service on their dietary behaviour change. However, the factors that are associated with satisfaction

achieved through this thesis appear to be similar to a student-led physiotherapy clinic from the perspective of twenty participants where data were collected through a semi-structured interview (272).

Forbes and colleagues explored the patients' perspective of participating in student-led physiotherapy clinics used for clinical education of students, that provided cost-effective services to the public (272). Common factors associated with satisfaction identified amongst the student-led physiotherapy clinic and the Student Nutrition Service included the thoroughness of care provided by students, supervisors who supervised the student to enable the student to perform the role, humility amongst students demonstrated by checking their decision making with their supervisor and their good communication skills (272). Therefore, this study (272) and the Student Nutrition Service demonstrate that intervention patient satisfaction is associated with thoroughness of care provided by student participants and intervention patients contributing to student learning, independent of cost of care to the patient.

4.4.1 Key aspects of the Student Nutrition Service

The supported environment fostered reciprocity between all participants, and this was amongst the key aspects of the Student Nutrition Service reported by intervention patients and student participants to facilitate their new behaviours. The next section discusses components of the intervention environment reported in detail against the literature and Bandura's SCT (126).

4.4.1.1 Individualising learning strategies without the requirement to demonstrate the new behaviour

4.4.1.1.1 Intervention patients

In concordance with Bandura's theory (126), intervention patients and student participants described the learning environment as a motivator for behaviour change. Intervention patients described the method used by the student participants and facilitators who offered modelling and elaborative suggestions to extend behaviours. Negotiation of individualised dietary strategies enabled patients to be empowered within their intervention. As a result, intervention patients did not feel they were being told what to do but felt safe to choose to practice and adopt the new behaviours.

There's evidence that the power relationship enacted where health care professionals maintain expert status over providing health solutions to patients draws patients away from developing confidence in self-management as described by this patient (273).

Yet, the Student Nutrition Service, takes away the monopoly power relationship between a practitioner and patient, as the intervention was conducted through student participants who also learned from and with the intervention patients, essentially partnering with the patients involved (273). This form of partnering that promotes both student participants and intervention patients to learn together fosters a patient-centred care approach as described by Karazvian and colleagues as a framework that promotes self-management, interchange of knowledge that reduces morbidity and improves quality of life (273).

Patient participants reported receiving patient-centred care in the Student Nutrition Service. The patient-centred care provided by student participants in the Student Nutrition Service is similar to aspects of patient-centred care reported in the literature. Common aspects of patient centred care reported by intervention patients and described in the literature included a positive professional to patient relationship, individualising and adapting care, redistributing power to the patient, displaying humanistic behaviours and using effective communication (274).

Intervention patient's described student participants as displaying their humanistic behaviours and their personality through the cooking session. It was also through the group class that intervention patients and student participants felt that they built upon a positive working relationship due to the time spent together, as it was the primary site of mutual learning between intervention patients and student participants. The individualised sessions and group sessions enabled student participants to use effective communication, redistribute power to the intervention patient and individualise and adapt the care provided.

The motivational messages enabled the key nutritional messages previously communicated in the individualised session or the group session to be communicated as a summary. Therefore, the motivational messages also functioned to redistribute power to the intervention patient to motivate the adoption of behaviours associated with the key nutritional messages learnt and provide possible ideas personalised to their dietary preferences that could be adopted. Thus, the motivational messages provided intervention patients with ideas of how to change dietary behaviour and transfer this learning to other meaningful environments including their home. Similarly, tailored motivational messages

individualised to the patient in respect to content and tone has also been previously associated with patient preference and dietary changes amongst adults in the primary care setting (275, 276). This thesis demonstrates that the motivational messages also facilitated learning in how to apply key nutrition messages in practice, thus promoting self-management.

In a systematic review, Sladdin and colleagues recognised a strong desire amongst patients to receive individualised nutrition care as well as an opportunity to have greater involvement in their care through a patient-centred approach (274). Aspects of negotiation, provision of information and individualised recommendations throughout all aspects of the intervention (i.e., individual session, group sessions and motivation messages) removed individual barriers to behaviour change (e.g., such as food preferences). These also provided patients with suitable strategies that patients were confident to apply which enabled them to initiate their own care. This motivated patients to self-manage. Bandura identified these features of individualisation (i.e., goal identification and attainment as well as environmental motivators) as environmental elements that facilitate behaviour change (126).

This highlights the importance of the intervention design, that included the individualised sessions, group sessions and motivational messages to create a patient-centred care experience. This also supports the intervention patient's perspective that all components of the intervention provided in the Student Nutrition Service was valuable to them as enablers for their dietary behaviour change. The components of the intervention assisted patients to develop cognitive factors as described by Bandura (126) that influenced learning and behaviour changes, including the development of nutrition knowledge, cooking skills and skill

of applying nutrition knowledge to food practices.

4.4.1.1.2 Student Participants

In consideration of Bandura's theory (126), student participants reported that the learning environment was positive and usual pressures associated with coursework or placement-based assessment was removed. They also reported benefiting from the encouragement and constructive feedback provided by the supervisor and the patients. Student participants reported that they were able to make mistakes, not be judged, and supported through anxiety often associated with working directly with patients, including answering patient questions and unscripted responses to patients' comments. Encouragement and support provided from a supportive supervisor is crucial to learning within the real-world environment, as students reported the importance of encouragement and recognition from their supervisor; one of their role models of practice that they aspire to achieve (277). Therefore, a supportive encouraging real-world environment that enables scaffolded learning without assessment of judgment facilitating them to practice dietetic behaviours from the perspective of student participants.

The negative effect of this unique student-supervisor relationship is revealed in Rowland and colleagues' meta-narrative review that reports problematic modelling that can arise from the student learning in the real-world environment (278). Role modelling the provision of patient from senior clinicians demonstrating skill beyond what is required by entry-level health professionals to complete placement can lead to goals formed by aspirations rather than coursework requirement (278). This hidden curriculum formed from expectations misaligns with graduate outcomes and the requirement for students to balance their learning needs against the provision

of patient care. Therefore, in their experience at the Student Nutrition Clinic, clear expectations of the student participant were provided through student lead and initiated learning goals. Scaffolding assisted student participants to achieve these created expectations that aligned with competencies required by a graduate. This factor avoided misaligned expectations and aspirations in the Student Nutrition Service and contributed to creating an environment that encouraged student learning.

The intervention design ensured that student participants were matched to developmentally suitable activities according to their year level of study. The supervisor provided private verbal and re-enactment support to assist student participants to achieve their practice goals. This support would involve the supervisor providing student participants with a model of reflection (i.e., Gibbs' cycle) as well as opportunities to practice with the supervisor and receive feedback prior to enacting the behaviour of dietitian with their patient. This form of support was also provided if student participants required during the individual sessions or group sessions. This scaffolding enabled the student participant to enact the role of the professional demonstrating desired behaviours, whilst minimising direct supervisor interventions with the patient that could be an environmental barrier to the desired behaviour. Scaffolded experiential learning is important in pre-placement, placement and post-placement learning settings for competency development and work readiness amongst health professionals such as pharmacists (279, 280). As experiential learning sites promotes students to build professional identity through self-regulation and reflection, scaffolded reflection provided by the Student Nutrition Service may have contributed to professional identity

development (281). Therefore, a supportive environment free from these environmental barriers facilitated the development of graduate skills amongst student participants and self-efficacy which enable transfer of dietetic behaviours to coursework contexts.

Student participation therefore consisted of modelling and practice with patients, student observation of peers and some student observation of the supervisor modelling practice. Therefore, the Student Nutrition Service was well structured to minimise misaligned aspirations and self-expectations (cognitive barriers to behaviour), and to support cognitive factors such as the development of skills through developing self-efficacy amongst students (126).

For the specific context of nutrition and dietetics students, Porter and Colleagues identified that patient involvement in student education as a facilitator of skill and competency progression (282). In this study, students reported the development of communication skills, patient counselling skills, reflection skills and professional skills along with progression on the Australian National Dietetic Competencies. This is concordant with the findings of Porter and colleagues systematic review that identified the attainment of these skills through both real and simulated patients (282). This demonstrates that students perceived that dietetic skills were developed from the intervention experience they had with patients.

Camaraderie with peers

Intervention patients and student participants reported that their peers were a source of motivation. According to Bandura's theory, peers would provide an environmental motivator in the Student Nutrition Service setting (126). Intervention

patients reported that they attended the sessions because of the friendships formed with their peers where they could also gauge each other's' progress despite their individualised goals. A student participant also reported camaraderie between the intervention patients, so this was evident to those participating in the Student Nutrition Service.

This support provided from peers in group patient interventions has been documented amongst stroke and cancer patients. Similarly, group sessions with peers experiencing the same medical condition were associated with friendships or camaraderie described as making new connections (283) or sense of community or unconditional acceptance (284). Upward and downward comparisons was also reported as an important process identified by patients that led to therapeutic benefits of feeling empowered and a sense of belonging (283). The camaraderie between peers provides an environmental facilitator of learning and behaviour change whilst comparisons against other peers provides cognitive influences that promotes self-efficacy towards behaviour change (126).

Students who participated in peer mentoring also reported this activity as a motivator. Amongst student participants from different year levels, the senior student participant reported that they were motivated when junior student participants asked them questions. Senior student participants were motivated to demonstrate their knowledge and reasoning to peers, and model dietetic practices correctly, and these opportunities developed their confidence. Junior student participants who preferred to learn from senior student participants and seek peer support from senior student participants, found that the mentoring experience gave them the opportunity to do this and motivated their learning and skill progression.

Meanwhile, junior student participants who preferred to learn from their supervisor still gained benefit from observing senior student participants as models of how dietetic practice could be applied, and as another motivator to engage in new dietetic behaviours. The junior student participants also reported that the senior student participant's encouragement and support were motivators to conduct the new behaviour and attain their learning goals.

The benefits of peer mentoring in clinical settings have been also reported amongst midwifery students (285). Third year midwifery students mentoring first year midwifery students on clinical placements, 75% of mentors reported the development of communication and leadership skills while over 80% of junior and senior students reported that mentoring assisted junior students to adjust to the placement (285). Student who preferred to learn from their supervisor appeared to have established trust and approachability based on student participant semi-structured interview data that removed the students feeling of vulnerableness which has been characterised as a good supervisor-student relationship (286, 287).

Students who participated in peer mentoring with their same year peers reported that they enjoyed sharing their strengths in a team working relationship. This sharing enabled these student participants to collaborate i developing their knowledge and preparing for sessions to provide the best experience for intervention patients. Practical observation of the strengths amongst peers provided student participants with motivation that assisted in their learning through modelling their peer.

Satisfaction, development of confidence in clinical practice and improvement in learning has also been reported in research about peer learning. Peer-assisted learning on placements has also been associated with a good learning experience reported amongst dietetic students (288). Dietetic students also more frequently reported a satisfactory workload compared to the presence of no peer learning (288). Similarly, a systematic review of health professional students participating in peer learning, reported increased motivation, confidence and preparation for placement amongst students (289). Aston and Molassiotis (290) have also previously recognised reduced anxiety amongst junior students receiving peer mentoring from senior students, as well as the development of teaching skills amongst senior students who mentored junior students.

Peer mentoring enables observational learning described by Bandura where behavioural imitation of a model, in this case, the peer occurs (126, 291). Observational learning can scaffold the learner to imitate the new behaviour fast-tracking the new behaviour in the learner compared to theory-based learning which requires additional time to action the new behaviour (126). Research evidence also suggests that motivation levels are higher when peer mentoring is embedded within standard learning curriculum compared to a standard learning curriculum taught by the teacher alone (292).

4.4.1.2 Respect for each other's role in the Student Nutrition Service

Intervention patients and student participants reported respect for each other's role in the Student Nutrition Service that also enabled a warm positive learning environment to be created. The intervention patients also saw their role in student learning and reported that they empathised with the difficult skills that the student

practiced and developed. Their perceived teaching role and their empathy for the student participants as learners motivated intervention patients to be attentive and studious. These motivators are described by Bandura as adoptive motivators (126).

Student participants were dependent upon the openness of patients to the student intervention to facilitate their learning. Almost all student participants reported that 'the patient was friendly' as a reason they were able to demonstrate dietetic skills and develop competencies. Student participants reported that the mutual respect they received intervention patients was as a strong motivator to demonstrate dietetic behaviour. Student participants identified that intervention patients were receptive to student suggestions and models of practice even though these suggestions were provided by student participants.

Student participants also reported that the behaviour change amongst intervention patients, that resulted from their suggestions, enabled student participants to see the impact of their practice on intervention patient goal attainment which directly impacted patient outcomes. This was a strong motivator for student participants to continue to enact dietetic behaviour and was particularly reported amongst student participants who were undertaking their first exposure to patients. Knowing that their intervention patient was responsive to change, lead student participants to identify and anticipate further opportunities for positive behaviour change amongst patients if nutritional support is continued. Bandura suggested that this confirmation of their anticipatory thoughts and perceiving that their recommendations are effective, motivates the student to continue to choose this cause of action for their patient (126).

Patients have also acted as strong motivators within medical student education. Through a thematic analysis of focus groups amongst undergraduate medical students, Diemers concluded that early patient contacts motivated students to study, enhance their knowledge and construction of clinical reasoning (293). Patients provided experiential learning for students that enabled students to develop analytical reasoning (293), similar to the recognition of receptiveness to behaviour change amongst patients in participating dietetic students. However, Manninen and colleagues suggest that from their ethnographic study, that patients may only be active in student learning if students are able to create a good atmosphere and a mutual relationship (294). As both students and patients developed a mutual learning relationship in the supportive Student Nutrition Service environment, these factors appeared to be associated with the relationship that demonstrate respect and motivation observed.

Therefore, from both the patients and students' perspectives, the Student Nutrition Service led to patients and student forming a mutually supportive relationship that filled a service delivery gap amongst patients and learning gap amongst students. Additionally, patients had desirable changes in objective clinical markers of PAD and both intervention patients and student participants reported desirable changes to their behaviour from participating. The Student Nutrition Service was an environment that fostered reciprocal learning outcomes for intervention patients and student participants which also acted as a motivator for further behaviour change. These findings are considered against the strength and limitations of the study design to determine the effectiveness of the service.

4.5 Strengths and Limitations

As a mixed methods study that embedded a RCT, this study provided a rigorous design and enabled the collection of qualitative data to explain quantitative data and minimised bias to determine the effectiveness of the service. The RCT design reduced the risk of selection bias through using a computer-generated randomisation sequence of patients into respective intervention and control groups by a blinded researcher. Additionally, stratifying the patient allocation according to mild disease (stage 0 to 3) or severe disease (stage 4 to 6) ensured that disease states that could confound the clinical outcomes were spread amongst the intervention and control group. The stratification was successful in reducing confounding from disease states as demonstrated by the non-statistically significant difference between PAD disease states as observed in Table 12 (page 135-136). Stratifying also created an additional complexity to randomisation, greatly reducing the ability of the researchers providing the intervention to determine the allocation.

Subjective clinical outcomes such as diet history collection was conducted by students who were blinded to the patient's allocation. Additionally, patient participant identifications were removed enabling blinded data analysis by the doctorate candidate. The doctorate candidate was unblinded at the point of writing after presenting the results to the research team. These forms of blinding reduce reporting bias. The collection of multiple quantitative outcome measures also reduced measurement bias.

To gain the perspective of patient participants', questionnaires and focus group data were gathered whilst student participants' perspectives were captured through questionnaires, written reflections and semi-structured interview data.

These forms of data collection enabled the identification of new behaviours and facilitators of behaviour change to be reported. The interviewers who conducted the focus groups amongst patients and semi-structured interviews amongst students were independent of the intervention and had not been directly involved in any of the study activities providing rigour and credibility. Intervention patients and student participants were blinded to the questions asked in the focus groups and semi-structured interviews respectively. This method of collecting data from patients and students reduced reporting bias through triangulating multiple different sources of qualitative data to gather information on their evaluation. Data gathered via the documented processes additionally provides transparency reducing bias.

Although the design featured reduced measurement and reporting bias, the patient findings are limited by the sample size of 43 patients. The suboptimal recruitment and retention rate achieved a smaller sample than the required total sample of 50 and was therefore theoretically underpowered to detect the effect on PAD progression. Changes particularly in vascular health markers including FMD and TG that the sample size was theoretically calculated with, were not theoretically possible. Yet there was statistically significant reduction in two other vascular health markers of PAD progression. Statistically and clinically significant within group reduction in systolic blood pressure and total cholesterol were observed.

There were no indicators of PAD progression, as demonstrated through observed improvements and maintenance in optimal health, the non-statistically significant changes in pain-free walking distance and walking distance over 6 minutes and lack of adverse vascular events at outcome.

Although the findings were associated with improvements in the intervention group, the findings were limited by lack of compliance of some participants in the control group (Table 16 and 17). Small improvements in dietary quality amongst the control group, may have diluted the effect of the intervention and caused the between group SBP to not reach statistical significance. Eight control patients provided data that could have been impacted by confounding factors. Five patients allocated to the control group changed their eating by increasing the fruit and vegetables consumed and reducing the quality of discretionary foods consumed. These dietary changes improved the overall diet quality of these patients during the intervention period (Table 16 and 17). Additionally, 2 patients required surgical intervention aimed at improving their vascular function during the intervention period and one control patient also decreased their usual exercise.

However, 8 intervention patients also provided data that could have negatively impacted the result by the same confounding factors. One intervention patient maintained their usual food intake despite accepting the nutrition intervention negotiated and discussed with them. Six intervention patients also reduced their usual exercise during the intervention and one intervention patient required surgical intervention aimed at improving their vascular function. As surgical intervention and behaviour change was similar in both the intervention and control group, these patients were not excluded from the per protocol analysis. Amongst the control group, the reduction by 7mmHg from baseline to outcome was statistically significant (148$\pm$23mmHg to 137$\pm$16mmHg, p=0.02) (Table 14 and 15). Small not statistically significant dietary changes were also observed within the control group particularly through the improvement in vegetable intake (2.5$\pm$1.3

serves to 3.2±1.4 serves, p=0.08) in addition to the improvement in discretionary serves (Table 16 and 17). These dietary changes improved the diet quality amongst the control group.

Twenty intervention patients and twenty-two control patients maintained their involvement over the 3 month-intervention period. The control group had an attrition rate of 18.5% (5 out of 27 randomised) and the intervention group had an attrition rate of 5% (1 out of 21 randomised) (Figure 5). This was similar to the 12-month dietary intervention study in patients with PAD where the control group had a 25% attrition rate (5 out of 20 randomised) and the intervention group had a 12% attrition rate (3 out of 25 randomised) (251).

Fourteen out of 22 control patients were compliant in maintaining their usual activity and food intake during the 3-month intervention. The dietary changes observed in the control group provided with usual care highlights a limitation of this unblinded dietary intervention. The difficulty of adequately controlling and blinding the intervention in dietary studies have been acknowledged where difficulty in blinding patients increases the risk of exposure to expectation bias (84). Additionally, while placebo-controlled trials are most robust, it's been acknowledged that creating a placebo for dietary advice studies is challenging (84). Although placebos have been successfully applied in short feeding studies providing participants with food to test the intervention, feeding studies have limited external validity as it removes the factor of how patients are able to obtain the food they receive (84). Factors such as cost of purchasing the prepared foods and not being able to recreate the food/meal provided limit external validity.

Nevertheless, this study provides findings that compare self-implementation to supported implementation of dietary changes. Similarly, although saturation was not reached at the point of qualitative analysis from patient focus group data due to the small number of intervention patients involved in this pilot project the patient's perspectives offered insights into external validity of the Student Nutrition Service intervention. Therefore, other patient perspectives related to the external validity of the intervention may be provided by other participants and should be continued to be measured in future studies. Additionally, although focus group data supported data from the Knowledge Quiz that intervention patients had obtained knowledge from attending the community classes, the Knowledge Quiz could be provided at the first community class in future studies improve the rigor of data collection on nutrition knowledge.

The intervention was provided amongst smaller groups than anticipated, which was a further limitation of the research. A major factor was the slow recruitment rate and time between recruitment and intervention caused some consented participants to experience a change of mind or change in circumstance. As a result of these changes, these patient participants withdrew from the study. Changes in circumstances included change in health requiring intervention (e.g., cancer diagnosis, had a fall, required amputation etc).

These changes also affected the student intervention. Small patient numbers limited the availability of learning opportunities for student participants. This resulted in some students who had expressed interest to not consent to participate in the study due to the lack of opportunities. Therefore, the lack of patients also reduced the student recruitment rate. Additionally, patient participants who did not

attend their appointment, limited the assigned student participant a learning opportunity. In these situations, student participants were assigned other patients who were booked in, which then limited opportunities for students who had not commenced. Nevertheless, theoretical saturation was reached amongst the student perspectives gathered (295). Therefore, although the opportunity for students were limited by patient participation, the perspectives gathered on perceived competency and professional identity development from the Student Nutrition Service reached saturation (232) and therefore are factors that can be considered in future studies. Future studies should also consider observed student dietetic behaviour formally assessed by an Accredited Practicing Dietitian Placement Educator as an outcome as this current thesis reports student participant perceptions which may not completely reflect competency obtained as assessed in placement. Additionally, the use of Bandura's SCT (126) as a conceptual framework grounds the concepts within exciting theory adds rigor to the analysis methods used and has also been applied in other health behaviour change interventions (164, 296).

The perspectives of intervention patients and student participants may have been positively or negatively affected by the candidate's view of the research such as the research question, the participants, and the setting. For example, the candidate's lens, influenced their position and interactions with patient participants and student participants. Subheadings 4.6 and 4.7 provides a reflexive statement describing the candidate's position with patient and student participants and how the candidate's lens could have impacted on the intervention and the methods used to reduce bias within data analysis and interpretation.

4.6 Candidate's position with Patient Participants

Before conducting this thesis, the candidate had contributed to the recruitment and data collection of three projects with patients with PAD. This experience enabled the candidate to develop familiarity with the disease, its treatment both in the inpatient and outpatient settings, the vascular team, and the research available. This familiarity assisted the candidate to develop rapport with the patients which may have impacted on the recruitment. Knowledge of the condition enabled the candidate to take notice and cater for patients' limitations such as pain on walking or inability to stand for long periods of time due to PAD, during the recruitment and participating process that may have contributed to rapport building and removal of barriers to participation.

As the candidate was associated with assisting the intervention patient to achieve behaviour change through student supervision and the provision of fortnightly motivational messages, bias in the collection of subjective patient views such as their perspective of the service needed to be managed. Therefore, an external researcher conducted the focus groups which was the primary source of this information.

4.7 Candidate's Position with Students Participants

The candidate was a 2014 graduate of the Flinders University, Bachelor of Nutrition & Dietetics Honours program and a Casual Academic within the Flinders University Nutrition Department since 2017 to present. Participating students were also enrolled at Flinders University, Bachelor of Nutrition & Dietetics or Master of Nutrition and Dietetics programs. As the course structure had not significantly changed from when the candidate was a dietetics student, the candidate had a level

of familiarity with the course structure and the teaching staff that enabled the candidate to empathise with the participating dietetics students. The familiarity with the course enabled the candidate to help students to link the theory learnt in the course to the practical aspects of participating in the Student Nutrition Service to assist students to apply theory to their practice and understand the importance of the theory taught. Therefore, the results may have been influenced by the candidate's familiarity with the coursework program, and an alternate supervisor may not have achieved the same or the degree of positive student perspectives.

The candidate was also aged 25 to 26 years during the intervention periods, similar to the mean age of student participants which was 26 years. The similarity in age may also have contributed to the empathy and familiarity that enabled an honest and open relationship between the participating students and the supervisor enabling students to ask questions. In addition to the manner of supervision used where the supervisory relationship that was based on encouragement and assistance compared to assessment, this factor may have assisted this relationship to perceived as a peer mentoring experience.

The candidate is Chinese but born in Australia, providing an insight and appeal to international and domestic students. These factors may have contributed to rapport building between the students and supervisor and may be associated with the supervisory relationship that was developed and described by students.

To minimise the bias associated with the data collected on student perspectives, the data to answer the research question was collected at the end of the student involvement when the student and candidate relationship ended. Additionally, the

semi-structured interview, the primary data source was conducted by a researcher who was not involved in the intervention. The completion questionnaire was also completed anonymously where only the study identification number was recorded as the identifier and provided to the interviewer prior to the semi-structured interview. As the reflection and observation sheets were completed during the intervention and reflected learnings and comments during the intervention, blinding was not possible and deemed, not necessarily a significant contributor to reporting bias associated with the research question.

Therefore, features of the study design were embedded to reduce bias associated with the candidate's viewpoint, the collection of data and in data analysis. Although the study was theoretically underpowered to determine the effect of the intervention of clinical outcome of the patients, the findings demonstrate that the intervention for the patients was effective based on some objective outcomes as well as from the intervention patient and student participants perspectives.

4.8 Effectiveness of the Student Nutrition Service

To the author's knowledge this study is the first to capture patient outcomes, patient and student perspectives of a dietetic student intervention involving dietetic students of all year levels. The findings demonstrate that patients with PAD can make dietary changes motivated by the knowledge and practice related to dietary behaviours that could improve their disease condition. The findings demonstrate that support provided from the Student Nutrition Service can reduce intervention patients' discretionary food intake to meet the Australian dietary recommendations and result in meeting ideal ranges for SBP and total cholesterol amongst patients with PAD. The support provided a safe environment, with camaraderie amongst

peers, respect for each participant's role in the service and individualised intervention supports existing literature on effective patient-student learning relationships (294). At outcome, there were no signs of vascular disease progression amongst the intervention nor the control group. However, the dietary changes amongst the intervention group were theoretically associated with a reduced cardiovascular risk.

A follow-up study with a longer duration would be necessary to determine the presence or absence of reduced cardiovascular risk. Nevertheless, study adds to the existing literature by providing supporting rationale for dietetic students to receive real-world patient exposure to enhance their learning and confidence in dietetic practice (151, 267, 269). Findings demonstrate that exposure could particularly enhance student identification and practice of dietetic competencies. The rationale for real-world patient exposure is further supported by the positive patient responses to the student intervention as well as dietary behaviour changes amongst patients.

4.8.1 Filled the Service and Learning Gap

Patients were also provided with a nutrition service that they would normally not have access to. In addition to increasing patients' understanding of the benefits of the new behaviour, observing participating students learn and develop skills, also built patients' motivation to continue with the program and self-efficacy.

This framework fostered students to transition from theoretical practices based on the patients' medical condition as dictated by the course curriculum and instead discover their professional identity (i.e., the practitioner that they wanted to be

when communicating with patients) and to practice patient-centred care when considering the theory.

International students experienced placement challenges identified by many dietetic students in the Student Nutrition Service is supported by a previous study conducted on clinical placement educators' perspective (269). Building confidence in dietetic practice, patient communication and familiarising themselves with a new setting (i.e., clinical or community) and role were amongst the challenges identified. However, they also faced additional challenges associated with cultural differences in particular lack of familiarity with the local food, eating patterns, patient attitudes and available social activities (297).

Although placement challenges exist, exposure to patients and theoretical information taught in the curriculum enhanced students learning (298). Similar to the findings from the Student Nutrition Service, Kim and colleagues reported that students were able to acquire and enhance existing dietetic skills such as communication skills and integrate concepts taught in the curriculum to their patient experience of providing a meal service to elderly patients (298). Specifically, students in this intervention spent approximately 2 hours per a week for 5 to 6 weeks assisting in preparing meals, interacting with elderly clients whilst they congregate for the meal, delivering meals to those who were homebound and providing nutritional education presentations. Along with the Student Nutrition Service data, Kim and colleagues (298) demonstrates that a small period (2-3 hours) of exposure over a considerable period of time such as at least a month may be associated with dietetic skill and practice development that could be manageable for dietetic students.

Just as other forms of patient involvement in dietetic student education have increased awareness and confidence amongst students in dietetic practice (136, 151), student participation in the Student Nutrition Service also built confidence and self-efficacy through patient interactions. In the Student Nutrition Service, students reported that the patients' respect and encouraging engagement and feedback were important in their development of self-efficacy and professional identity. As acknowledged by Porter and Colleagues the patient voice was a powerful source of feedback for students (282). The verbal and written feedback provided students with assurance that the patients were satisfied with students' shaping their goals and assisting their dietary change. In particular, the verbal feedback, provided students with both motivation and confidence as this included their patients reporting new healthy eating behaviours that they had incorporated into their lives or shared with others.

Awareness and confidence from exposure to real world dietetic practice through standardised scenarios (299) and experiential learning (151) have been commonly reported outcomes (282). Similar to the Student Nutrition Service, experiential learning in practicing diet history interviewing skills amongst third year Australian nutrition and dietetics students provided students an authentic yet safe learning experience to develop interpersonal communication skills and confidence in dietetic practice (130). It appears that experiential authentic real-world settings (151, 265, 300) are required to foster the development of professional identity. From participating in the Student Nutrition Service students reported the development of professional identity. However, this outcome has not been routinely reported amongst simulated learning experiences (299, 301).

Participating students reported that, whilst they valued the real-life experience of the Student Nutrition Service it was important that their first exposure to real patients be situated within a safe learning environment. This safe environment supported students to learn dietetic practice engaging in scaffolded dietetic activities, and through the provision of support in researching patient question, forming evidence-based responses, and being encouraged to view and interact with patients as individuals.

Embedding participation into dietetics courses would incentivise students to participate and learn in these environments prior to assessment. This may enhance their motivation and application of their learning and may facilitate greater satisfaction in the course content through reducing stress associated with examinations and placements. Incentives are described by Bandura as highly influential of adoptive behaviour (126). Embedded participation not only acknowledges the student's participation to assist their coursework but also reduces their burden in seeking and participating in volunteer real world experiences. Volunteer activities limit the number of students that will participate. For example, although the Student Nutrition Service was open to all dietetic students as a volunteer experience not all students chose to participate and not all students could participate due to their availability. Embedded opportunities offer participation to all students and removes barriers associated with time or guilt of spending less time on coursework.

Professional identity and dietetic competency development are important for dietetic students to learn the skills required to graduate (197, 302). Student-led or student directed, or peer review approaches along with self-reflection enable

students to develop professional identity and self-assessment of dietetic competency progress. Therefore, authentic real-world settings along with a student-led, student-directed or peer reviewed approach such as the Student Nutrition Service facilitates dietetic student learning to develop skills embedded within a safe environment. This safe environment could be particularly important for international students (303).

International students participating in the Student Nutrition Service reported that they improved upon their food knowledge skills from participating. The primary activity that enhanced the development of food knowledge skills was diet history interviewing and dietary analysis on Foodworks. Additionally, some students enhanced their food knowledge skills through the small group presentation context and some also reported strengthening their food knowledge skills through self-directed research with the aim to incorporate simple, practical, evidenced-based nutritional messages to intervention patients with approval from their supervisor.

The development of familiarity with the intervention environments, new skills and new knowledge were associated with the new dietetic behaviour which promoted professional identity and perceived competency development amongst participating students. These aspects enabled the student to exercise personal control over their dietetic practice behaviours that facilitated the perception of developing competencies (126). The students' understanding of the dietetic competencies and how to practice new behaviours came from orientation, observational learning, practical learning and reflective practice components of the intervention. These facilitated confidence and self-directed learning that are essential to underpin the development of competency (127). The students who

participated in the Student Nutrition Service without completing a prior placement did not perceive they were a competent graduate level dietitian at the end of their participation. However, students viewed that the service contributed to their development of competencies and confidence. As described by Bandura, this view may be facilitated by the forethought that competency can only be gained through successfully completing assessed placement. Nevertheless, the Student Nutrition Service was a supportive environmental facilitator of dietetic students' learning. Students reported to development in cognitive factors (i.e., skills and knowledge) that enabled students to perform dietetic behaviours and perceived that they developed their dietetic competencies across all domains. While the Student Nutrition Service model tested facilitated both patient and student outcomes, the perspectives of intervention patients and student participants assisted to identify areas within the model that were important for both participant groups to achieve the desired behaviour change in this setting.

4.9 Future directions: Bandura's Social Cognitive Theory as a framework for intervention design and analysis

Bandura's SCT (126) assisted the candidate to examine how the Student Nutrition Service facilitated positive behaviour change for both patients and students. This provides powerful insight to inform the delivery of future healthcare services to PAD patients as well as the curriculum of dietetic students. It provided a framework that enabled the design of the Student Nutrition Service. The findings support the utilisation of this framework along with the insights from both patients and students could inform future strategies in planning the prevention, treatment and management of chronic diseases. Along with the expected rise in chronic health

conditions, healthcare will need to be increasingly person-centred to be receptive to the aging population (304). Bandura's SCT (126) enables interventions to be person-centred and therefore is a suitable framework in the design and analysis of chronic disease interventions.

Figure 19 depicts the interaction between the three pillars of Bandura's SCT (126) from the perspective of intervention patients and student participants to facilitate behaviour change from participating in the Student Nutrition Service. Concepts described in Figures 16, 17 and 18 illustrate the duality between intervention patient and student participant drivers of behaviour change. The formation of new behaviours as described by intervention patients and student participants respectively are combined in Figure 19 as behaviour change and learning amongst student participants are occurring in parallel and mutually within the Student Nutrition Service. The bolded two-way arrows represent the reciprocity relationship between the personal, behaviour and environmental pillars of Bandura's SCT (126). As Bandura describes that self-efficacy influences each of the three central pillars, this influencer is depicted by the circle surrounding these three central pillars (126). The narrow arrows represent the interaction between self-efficacy and aspects of self-efficacy (i.e., goals and motivation) and their influence on the three central pillars of behaviour changes (126) as described from participating patients and students.

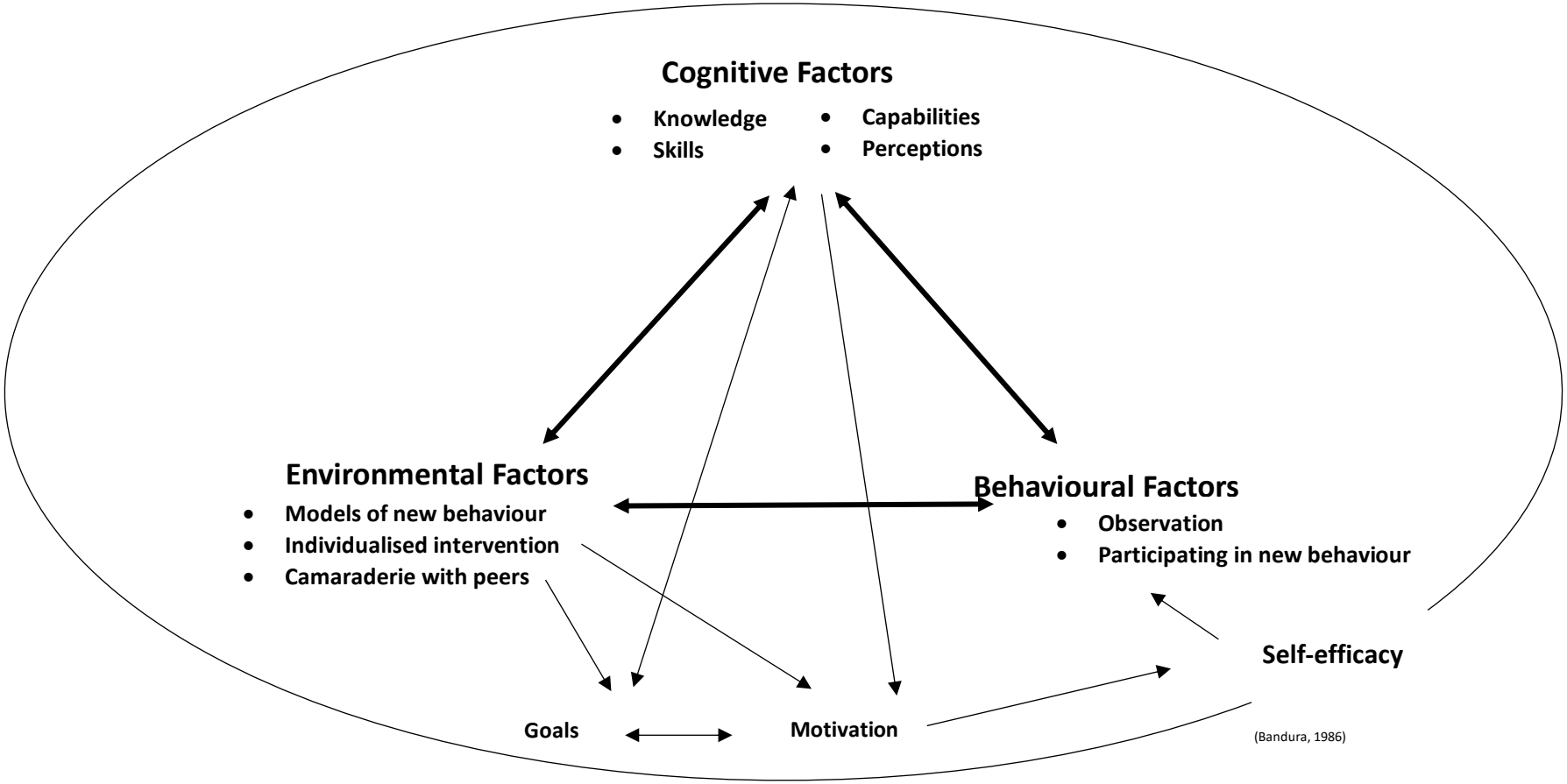

Figure 19: Refined Student Nutrition Service Model based on intervention patients and student participants' perspectives mapped on Bandura's SCT (126)

Key findings

- Intervention patients valued the accurate individualised information provided through multiple information sources and skill modelling activities. These factors enabled them to succeed in making changes through reducing their obstacles to change and facilitated the building of self-efficacy in adopting new dietary behaviours
- The intervention patients' role as a teacher in student learning and the reciprocity of the learning within the service provided were likely additional motivators for adoptive behaviour.
- Reduction in SBP and total cholesterol observed were similar to other studies and meet optimal targets.
- Experiential learning with supervision through this model of care provides student participants with a safe environment that enables their focus on learning, and patients to feel reassured and involved in their own care.
- The Student Nutrition Service Model designed using Bandura's SCT was effective at improving clinical patient outcomes and perceived development of competency and professional identity amongst student participants.

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS FOR PRACTICE AND RESEARCH

5.1 Conclusions

The Student Nutrition Service was a warm supportive environment that enabled intervention patients and student participants to learn together and derive benefits that were specific to their goals. Students developed and built upon dietetic competencies specifically in communication, interpersonal, dietetic data collection, assessment, clinical reasoning, food knowledge, patient-centred counselling and education as well as reflective skills. As a result, students felt more confident for future patient exposures within their course as well as specific assessment activities such as their oral viva examination and final year placements. The confidence developed through skills from patient exposure, led students to value the experience, recommend the experience to other students, and voice their desire for the service to continue.

Intervention patients reduced their consumption of discretionary foods and improved their overall diet quality to a greater extent than the control group. This finding demonstrated that support is required for patients to achieve and be closer to achieving dietary targets that align with clinical targets such as blood pressure and total cholesterol. Motivators of dietary change consisted of awareness that healthy eating could improve the disease state, reciprocity for free healthcare services and assisting students learn to be dietitians.

The study was small which may mostly be a result slow participant recruitment and barriers to participating in an intense intervention. Whilst the study did not reach the sample size calculation or theoretical saturation to inform themes related to the

intervention patient's perspective, the results captured from this mixed methods study demonstrate implications for practice and future research.

As a case study the Student Nutrition Service for PAD demonstrated effectiveness in serving an underserved population whilst enabling students who lack practical learning opportunities to learn. Therefore, this evidence contributes to the existing evidence that student-directed interventions for underserved populations can provide patients with clinical outcomes and students with learning outcomes that contribute to their development as a health professional. This finding provides implications for practice amongst dietetic students that may also be extended to the education of other health professionals.

5.2 Implications for Practice

This study demonstrates preliminary data to support the practice recommendation that nutritional support should be provided to patients with PAD. Nutritional support should be provided in the form of one-to-one consultations as well as group classes to build capacity amongst patients to self-manage their dietary behaviours. One-to one consultation could come through referral to the dietetics hospital outpatient clinic. Further implementation research is required to enable private consultations and group sessions in the community setting to remove barriers to dietetic care in the primary care setting. Access to subsidised primary supports is important amongst this population group as many are elderly, living on a pension or younger working aged but limited by their vascular condition and supported by a disability pension. Further research can also aid the implementation of nutritional care led by students.

The results demonstrate that non-assessed student learning in authentic real-world scenarios such as the Student Nutrition Service are beneficial for dietetic students to develop their professional identity and competencies in a safe environment. With the new self-directed assessment of dietetic competencies released in 2017 (197), trialling non-assessed authentic learning experiences for dietetic students of all year levels could begin in practice to enable students to develop skills to self-direct their assessment. For sites that contain student dietetic clinics for fourth year student placements, this model of peer learning, introducing students of all year levels could be implemented and trialled.

Amongst education of other health professionals, these data provide some rationale to support this model of student services as an educative opportunity for students of all year levels. As an educative model that also provides patient outcomes through interventions informed by guidelines and available research, it may also be adopted amongst patients with other chronic diseases and amongst other single professions services and interdisciplinary services. Students and patient outcomes achieved from the Student Nutrition Service model were similar to existing research amongst other single profession and interdisciplinary services supporting this model of practice.

5.3 Implications for Research

Whether patients maintain the targeted dietary behaviours and clinical outcomes after the intervention period are important areas to explore through long term follow up at 6, 12 and 18 months. This would enable a better understanding of whether the Student Nutrition Service is comparable to professional led dietary interventions that are commonly maintained at 6 and 12 months post intervention

and not at 18 months (257). Additionally, the collection of long-term health outcomes at the same timepoints could enable cost-effectiveness of the service compared to the usual care control group. Although there is some existing research to suggest that student-led models are cost effective (31) the literature is conflicting amongst interprofessional-led models (30). Therefore, the further exploration of cost effectiveness of providing the service for patient care could be considered. Of interest, future research could examine the rates of hospital admissions, use of healthcare dollars and mortality between the intervention and control group. The intervention group could also be compared to outcomes and costs of the service if it were provided by dietitians compared to students.

Although this thesis demonstrates the effective components of a student service model to achieve learning amongst patients and students, the cost effectiveness of this learning model was not assessed. The service utilised an existing office space, a hired community kitchen and room for education activities, a 1.0FTE Accredited Practising Dietitian (the candidate who was supported by a scholarship) and an 0.4 FTE administrative assistant. Thereby the Student Nutrition Service functioned at a low cost. However, the cost of resources required to run the service could be modelled and compared against resources required if the service was embedded in the curriculum. A basic economic evaluation of these cost could indicate the cost of the service and if coupled with data on how the service translates to curriculum learning. The students' perspectives about their participation in assessed activities such as placement could determine whether implementation is required within the dietetic course structure. The collection of students' competency-based assessment data and analysis of competency development would determine if behaviour

change observed in the Student Nutrition Service is associated with competency development. Interviews that explore student perspectives about their long-term outcomes may also identify the influence of learning transferred between the Student Nutrition Service and coursework. Bandura's SCT (126) could also enhance the understanding of how learning and development transfers from the Student Nutrition Service to other assessed dietetic practice activities within coursework, as the theory can describe learning in accordance with the triadic domains. This is evidenced by how learning within the Student Nutrition Service is described by Bandura's SCT (126) throughout this thesis. Similarly, within the assessed dietetic practice activity such as student placement, environmental, cognitive and behavioural influences are present, as well as interactions that affect learning in this situated context. An additional branch of this research could determine the feasibility of implementation with the dietetic course structure. Any changes would need to meet requirements by the Dietetics Association of Australia.

A larger RCT that provides an appropriate sample size could enable further investigation of the effect of dietary intervention on the presence of reduced inflammation and oxidative stress amongst patients. This could assist in explaining if this mechanism is associated with improved dietary quality through the AGHE on patients with PAD. Exploration of inflammatory markers that detect the presence of oxidative activities such as VCAM, TNF-α, IL-1β, IL-4 and IL-6 which have been associated with anti-inflammatory effects of healthy food pattern such as fruit and vegetable consumption (305) could be informative of whether the dietary changes that occurred were cardiovascular protective through reducing oxidative stress. As placebos have limited external validity (84), this RCT could consider patient self-

selection of participating in the intervention or control. Based on the attrition rate observed in this study, this consideration could be more feasible amongst patients with PAD to provide external validity and reduce bias associated with dietary change amongst the control group. However, if future studies were to measure inflammatory markers the intervention period needs to be at least 8 weeks or more and anthropometry measures should be taken in consideration that change in weight can also confound the inflammation observed (306).

Although more face-to-face contact time has been associated with dietary change (257), contact time has also shown to exclude the younger working population and those with other commitments from participating in this study. Yet patients within the control group who had no intervention contact time demonstrated dietary changes through awareness only that diet could assist with their disease. This demonstrates that patients with PAD are looking for alternatives and perhaps a personal preference allocation may demonstrate results that represent usual care compared to intervention activities more closely. Additionally, individualisation of the intervention was a key facilitator of behaviour change identified from the patient focus group data. Individualisation of intervention with patient specific strategies was reported to facilitate new nutritional knowledge and skills. Therefore, to attract the younger PAD population the intervention could be individualised based on the presence of diabetes, level of nutritional knowledge and skills that the patient desires to obtain. These factors could be negotiated at the baseline appointment with the interventionist to ensure adequate one-to-one support in-person or over the phone and a level of group support is provided to participating patients. An alternative innovative translation of the intervention into

face-to-face private consultations along with digital group sessions may be an appropriate approach for the younger working patient population. Convenient healthy foods and simple easy meal preparations kits may also be a suitable alternative to face-to-face cooking sessions.

Providing patients with supports from one-to-one and group settings assists intervention participants to be exposed to the supportive environment that facilitates behaviour change. The environment facilitated participants to develop camaraderie between other participants, and professional relationships with the students providing their service. As the intervention applied in this study would be similar for patients with CVD such as hypertension, hyperlipaemia and coronary heart disease, these patient populations could also be included as students demonstrated that they were able to responsively and effectively manage the dietary needs of a range of these patients through the intervention, under supervision.

This study demonstrated the preference amongst students to be exposed to non-assessed authentic real-world settings during their studies to develop practice skills gradually rather than exclusively in the setting of assessed placement activities. This finding provides rationale for trialling developmentally appropriate, non-assessed authentic real-world settings for students of all health disciplines who are each required to demonstrate practice competencies and could benefit from patient exposure early in their course curriculum. Additionally, patients could benefit from a multidisciplinary intervention including students from disciplines such as medicine, physiotherapy, occupational therapy, podiatry, pharmacy and exercise physiology.

This journey in determining the effectiveness of a dietetic Student Nutrition Service for patients with PAD has demonstrated success in developing a functional service that contributes to patient health and dietary behaviour changes as well as student learning and perceived competency development. Therefore, it has been a fruitful journey and contributes to the research available, and also provides additional avenues that can be further explored. Although this journey would be considered lengthy for most, its rewards for patients and students have made it a worthwhile journey.

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APPENDICIES

Appendix 1: Student-led health interventions Systematic Review: Supplementary Materials

Search Strategies

Database searched	Search Strategy				Results 19th August 2019
CINAHL	#	Query	Limiters/ Expander	Results	32
	S1	TX (student* N4 (led OR run OR managed OR facilitated OR directed)) AND (clinic OR clinics OR service* OR consult* OR care OR healthcare OR program* OR practice* OR model* OR initiative* OR intervention* OR promotion* OR centre* OR center*)	Search modes - Boolean/ Phrase	1740	
	S2	(MH "Obesity") OR (MH "Obesity, Morbid")	Search modes - Boolean/ Phrase	75,589	
	S3	(MH "Overweight")	Search modes - Boolean/ Phrase	0	
	S4	(MH "Diabetes Mellitus+")	Search modes - Boolean/ Phrase	142,725	
	S5	(MH "Hypertension")	Search modes - Boolean/ Phrase	48,465	
	S6	(MH "Blood Pressure")	Search modes -	34,844	

		Boolean/ Phrase			
S7	(MH "Cardiovascular Diseases") OR (MH "Heart Diseases+") OR (MH "Vascular Diseases+")	Search modes - Boolean/ Phrase	498,753		
S8	(MH "Hyperlipidemia") OR (MH "Hypercholesterolemia")	Search modes - Boolean/ Phrase	16,946		
S9	TX (obes* or overweight or hyperten* or "blood pressure" or "cardiovascular disease" or "heart disease" or "vascular disease" or hyperlipid*mia or hypercholesterolemia)	Search modes - Boolean/ Phrase	332,438		
S10	S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 ORS9	Search modes - Boolean/ Phrase	781,453		
S11	S1 AND S10	Search modes - Boolean/ Phrase	83		
S12	S1 AND A10	Search modes – Boolean/ Phrase Limiters- Age groups: Adolescents: 13-18 years, Adult:19-44years, Middle Aged:45-64 years, Aged:65+, Language: English	32		

<table>
<tr><td>Medline</td><td><table>
<tr><td>#</td><td>Searches</td><td>30</td></tr>
<tr><td>1</td><td>((student* adj4 (led or run or managed or facilitated or directed)) and (clinic or clinics or service* or consult* or care or healthcare or program* or practice* or model* or initiative* or intervention* or promotion* or centre* or center*)).mp.</td><td>1747</td></tr>
<tr><td>2</td><td>Obesity/ or Obesity, Morbid/</td><td>187953</td></tr>
<tr><td>3</td><td>Overweight/</td><td>22769</td></tr>
<tr><td>4</td><td>exp Diabetes Mellitus/</td><td>406163</td></tr>
<tr><td>5</td><td>Hypertension/</td><td>227384</td></tr>
<tr><td>6</td><td>Blood Pressure/</td><td>268567</td></tr>
<tr><td>7</td><td>cardiovascular diseases/ or exp heart diseases/ or exp vascular diseases/</td><td>2285047</td></tr>
<tr><td>8</td><td>exp Hyperlipidemias/</td><td>64463</td></tr>
<tr><td>9</td><td>(obes* or overweight or hyperten* or "blood pressure" or "cardiovascular disease" or "heart disease" or "vascular disease" or hyperlipid*mia or hypercholesterolemia)</td><td>1284202</td></tr>
<tr><td>10</td><td>2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9</td><td>3257557</td></tr>
<tr><td>11</td><td>1 AND 10</td><td>87</td></tr>
<tr><td>12</td><td>Limit 11 to (English language and humans and ("adolescent (13 to 18 years)" or "young adult (19 to 24 years)" or "adult (19 to 44 years)" or "young adult and adult (19-24 and 19-44)" or "middle age (45 to 64 years)" or "middle aged (45 plus years)" or "all aged (65 and over)" or "aged (80 and over)"))</td><td>30</td></tr>
</table></td></tr>
<tr><td>ProQuest Health & Medicine</td><td>student* NEAR/4 (led OR run OR managed OR facilitated OR directed)
AND
clinic OR clinics OR service* OR consult* OR care OR healthcare OR program* OR practice* OR model* OR initiative* OR intervention* OR promotion* OR centre* OR center*
AND
obes* OR "morbid* obes*" OR overweight OR diabet* OR hypertensi* OR "blood pressure" OR heart OR cardiac OR cardiovascular OR coronary OR vascular OR stroke OR "cerebrovascular accident*" OR arrhythmi* OR atrial OR myocardial OR hyperlipidemia OR cholesterol OR Hypercholesterolemia OR hypertriglyceridemia*
<u>Limit to:</u> Full text
<u>Additional limits:</u> Age group: Adolescents 13-18years) Adults(19-44years), Middle aged (45-64 years), Aged (65+years), aged (80+years), Article, English</td><td>529</td></tr>
<tr><td>PsycINFO</td><td><table>
<tr><td>#</td><td>Searches</td><td>21</td></tr>
</table></td></tr>
</table>

	1	((student* adj4 (led or run or managed or facilitated or directed)) and (clinic or clinics or service* or consult* or care or healthcare or program* or practice* or model* or initiative* or intervention* or promotion* or centre* or center*)).mp.		1973	
	2	Obesity/ or Obesity, Morbid/		23276	
	3	Exp Overweight		244569	
	4	exp DIABETES/		16720	
	5	HYPERTENSION/		6486	
	6	Blood Pressure/		6885	
	7	exp cardiovascular disorders/		59669	
	8	Cholesterol/		2094	
	9	(obes* or overweight or hyperten* or "blood pressure" or "cardiovascular disease" or "heart disease" or "vascular disease" or hyperlipid*mia or hypercholesterolemia).mp		91580	
	10	2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9		144850	
	11	1 AND 10		21	
	12	Limit 11 to (English language and adulthood<18+years>)		16	
Web of Science	(((student* NEAR/4 (led OR run OR managed OR facilitated OR directed)) AND (clinic OR clinics OR service* OR consult* OR care OR healthcare OR program* OR practice* OR model* OR initiative* OR intervention* OR promotion* OR centre* OR center*)) AND obes* OR “morbid* obes*” OR overweight OR diabet* OR hypertensi* OR "blood pressure" OR heart OR cardiac OR cardiovascular OR coronary OR vascular OR stroke OR "cerebrovascular accident*" OR arrhythmi* OR atrial OR myocardial OR hyperlipidemia OR cholesterol OR Hypercholesterolemia OR hypertriglyceridemia*)) Refined by: LANGUAGES: (ENGLISH) Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC.			636	
Informit Health Database Collection	(obes* OR "morbid* obes*" OR overweight OR diabet* OR hypertensi* OR "blood pressure" OR heart OR cardiac OR cardiovascular OR coronary OR vascular OR stroke OR "cerebrovascular accident"* OR arrhythmi* OR atrial OR myocardial OR hyperlipidemia OR cholesterol OR Hypercholesterolemia OR hypertriglyceridemia*) AND ((clinic OR clinics OR service* OR consult* OR care OR healthcare OR program* OR practice* OR model* OR initiative* OR intervention* OR promotion* OR centre* OR center*)) AND			4	

	student (led OR run OR managed OR facilitated OR directed)	
Cochrane Library	((student* near/4 (led or run or managed or facilitated or directed)) and (clinic or clinics or service* or consult* or care or healthcare or program* or practice* or model* or initiative* or intervention* or promotion* or centre* or center*)) and (obes* or "morbid* obes*" or overweight or diabet* or hypertensi* or "blood pressure" or heart or cardiac or cardiovascular or coronary or vascular or stroke or "cerebrovascular accident*" or arrhythmi* or atrial or myocardial or hyperlipidemia or cholesterol or Hypercholesterolemia or hypertriglyceridemia*	95
Scopus	(TITLE-ABS KEY ((((student* W/4 (led OR run OR managed OR facilitated OR directed)) AND (clinic OR clinics OR service* OR consult* OR care OR healthcare OR program* OR practice* OR model* OR initiative* OR intervention* OR promotion* OR centre* OR center*))))) AND (TITLE-ABS- KEY ((obes* OR "morbid* obes*" OR overweight* OR diabet* OR hypertensi* OR "blood pressure" OR heart OR cardiac OR cardiovascular OR coronary OR vascular OR stroke OR "cerebrovascular accident*" OR arrhythmi* OR atrial OR myocardial OR hyperlipidemia OR cholesterol OR hypercholesterolemia OR hypertriglyceridemia*)) AND (LIMIT-TO (LANGUAGE , "English"))	208

Data Extraction Protocol

Protocol for data extraction on Covidence:

To extract all data available from the paper.

Watch https://www.youtube.com/watch?v=iBqsKQDsW4k re. editing data extraction forms to ensure all information is added.

Best to copy and paste information from the paper to help with consensus stage

Use notes to let the other reviewer know if you have contacted author

Complete all fields

Examples of extra Fields to add if not already present in the form:

Identification:

- Year of publication
- Year that study occurred

Methods

- Description of intervention
- Duration of intervention
- Patient's recruitment methods
- Strengths to data collection
- Limitations to data collection

Population

- Number of patient participants (e.g., 40)
- Number of patients included in data analysis (e.g., 12)
- Number of drop out and rate (e.g., 13, 20%)
- How was sample size calculated (if applicable)?

Baseline characteristics

- All descriptive characteristics e.g., mean age, gender
- E.g., baseline HbA1c, other clinical markers

Interventions

- Describe intervention by adding the following characteristics as appropriate:
  – type of care provided (e.g. x reviews)
  - who the care was provided by (e.g. student nurse and doctor or student alone)
  - Tailoring (individualised, group or both)
  - length of the intervention – to describe number of session, schedule, duration and dose (e.g. 1 x 30 mins over 3months etc)
  - mode of delivery (e.g. face-to-face or internet or telephone or

combination)
- Location of the intervention (e.g. clinic, home or list all locations used)
- What was provided? -include materials and procedures conducted
- Intervention adherence or fidelity - (e.g. if assessed, provide a description of how Students are assessed and describe the extent to which the intervention was delivered as planned)

The fields above are from the TiDieR Checklist to describe interventions

- Describe student involvement if described by adding the following characteristics as appropriate:
  - Student involvement as volunteer or part of course work
  - Student's discipline
  - Year level
  - Level of involvement (how many sessions involved)
  - Description of involvement
  - Relationship to coursework if relevant
  - Multi-D or single discipline
  - Feedback provided or not

Outcomes of interest are:

1. Clinical outcomes associated with disease progression: e.g., lipid studies, HbA1c, BP, adverse event
2. Student outcomes

Add outcomes based on study

Please check reference lists for other relevant articles

Results Summary Table

<table>
<tr><th>Author, year</th><th>Population</th><th>Patient Intervention</th><th>Results</th></tr>
<tr>
<td>Adams, 2015</td>
<td>Type 2 Diabetes

Intervention (n=67)
Control (n=56)</td>
<td><u>Intervention</u>:
Two student led level 3 medication review provided by pharmacy student under supervision

<u>Control:</u> standard care</td>
<td>
<table>
<tr><td></td><td colspan="2">Intervention</td><td colspan="2">Control</td><td></td></tr>
<tr><td></td><td>Mean</td><td>SD</td><td>Mean</td><td>SD</td><td>P-value</td></tr>
<tr><td>Baseline HbA1c mmol/mol</td><td>56.81</td><td>11.12</td><td>59.71</td><td>13.92</td><td></td></tr>
<tr><td>Outcome HbA1c mmol/mol</td><td>56.32</td><td>11.5</td><td>59.68</td><td>13.2</td><td>0.14</td></tr>
<tr><td>Baseline TC mmol/L</td><td>4.14</td><td>0.99</td><td>4.19</td><td>0.91</td><td></td></tr>
<tr><td>Outcome TC mmol/L</td><td>4.22</td><td>1.0</td><td>4.01</td><td>0.8</td><td>0.47</td></tr>
<tr><td>Baseline SBP mmHg</td><td>132.48</td><td>11.98</td><td>131.65</td><td>10.9</td><td></td></tr>
<tr><td>Outcome SBP mmHg</td><td>132.36</td><td>12.9</td><td>127.98</td><td>11.9</td><td>0.06</td></tr>
<tr><td>Baseline DBP mmHg</td><td>73.22</td><td>8.15</td><td>72.13</td><td>9.54</td><td></td></tr>
<tr><td>Outcome DBP mmHg</td><td>73.38</td><td>6.8</td><td>70.97</td><td>9.5</td><td>0.11</td></tr>
</table>
</td>
</tr>
<tr>
<td>Brown, 2015</td>
<td>Low income overweight and obese community residents

N =25</td>
<td>10 group community classes co-taught by between 2 to 4 students weekly over 10 weeks.</td>
<td>
<table>
<tr><td></td><td colspan="2">Intervention</td></tr>
<tr><td></td><td>Mean</td><td>SD</td></tr>
<tr><td>Baseline weight (kg)</td><td>112.99</td><td>36.84</td></tr>
<tr><td>Outcome weight (kg)</td><td>111.03</td><td>36.91</td></tr>
<tr><td>Baseline BMI (kg/m^2)</td><td>41.43</td><td>11.85</td></tr>
<tr><td>Outcome BMI (kg/m^2)</td><td>40.72</td><td>11.89</td></tr>
<tr><td>Percent weight change</td><td>-2.51</td><td>2.08</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td>Cusumano, 2017</td>
<td>Overweight or obese patients based on BMI score.

N=28</td>
<td>12 individual meetings to set goals and strategies, 6 cooking classes and 1 supermarket tour providing 19 sessions over 12 weeks.</td>
<td>
<table>
<tr><td></td><td colspan="2">Intervention</td><td></td></tr>
<tr><td></td><td>Mean</td><td>SD</td><td>P-value</td></tr>
<tr><td>Baseline weight (kg)</td><td>111.98</td><td>33.47</td><td></td></tr>
<tr><td>Outcome weight (kg)</td><td>109.00</td><td>33.93</td><td><0.001</td></tr>
<tr><td>Baseline BMI (kg/m^2)</td><td>41.21</td><td>10.64</td><td></td></tr>
<tr><td>Outcome BMI (kg/m^2)</td><td>40.13</td><td>10.98</td><td><0.001</td></tr>
</table>
</td>
</tr>
<tr>
<td>Gorrindo, 2014</td>
<td>Type 2 Diabetes

N= 43</td>
<td>Visits and phone calls regarding clinical care provided by PHE students to provide follow up every 1 to 2 months or as needed over 12 months.</td>
<td>
<table>
<tr><td></td><td colspan="2">Intervention</td><td>P-value</td></tr>
<tr><td></td><td>Mean</td><td>SD</td><td></td></tr>
<tr><td>Outcome HbA1c</td><td>9.6</td><td>NP</td><td><0.0001</td></tr>
</table>
</td>
</tr>
<tr>
<td>Janson, 2009</td>
<td>Type 2 Diabetes

Intervention (n= 384)

Control (n=163)</td>
<td>Individual 30-minute appointment and follow up for individual self-management activities by nursing practitioner or pharmacy students.</td>
<td>
<table>
<tr><td></td><td colspan="2">Intervention</td><td colspan="2">Control</td><td></td></tr>
<tr><td></td><td>Mean</td><td>SD</td><td>Mean</td><td>SD</td><td>P-value</td></tr>
<tr><td>Baseline HbA1c</td><td>7.7</td><td>1.7</td><td>7.6</td><td>1.7</td><td>0.60</td></tr>
<tr><td>Outcome HbA1c</td><td>7.7</td><td>1.6</td><td>7.5</td><td>1.7</td><td>0.24</td></tr>
<tr><td>Baseline LDL</td><td>106</td><td>34.3</td><td>107</td><td>36.3</td><td>0.90</td></tr>
<tr><td>Outcome LDL</td><td>100</td><td>31.3</td><td>98.4</td><td>31.9</td><td>0.64</td></tr>
<tr><td>Baseline SBP</td><td>134</td><td>21</td><td>130</td><td>20.5</td><td>0.09</td></tr>
<tr><td>Outcome SBP</td><td>134</td><td>20.3</td><td>130</td><td>21.1</td><td>0.07</td></tr>
<tr><td>Baseline DBP</td><td>71.4</td><td>10.6</td><td>72.1</td><td>12</td><td>0.54</td></tr>
<tr><td>Outcome DBP</td><td>71</td><td>11.7</td><td>71.8</td><td>11.5</td><td>0.52</td></tr>
</table>
</td>
</tr>
<tr>
<td>Kahkoska, 2018</td>
<td>Type 2 diabetes

N=29</td>
<td>Team of trans-disciplinary trainees (medical, nursing, pharmacy students) working together to perform triage, medication reconciliation, brief history and physical exam followed by one 60 to 90 min shared medical</td>
<td>
<table>
<tr><td></td><td colspan="2">Intervention</td></tr>
<tr><td></td><td>Mean</td><td>SD</td></tr>
<tr><td>Baseline HbA1c</td><td>9.7</td><td>1.6</td></tr>
<tr><td>Outcome HbA1c</td><td>9.2</td><td>1.4</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr><td></td><td></td><td>appointment led by patients.</td><td></td></tr>
<tr><td>Lee, 2016</td><td>Type 2 Diabetes

N=22</td><td>Six classes and 12 weekly phone calls over 12 weeks delivered by medical students and resident physicians.</td><td><table>
<tr><td></td><td colspan="2">Intervention</td></tr>
<tr><td></td><td>%</td><td>Range</td></tr>
<tr><td>Baseline HbA1c</td><td>9.2</td><td>6.0-12.5</td></tr>
<tr><td>Outcome HbA1c</td><td>8.0</td><td>5.9-11.4</td></tr>
</table></td></tr>
<tr><td>Martin, 2015</td><td>Type 2 Diabetes

N=48</td><td>One off clinic visit provided by pharmacy students</td><td><table>
<tr><td></td><td colspan="2">Uncontrolled diabetes</td><td colspan="2">Controlled diabetes</td></tr>
<tr><td></td><td>Median</td><td>%</td><td>Median</td><td>%</td></tr>
<tr><td>Baseline HbA1c</td><td>78.1</td><td>9.3</td><td>44.3</td><td>6.2</td></tr>
<tr><td>Outcome HbA1c</td><td>59.8</td><td>7.6</td><td>46.4</td><td>6.4</td></tr>
<tr><td>P-value</td><td colspan="2">Not significant</td><td colspan="2">0.004</td></tr>
</table></td></tr>
<tr><td>Mehta, 2016</td><td>Type 1 or Type 2 Diabetes

N=68</td><td>Individual education conducted by medical students about advantage of primary care in the management of diabetes and preventing long-term complications over 9 months</td><td><table>
<tr><td></td><td colspan="2">Attended 2 or more appointments</td><td colspan="2">Attended less than 2 appointments</td></tr>
<tr><td></td><td>Mean</td><td>SD</td><td>Mean</td><td>SD</td></tr>
<tr><td>Baseline HbA1c</td><td>9.5</td><td>2.3</td><td>8.9</td><td>3.1</td></tr>
<tr><td>Outcome HbA1c</td><td>8.3</td><td>2.2</td><td>8.3</td><td>2.1</td></tr>
<tr><td>P-value</td><td colspan="2">0.008</td><td colspan="2">0.4</td></tr>
</table></td></tr>
<tr><td>Nagelkerk, 2018</td><td>Diabetes

N=250</td><td>Inter-professional collaborative practice education program provided by an inter-professional team of students (medical, pharmacy and physician assistant students) with the practice team.</td><td><table>
<tr><td></td><td colspan="2">Intervention</td></tr>
<tr><td></td><td>Mean</td><td>P-value</td></tr>
<tr><td>Baseline HbA1c</td><td>7.3</td><td></td></tr>
<tr><td>Outcome HbA1c</td><td>7.2</td><td>0.346</td></tr>
<tr><td>Baseline SBP</td><td>136</td><td></td></tr>
<tr><td>Outcome SBP</td><td>136.9</td><td>0.217</td></tr>
<tr><td>Baseline DBP</td><td>81.3</td><td></td></tr>
<tr><td>Outcome DBP</td><td>82.0</td><td>0.073</td></tr>
</table></td></tr>
</table>

			Baseline HDL	49.7	
			Outcome HDL	50.8	0.126
			Baseline LDL	102.3	
			Outcome LDL	97.6	0.171
			Baseline glucose	156.7	
			Outcome glucose	148.7	0.110
Nuffer, 2012	Type 1 or Type 2 Diabetes	Six one-hour, one-to-one diabetes self-management sessions by pharmacy students over 6 months.		Intervention	P-value
				Mean SD	
			Baseline HbA1c	7.7 2.0	
			6mo post intervention HbA1c	6.8 1.1	<0.001
			Baseline TC	181.3 45.7	
			6mo post intervention TC	167.2 39.2	<0.001
			Baseline SBP	132.3 16.8	
			6mo post intervention SBP	128 14.6	<0.001
			Baseline DBP	77.8 10.9	
			6mo post intervention DBP	75.3 9.8	<0.001
			Baseline LDL	104.1 42	
			6mo post intervention LDL	92.1 33.4	<0.001
			Baseline HDL	41.7 12.2	
			6mo post intervention HDL	42.9 14.3	0.15
			Baseline TG	192.2 116	
			6mo post intervention TG	161 91.2	<0.001
Rojas, 2015	Hyperlipidemia N= 96	Free appointment with medical students and dispensing of medications free of change. Follow up between 6 weeks and 18 months after initial appointment.		Intervention	P-value
				Mean SD	
			Baseline LDL mg/dl	135.8 37.2	
			Follow up LDL mg/dl	101.3 34.6	<0.001
Smith, 2014	Diabetes	Individualized clinic sessions by medical students.		Intervention	P-value
				Mean SD	

	N=182		Baseline HbA1c: 9.15 (2.5) 6mo post intervention HbA1c: 8.19 (2.15) 0.001 Baseline LDL: 116.34 (43.6) 6mo post intervention LDL: 87.21 (32.19) 0.001 Baseline HDL: 46.11 (13.84) 6mo post intervention HDL: 49.35 (13.00) 0.001 Baseline TG: 230.18 (191.87) 6mo post intervention TG: 159.64 (84.28) 0.001 Baseline SBP: 131.89 (18.2) 6mo post intervention SBP: 126.65 (18.77) 0.05 Baseline DBP: 81.86 (12.08) 6mo post intervention DBP: 75.08 (11.79) 0.001
Smith, 2017	Hypertension N=496	Free appointment by medical students under physician supervision. Follow up visit 9 to 15 months later.	Intervention: Mean (SD); P-value Baseline SBP: 141.6 (21.8) Outcome SBP: 132.1 (17.3) <0.001 Baseline DBP: 85.1 (13.2) Outcome DBP: 79.4 (10.8) <0.001
Stroup, 2003	Diabetes Intervention (n=30) Control (n=40)	Home visitation or phone call program provided by pharmacy students over 2 years.	Intervention: Mean (SD); Control: Mean (SD); P-value Baseline HbA1c: 11.2 (1.3); 10.7 (1.6) Outcome HbA1c: 10.0 (2.0); 9.9 (2.5) Change: -1.2; -0.8 0.4678 Baseline TC: 203 (43.4); 193.2 (30.1) Outcome TC: 195.6 (46.3); 184.5 (39.4) Change: -8.5; -5.0 0.8047 Baseline SBP: 130.8 (14.5); 121.3 (15.3) Outcome: 130.8 (15.4); 125 (15)

			SBP					
			Change	-0.9		+3.0		0.4545
			Baseline DBP	79.1	7.2	74.4	9.1	
			Outcome DBP	76.9	8.6	74.1	7.8	
			Change	-2.5		-0.5		0.4955
Szkiladz, 2013	Heart failure Intervention (n=86) Control (n=94)	Additional discharge counselling by pharmacy students compared to no discharge counselling by pharmacy students on medication and lifestyle considerations.		Intervention		Control	P-value	
				%		%		
			Adjusted heart failure readmissions	10.5		8.5	0.8	
			Adjusted heart failure readmission	11.1		8.1	0.52	

Table 3: Critical Appraisal of Randomised Controlled Trials

Author, year	**Adams, 2015**	**Stroup, 2003**
Chronic Disease	T2DM	Diabetes
1. Was true randomisation used for assignment of participants to treatment groups?	Y	Unclear
2. Was allocation to treatment groups concealed?	Y	N
3. Were treatment groups similar at the baseline?	Y	Y
4. Were participants blind to treatment assignment?	N	N
5. Were those delivering treatment blind to treatment assignment?	N	N
6. Were outcomes assessors blind to treatment assignment?	Y	N
7. Were treatment groups treated identically other than the intervention of interest?	Y	Unclear
8. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	Y	N
9. Were participants analysed in the groups to which they were randomised?	Y	N
10. Were outcomes measured in the same way for treatment groups?	Y	Y

11. Were outcomes measured in a reliable way?	Y	Y
12. Was appropriate statistical analysis used?	Y	Y
13. Was the trial design appropriate, and any deviations from the standard RCT design (individual randomisation, parallel groups) accounted for in the conduct and analysis of the trial?	Y	Y
Overall Appraisal (Include, Exclude, Seek further info)	Include	Include
Comments (Including reason for exclusion)	No outcome timepoint data measured. Trial was unblinded.	Method of randomisation applied, allocation concealment and number of patients included in 2-year outcome data was not stated. Patients continued to see their physicians as scheduled.

Table 4: Critical appraisal of quasi-experimental studies

Author, year	**Brown, 2015**	**Janson, 2009**	**Kahkoska, 2018**	**Lee, 2016**	**Nagelkerk, 2018**	**Szkiladz, 2013**	**Cusumano, 2017**	**Gorrindo, 2014**	**Martin, 2015**	**Mehta, 2016**	**Nuffer, 2012**	**Rojas, 2015**	**Smith, 2014**	**Smith, 2017**
Chronic Disease	Overweight and Obesity	Diabetes	Diabetes	Diabetes	Diabetes	Heart Failure	Overweight and Obesity	Diabetes	Diabetes	Diabetes	Diabetes	Hyperlipidaemia	Diabetes	Hypertension
1. Is it clear in the study what is the cause' and what is the 'effect' (i.e., there is no confusion about which variable comes first)?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. Were the participants included in any comparisons similar?	Y	NA	NA	NA	NA	Y	NA	NA	NA	NA	NA	NA	NA	NA
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Y	NA	NA	NA	NA	Y	Unclear	NA	NA	NA	NA	NA	NA	NA
4. Was there a control group?	N	Y	N	N	N	Y	N	N	N	N	N	N	N	N
5. Were there multiple measurements of the outcome both pre- and post-the intervention/ exposure?	Y	Y	N	Y	Y	Y	Y	Y	Unclear	Y	Y	N	Y	Unclear
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	N	Y	Y	NA	Unclear	Y	Y	Y	Y	Y	Y	Y	Y	Y
7. Were the outcomes of participants included in any comparisons measured in the same way?	Y	Y	Y	NA	Y	N	NA	NA	NA	NA	NA	Y	NA	NA
8. Were outcomes measured in a reliable way?	Unclear	Y	Y	Y	Y	Y	Unclear	Y	Y	Y	Y	Y	Y	Unclear
9. Was appropriate statistical analysis used?	Y	Y	Y	Y	Y	Y	Unclear	Y	Y	Y	Y	Y	Y	Y
Overall Appraisal (Include, Exclude, Seek further info)	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include

Comments (Including reason for exclusion)	the		HbA1c was the only outcome measure.		Unclear why not all patients have lipid study results	Lacked detail on number of patients who did not receive follow up and readmitted.	Was a chart audit so described BMI and weight as measures collected from charts. Unclear how weight was originally measured.	Retrospective study.	Retrospective study.	Retrospective study.	Retrospective study.	Only collected LDL data as outcome measure to determine hyperlipidaemia control.	Retrospective study.	Collect BP data from chart, unclear how original BP was measured. Only measured BP as outcome measure for hypertension control.

Table 5: Patient intervention detail reported according to the TIDieR criteria (80)

Author, year	Patient intervention							
	What	Who provided	How	Where	When and how much	Tailoring	Changes	Fidelity
Adams et al, 2015	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Brown et al, 2015	Yes	Yes	Yes	Yes	Yes	No	No	No
Cusumano et al, 2017	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Gorrindo et al, 2014	Yes	Yes	Yes	Yes	No	Yes	No	No
Janson et al, 2009	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Kahkosa et al, 2018	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Lee et al, 2016	Yes	Yes	Yes	Yes	Yes	No	No	No
Martin et al, 2015	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Mehta et al, 2016	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Nagelkerk et al, 2018	Yes	Yes	Yes	Yes	No	No	No	No
Nuffer et al, 2012	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Rojas et al 2015	Yes	Yes	Yes	Yes	No	Yes	No	No
Smith et al, 2014	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Smith et al, 2017	Yes	Yes	Yes	Yes	No	Yes	No	No
Stroup et al, 2003	Yes	Yes	Yes	Yes	No	Yes	No	No
Szkiladz et al, 2013	Yes	Yes	Yes	Yes	Yes	Yes	No	No

Table 6: Student intervention detail reported according to the TIDieR criteria (80)

Author, year	Student intervention							
	What	Who provided	How	Where	When and how much	Tailoring	Changes	Fidelity
Adams et al, 2015	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Brown et al, 2015	Yes	Yes	Yes	No	Yes	Yes	No	No
Cusumano et al, 2017	Yes	Yes	No	No	No	Yes	No	No
Gorrindo et al, 2014	Yes	Yes	No	No	Yes	Yes	No	No
Janson et al, 2009	Yes	Yes	Yes	No	Yes	Yes	No	No
Kahkosa et al, 2018	Yes	No	Yes	Yes	No	No	No	No
Lee et al, 2016	Yes	Yes	Yes	No	Yes	Yes	No	No
Martin et al, 2015	Yes	No	Yes	Yes	No	Yes	No	No
Mehta et al, 2016	Yes	Yes	No	No	No	No	No	No
Nagelkerk et al, 2018	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Nuffer et al, 2012	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Rojas et al 2015	No	No	Yes	No	No	No	No	No
Smith et al, 2014	No	No	Yes	No	No	No	No	No
Smith et al, 2017	No	No	Yes	No	No	No	No	No
Stroup et al, 2003	No	No	Yes	No	No	No	No	No
Szkiladz et al, 2013	Yes	Yes	Yes	Yes	No	Yes	No	No

Appendix 2: Ethical Approval

Office for Research

Flinders Medical Centre
Ward 6C, Room 6A219
Flinders Drive, Bedford Park SA 5042
Tel: (08) 8204 6453
E: Health.SALHNOfficeforResearch@sa.gov.au

Government of South Australia
SA Health
Southern Adelaide Local Health Network

Final Approval for Ethics Application

1 December 2017

Prof Michelle Miller
michelle.miller@flinders.edu.au

Dear Prof Michelle Miller

OFR Number:	83.17
HREC reference number:	HREC/17/SAC/131
Project title:	Creating efficiencies while improving effectiveness: An evaluation of a student-led nutrition service for delaying the progression of peripheral vascular disease.
Chief Investigator:	Prof Michelle Miller
Ethics Approval Period:	24 November 2017 – 24 November 2020

The Southern Adelaide Clinical Human Research Ethics Committee (SAC HREC EC00188) have reviewed and provided approval for this application which appears to meet the requirements of the *National Statement on Ethical Conduct in Human Research (2007)*.

You are reminded that this letter constitutes **Ethics** approval only. **Ethics approval is one aspect of the research governance process.**

You must not commence this research project at any SA Health sites listed in the application until a Site Specific Assessment (SSA), or Access Request for data or tissue form, has been approved by the Chief Executive or delegate of each site.

Public health sites approved under this Ethics application:

- Flinders Medical Centre
  - Vascular Surgery Outpatients Clinic
- Repatriation General Hospital / Marion GP Plus

The below documents have been reviewed and approved by the SAC HREC:

- NEAF v4 dated 21 September 2017
- Research proposal v1 dated 23 March 2017
- Letter of support from Prof Ian Spark, Head of Vascular Surgery FMC dated 13 April 2017
- Letter of support from Prof Michelle Miller, Head Nutrition and Dietetics FUSA dated 06 April 2017
- Recruitment letter v2 dated 16 October 2017
- Participant Information Sheet/Consent Form – Patient v7 dated 28 November 2017
- Participant Information Sheet/Consent Form – Student v6 dated 16 October 2017
- Participant Consent Form – MBS/PBS v1 dated 06 April 2017
- Draft script v1 dated 24 March 2017
- Outcome Quiz v1 dated 16 March 2017
- Data collection form – initial v1 dated 05 May 2017
- Peripheral Vascular Disease Student-Led Clinic Survey v1 dated 16 March 2017

- Clinic flyer v2 dated 25 May 2017
- Community kitchens list v1 dated 25 May 2017
- Survey Session 1 – Session 6 v1 dated 16 March 2017
- Student DAA form v1 dated 24 March 2017
- Student evaluation form v1 dated 20 April 2017
- Student small group education form v1 dated 24 March 2017
- Student individual clinic case reflection and feedback form v1 dated 24 March 2017

Terms And Conditions Of Ethics Approval:

As part of the Institution's responsibilities in monitoring research and complying with audit requirements, it is essential that researchers adhere to the conditions below and with the *National Statement chapter 5.5.*

Final ethics approval is granted subject to the researcher agreeing to meet the following terms and conditions:

1. The approval only covers the science and ethics component of the application. A SSA will need to be submitted and authorised before this research project can commence at any of the approved sites identified in the application.
2. If University personnel are involved in this project, the Principal Investigator should notify the University before commencing their research to ensure compliance with University requirements including any insurance and indemnification requirements.
3. Compliance with the *National Statement on Ethical Conduct in Human Research* (2007) & the *Australian Code for the Responsible Conduct of Research* (2007).
4. To immediately report to SAC HREC anything that may change the ethics or scientific integrity of the project.
5. Report Significant Adverse events (SAE's) as per SAE requirements available at our website.
6. Submit an annual report on each anniversary of the date of final approval and in the correct template from the SAC HREC website.
7. Confidentiality of research participants MUST be maintained at all times.
8. A copy of the signed consent form must be given to the participant unless the project is an audit.
9. Any reports or publications derived from the research should be submitted to the Committee at the completion of the project.
10. All requests for access to medical records at any SALHN site must be accompanied by this approval email.
11. To regularly review the SAC HREC website and comply with all submission requirements, as they change from time to time.
12. Once your research project has concluded, any new product/procedure/intervention cannot be conducted in the SALHN as standard practice without the approval of the SALHN New Medical Products and Standardisation Committee or the SALHN New Health Technology and Clinical Practice Innovation Committee (as applicable). Please refer to the relevant committee link on the SALHN intranet for further information.

For any queries about this matter, please contact the Office for Research on (08) 8204 7433 or via email to Health.SALHNOfficeforResearch@sa.gov.au.

Yours sincerely

A/Professor Bernadette Richards
Chair, SAC HREC

Office for Research

Flinders Medical Centre
Ward 6C, Room 6A219
Flinders Drive, Bedford Park SA 5042
Tel: (08) 8204 6453
E: Health.SALHNOfficeforResearch@sa.gov.au

Government of South Australia
SA Health
Southern Adelaide Local Health Network

Final Authorisation for Governance

28 November 2017

Professor Michelle Miller
College of Health Sciences
Flinders University

Dear Professor Miller,

OFR Number: 83.17
HREC reference number: HREC/17/SAC/131
SSA reference number: SSA/17/SAC/153
Project title: Creating efficiencies while improving effectiveness: An evaluation of a student-led nutrition service for delaying the progression of peripheral vascular disease.
Principal Investigator: Professor Michelle Miller

On the basis of the information provided in your Site Specific Assessment submission, I am pleased to inform you the SALHN Chief Executive Officer has granted approval for this study to commence at Flinders Medical Centre & Marion GP Plus, SA.

The below documents have been reviewed and approved:

- Site Specific Assessment form

HREC reviewed documents listed on the approval letter are accepted as part of the site authorisation.

The OFR reference number should be quoted in any correspondence about this matter.

If University personnel are involved in this project, the Principal Investigator should notify the University before commencing their research to ensure compliance with University requirements including any insurance and indemnification requirements.

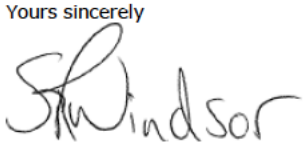
TERMS AND CONDITIONS OF ETHICS AND GOVERNANCE APPROVAL
As part of the Institution's responsibilities in monitoring research and complying with audit requirements, it is essential that researchers adhere to the conditions below and with the *National Statement chapter 5.5.*

- If University personnel are involved in this project, the Principal Investigator should notify the University before commencing their research to ensure compliance with University requirements including any insurance and indemnification requirements.
- Compliance with the National Statement on Ethical Conduct in Human Research (2007) & the Australian Code for the Responsible Conduct of Research (2007).
- To immediately report to the Office for Research anything that may change the ethics or scientific integrity of the project.
- Report Significant Adverse events (SAEs) as per SAE requirements available on the Office for Research website.
- Submit an annual report on each anniversary of the date of final approval and in the correct template from the Office for Research website.
- Confidentiality of research participants MUST be maintained at all times.
- A copy of the signed consent form must be given to the participant.
- Any reports or publications derived from the research should be submitted to the Committee at the completion of the project.
- All requests for access to medical records at any SALHN site must be accompanied by this approval letter.

- Once your research project has concluded, any new product/procedure/intervention cannot be conducted in the SALHN as standard practice without the approval of the SALHN New Medical Products and Standardisation Committee or the SALHN New Health Technology and Clinical Practice Innovation Committee (as applicable). Please refer to the relevant committee link on the SALHN intranet for further information.
- Researchers are reminded that all advertisements/flyers need to be approved by the committee, and that no promotion of a study can commence until final ethics and executive approval has been obtained. In addition, all media contact should be coordinated through the FMC media unit.

Should you have any queries about the consideration of your Site Specific Assessment form, please contact the Office for Research on 8204 6453 via email: Health.SALHNOfficeforResearch@sa.gov.au.

Yours sincerely



Simon Windsor
Research Governance Officer
Office for Research

Appendix 3: Study Flyer

Nutrition for blood vessel disease

Flinders UNIVERSITY
inspiring achievement

This research project will examine **if extra nutrition support** provided to patients with blood vessel disease (or Peripheral Vascular Disease) **can delay the progress of this disease.**

Previously tested on a small number of patients. Shown improvements in blood fats after 12 weeks.

Involves:

- An information collection session to determine current heart health and quality of life
- Repeated information collection session 12 weeks later and referral letter to GP for extra nutrition support if required
- 50% chance of gaining extra nutrition support through education session, review sessions, group talk and cooking skills sessions

Eligible if:

- You are an adult ≥18 years of age
- Have peripheral vascular disease (determined by your doctor through an ankle brachial pressure test)
- Have not had blood vessel surgery less than 1 month ago
- Can understand information in English
- Physically able to learn to cook
- Do not live in a low or high care residential aged care home

Your doctor will provide your details to PhD Candidate, Jenni Suen, if you are interested. She will discuss the details of this project with you and answer any questions.
You can also contact her on 0412 736 122 or student.nutrition.service@gmail.com

This study has been reviewed by the Southern Adelaide Clinical Human Research Ethics Committee v2 250517
inspiring achievement
CRICOS No. 00114A

Appendix 4: Recruitment letter

FLINDERS MEDICAL CENTRE

Flinders Medical Centre
Bedford Park 5042
South Australia
Tel +61 8 8204 5511
Fax +61 8 8204 5450
www.flinders.sa.gov.au

Date

Addressee
Address
Suburb State Postcode

Dear Title + Surname ,

You are receiving this letter as you have previously seen the vascular doctors at Flinders Medical Centre or Repatriation General Hospital or Marion GP Plus, for blood vessel disease in your legs. You might know this disease as peripheral arterial disease.

As peripheral arterial disease can worsen over time. We are always looking for new ways to stop the disease from worsening. We are aware that good nutrition can help some causes of blood vessel disease such as high blood pressure, cholesterol and diabetes. To help manage blood vessel disease, not all patients' with blood vessel disease have the chance to have one-to-one personalised nutrition support and learn skills to help them eat nutritious food.

Therefore, the vascular doctors have partnered with Flinders University to trial a free nutrition service for patients with peripheral arterial disease. Students, supervised by an Accredited Practising Dietitian will provide the nutrition service. This free nutrition service helps us to answer two questions. The first question is 'Do patients want to have this free nutrition service?' The second question is 'Can this free nutrition service prevent peripheral arterial disease from progressing over time?

To ensure that we interpret the answers to these two questions in a fair and appropriate way that stops all people from jumping to conclusions, the free nutrition service will be provided as a randomised clinical trial. This means that all participants will be given a 50% chance of receiving the free nutrition advice and a number of extra nutrition and heart health tests but also a 50% chance of having a number of extra free nutrition and heart health tests without any formal nutrition advice.

If you might be interested in receiving this free nutrition service, please contact Jenni Suen on 0413 503 286 or 8204 6303 or jenni.suen@flinders.edu.au.

By contacting Jenni Suen, she will be able to provide you with more information to help you decide if you wish to have this free service.

Regards,

Dr Chris Delaney
Vascular Fellow
Flinders Medical Centre

Appendix 5: Patient Participant Information Sheet

Flinders University

Participant Information Sheet/Consent Form - Patient

Interventional Study - *Adult providing own consent*

Flinders Medical Centre/ Repatriation General Hospital/ Marion GP Plus

Title	Creating efficiencies while improving effectiveness: An evaluation of a student-led nutrition service for delaying progression of peripheral vascular
Short Title	Does nutrition counselling combined with a cooking program improve blood vessel function for patients
Protocol Number	*83.17*
Coordinating	Prof Michelle Miller, MNutDiet, PhD, Adv APD
Principal Associate Investigator(s)	Dr Christopher Delaney, Ms Jolene Thomas, Mrs Amanda Wray, Ms Jenni Suen
Location	Southern Adelaide Local Health Network Vascular Surgery Clinics

Part 1 What does my participation involve?

1 Introduction

You are invited to take part in this research project named **Does nutrition counselling combined with a cooking program improve blood vessel function for patients with vascular disease?** This research project is provided as a randomised trial where all who participate will be given a 50% chance of receiving free nutrition advice and a number of extra nutrition and heart health tests but also a 50% chance of having a number of extra free nutrition and heart health tests without any formal nutrition advice. A computer program will perform the equivalent of a coin toss to determine what service participants are provided with. The researchers have no control over the process. This research study has been designed in this way to ensure the researchers interpret the results in a fair and appropriate way. This avoids the researchers or participants jumping to conclusions.

This invitation is given to all patients with peripheral vascular disease (or blood vessel disease in their limbs) who have not had vascular surgery in the past month and who are able to make decisions for themselves. Those who have limited understanding of information provided in English or live in a residential aged care facility or are not able to physically cook or do not wish to cook, cannot participate in this study. This study aims to explore if a 12-week student-led nutrition service improves participant's heart (cardiovascular) health and quality of life at an acceptable cost.

This Participant Information Sheet tells you about the research project. It explains what is involved. Knowing what is involved will help you decide if you wish to be involved.

Please read this information carefully. Ask questions about anything that you don't understand or wish to know more about. Before deciding whether or not to take part, you may wish to talk about it with a relative, friend or your local doctor.

Participation in this research is voluntary. If you do not wish to take part, you do not have to. You will receive the best possible available care whether or not you take part.

If you decide you want to take part in the research project, you will be asked to sign the consent form. By signing it, you are telling us that you:

- Understand what you have read or what someone has read to you in a language that you understand
- Consent to take part in the research project
- Consent to participating in the components of the research study
- Consent to the use of your personal and health information as described

You will be given a copy of this Participant Information Sheet and the signed Consent Form to keep.

To determine if the student-led service can be provided at an acceptable cost, the researchers require information about the medical care and medications that the government pays for, while you are involved in this study. This information is called your 'Medicare Benefits Schedule' and 'Pharmaceutical Benefits Scheme'. This information about you is available from the government.

To enable researchers to access this information, a research staff member will ask you to fill out and sign a separate consent form you are authorising the study to access your complete Medicare and Pharmaceutical Benefits Scheme (PBS) data as outlined on the back of the consent form. Medicare collects information on your doctor visits and the associated costs, while the PBS collects information on the prescription medications you have filled at pharmacies. The consent form is sent securely to the Department of Human Services who holds this information confidentially.

2 What is the purpose of this research?

Patients with peripheral vascular disease are at risk of poor nutritional health. Poor nutritional health can affect the patients' ability to have ideal clinical outcomes. The

current nutritional care is limited. This project will therefore trial an established student-led model of nutritional care to manage the unique nutrition requirements of patients with peripheral vascular disease on a large scale by including all patients with peripheral vascular disease.

A very similar smaller project (previously approved by ethics under protocol number OFR 177.16) previously tested the same nutritional and heart health tests in patients with peripheral vascular disease without advanced resting leg pain symptoms. The results suggested that positive change in nutrition and heart health may be seen if the project is tested on more participants. To help researchers better understand the cause of any changes in blood cell function seen, the researchers will also measure nitrite, nitrate and cortisol (a hormone) through a blood test. To help researchers understand if this research project can help your pain-free walking distance, we will additionally measure this.

As this research project is occurring on a larger scale, more students will be involved than the smaller study. An Accredited Practising Dietitian will supervise all students.

This research project has been started by the researcher, Professor Michelle Miller from Flinders University. The results of this research will be used by Ms. Jenni Suen to obtain a Doctor of Philosophy degree.

This research is being conducted by Nutrition and Dietetics, Flinders University and the Southern Adelaide Local Health Network (SALHN), Department of Vascular Surgery. Clinic visits will occur at the established Vascular Surgery Clinics. The cooking program will be held at a community centre near the majority of the participants.

3 What does participation in this research involve?

If you wish to take part, the researchers will firstly ask you questions about your medical and nutritional health and quality of life. Weight, height and waist

circumference will be measured to determine your weight status and risk of disease. Blood vessel cell function (known as endothelial function) and blood pressure will be measured and a blood test for your levels of cholesterol, inflammation, nitrate, nitrite and cortisol (a hormone) will be done. These tests assess your heart health. You will be asked to complete a walking test where you will walk at your usual pace on flat ground for six- minutes. If you have pain during the walk test, you may stop to rest. The distance you have walked will be recorded as your pain-free walking distance. When you feel able, you will continue the walking test until the 6 minutes has been completed. We will also record the total distance you walked in the 6 minutes. You will be asked to fill in a short questionnaire about your quality of life. These tasks will take 1 to 1.5 hours of your time.

After 12 weeks, you would see the researchers again for 1 to 1.5 hours to reassess your heart health. This is done by having your weight, height, waist circumference, diet, blood vessel cell function and blood pressure retested. A blood sample will also be taken to re-test your blood levels of cholesterol, inflammation, nitrate, nitrite and cortisol (a hormone). Additionally, your quality of life will be re-tested through answers to 6 questions and the walking test will be repeated. All blood test results will be summarised in a letter addressed to your GP. You are encouraged to make an appointment with your GP to discuss the results. You will then be discharged from nutritional care within this study. However, we will monitor any changes to your peripheral vascular disease for up to 2 years after the study through access to your medical records. Any hospital admissions, vascular procedures and other related examinations and procedures (e.g., blood test and angiogram results) will be noted.

During the 12-week follow-up appointment, if the researchers have a genuine concern about your nutritional health, the student dietitian supervised by an Accredited Practising Dietitian will inform you and offer you a GP letter suggesting a referral to a community dietitian and the necessary blood test and body composition results collected from this study.

Participating in this study will take a minimum of 3 hours of your time. At your first- and 12-week appointment, transport can be provided, or your parking ticket can be subsidised by the research team.

You will also have a 50% chance of having a 30-minute one-on-one nutrition education session by a student dietitian, supervised by an Accredited Practising Dietitian. The individual education appointment will focus on realistic dietary changes to improve the quality of your diet.

If you do not receive the one-on-one nutrition education session, you will receive the usual care provided to you by Southern Adelaide Local Health Network.

If you are provided with the chance to participate in the one-on-one nutrition education session, you will also be invited to a small group cooking skills and nutrition program at a community centre near the majority of the participants. The community kitchen used will meet occupational health and safety as well as food safety standards to ensure your safety. Transport can be provided to the cooking sessions. There will be six fortnightly cooking sessions. At these sessions you will have the opportunity to learn skills and information to improve your nutritional health. Cooking is involved, where we will show you how to create nutritious meals which you will then prepare and cook by yourself or with a partner during the session. You will be able to take the food that you prepare as a takeaway meal. The student dietitian and Accredited Practising Dietitian leading the group will cook for the group during the session so that the group can enjoy the meal together towards the end of the session. The hands-on cooking skills session will include a short questionnaire at the start of the program. At the end of the program there will be a discussion about which area/s involved in this study do you think was most valuable to you and why. This discussion will be led by a researcher who is not involved in providing the assessments at Flinders Medical Centre, the education sessions or the small group classes. This will be followed by an evaluation questionnaire after the 12 weeks.

These cooking sessions are for invited participants to attend and cater for those who

have not cooked before. Your partner may attend to provide verbal support and encouragement if safety standards of the site allow. If you wish for your partner to accompany you, please discuss this with the research team who will try to accommodate your request.

If you require to be seated to participate in the cooking activity, please discuss this with the research team. The research team can attempt to arrange for seated cooking if it meets the safety requirements of the community kitchen.

The individualised nutrition education session will be held on one occasion after the initial visit, followed by a review appointment at 6 weeks. The review appointment is where your goals and dietary changes are reviewed and you can discuss further ways to make dietary changes with the student dietitian, who will be under the supervision of the Accredited Practicing Dietitian.

Reminders and/or motivation will be provided through fortnightly phone calls or short messages. The cooking skills and nutrition program will be held fortnightly for 3 hours per session over 12 weeks. If invited, this will take about 20 hours of your time.

To assist in determining the cost-effectiveness of this study, researchers will look at your hospital case notes up to two years after your face-to-face involvement finishes. This helps the researcher to identify if your health has changed in any way. At your routine 6 and/or 12-month appointments with the vascular doctors, you will also be asked to fill in a quality-of-life questionnaire.

4 What do I have to do?

There are no costs associated with participating in this research project, nor will you be paid. All tests, appointments and sessions as part of the research project will be provided to you free of charge. To be involved in this research study we ask that you attend appointments and/or sessions organised by the research staff. The researcher will be responsible for appointment scheduling and will inform you in

advance regarding the dates and times for appointments and if applicable, any cooking sessions or review appointments, which we wish for you to attend.

Any dietary advice provided will be discussed with you. You are not required to make any special changes to your lifestyle, if you do not wish to. You are able to continue with your usual medications. Your participation does not prevent you from receiving medical care or from donating blood.

If you agree to be involved in another study during the 2 years that you are involved in this study, we would appreciate you contacting us to provide us with the details of the research. This allows us to make the required adjustments to our research data to ensure accuracy.

Participants involved in the cooking skills and education program are required to inform researchers and staff about any food allergies or intolerances prior to participation. This enables adequate measures to be taken, to prevent any adverse events. Researchers will start this conversation. If you have been prescribed with an EpiPen or medication to relieve any allergic reactions, we ask that you bring it to all cooking sessions as a precaution. This is in case of an unforeseen allergic reaction.

Appointments and sessions scheduled for you*:

Appointment or session type	Date and Time	Location	Duration
Initial Assessment appointment	Week 1		1 to 1.5 hours
One to One Nutrition Education Appointment	Week 1		½ hour
Cooking and Education Session 1	Week 2		3 hours

Cooking and Education Session 2	Week 4		3 hours
Cooking and Education Session 3	Week 6		3 hours
Review appointment	Week 6		½ hour
Cooking and Education Session 4	Week 8		3 hours
Cooking and Education Session 5	Week 10		3 hours
Cooking and Education Session 6	Week 12		3 hours
Reassessment appointment	Week 12		1 to 1.5 hours
		Total time involved for you:	

*The appointments not applicable to you will be crossed out.

5 Other relevant information about the research project

It is anticipated that 132 patients will take part in this project run through SALHN Vascular Surgery Clinics at Flinders Medical Centre, Repatriation General Hospital and Marion GP Plus. This project involves researchers based at Flinders Medical Centre and Flinders University.

6 Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage.

Your decision, whether to take part or not to take part, or to take part and then withdraw, will not affect your routine treatment, your relationship with those treating you or your relationship with the SALHN Department of Vascular Surgery Unit.

7 What are the alternatives to participation?

You do not have to take part in this research project to receive treatment at this hospital. Other options are available. A one-to-one dietitian appointment can be provided through a local doctor referral. As a patient of the Vascular Surgery Clinics a 30-minute group seminar by a dietitian is offered to you. The researcher will discuss the option/s with you before you decide whether or not to take part in this research project. You can also discuss the option with your local doctor.

8 What are the possible benefits of taking part?

We cannot guarantee or promise that you will receive any benefits from this research. However possible benefits may include an awareness and understanding of nutritional health, a full nutrition assessment and review in addition to early identification of nutrition issues through education of relevant food and nutrients that may play a role in peripheral vascular disease progression.

It is foreseen that the results of this study will help determine if routine one-to-one nutritional care at the SALHN Vascular Surgery Clinics benefit patient outcomes or not. It will also assess if this form of care is suitable for patients. This will help staff to better assist nutritionally vulnerable vascular patients, similar to you.

9 What are the possible risks and disadvantages of taking part?

Participation in this study is unlikely to result in any adverse effects. All clinical measurements are routinely undertaken or are questionnaire-based. There are

minimal risks and disadvantages associated with participating in this study.

1. When a blood sample is taken irritation, pain, bruising, feeling faint or bleeding at the site may occur. If this happens, it can be easily treated, as a trained phlebotomist will collect the blood sample in a facility that can provide medical attention. Consent will be received before taking the blood sample. You will be informed of the side effects and have the right to refuse to provide a blood sample for whatever reason.

2. Blood pressure measurements taken using a sphygmomanometer (blood pressure cuff) may cause some discomfort.

3. Some discomfort or disturbance may be experienced when the blood pressure cuff is used during the flow mediated dilation test. This test helps the researchers to understand how well your blood vessels in your body are working. During this test you we be asked to lie down on your back and place your right arm in a soft cradle. Once you are comfortable and rested for about 10 minutes, the blood pressure cuff will be placed around your right forearm. The researcher will then place some gel on your upper arm and use the ultrasound to have a look at a large blood vessel in your arm. You will be asked to stay still for the next 9-10 minutes. The researcher will take a recording of your blood vessel and then pump the blood pressure cuff up to stop the blood flow to your lower arm for 5 minutes. Your arm feels numb while the blood pressure cuff is pumped up. This is very similar to when you sleep on your arm and it feels numb. After 5 minutes, the blood pressure cuff will be released, and you will feel the blood return to your lower arm. At this point the researchers will use the ultrasound to record how your blood vessel reacts for the next 3 minutes.

4. If you have a food allergy or intolerance, there is a risk that you may have an allergic reaction or feel discomfort, if you were to consume the food that causes your allergy or intolerance. To avoid this, we ask that you inform the researcher and staff about your food allergy or intolerance prior to participation. This will allow changes to be made to prevent these events. Staff and participants will also undergo an induction. This includes occupational health and safety training prior to the cooking and nutrition classes.

5. Cooking can involve risks such as burns, cuts and stains on clothing. To reduce the risk of this occurring, you will be provided with an apron and instructed on how to use the cooking equipment safely, but we also ask that you take extra care knowing these risks. At least one staff member trained in first aid will be present to help you if you accidently sustain a burn or cut.

6. If you develop symptoms which you think might be related to an infection (e.g., diarrhoea, vomiting) we ask that you notify the study coordinator who will advise whether it is safe for you to attend the following session/s.

10 What will happen to my test samples?

An 18ml blood sample will be collected as part of this study in order to assess your cholesterol, inflammation (tested as hs-CRP and white blood cell differential tests),

cortisol and nitric oxide levels. To test the nitric oxide levels, some of your blood will be temporary stored in a locked freezer owned by Nutrition and Dietetics to be analysed by a scientist at Flinders University. The scientist will process your blood in the Vascular Laboratory on the same day that it is collected and store it in the locked freezer to be tested later for the levels of nitric oxide. All other blood samples will be sent to the site pathology laboratory for testing and is usually tested within 48 hours by professional pathologists who usually test your blood when you have a blood test at the doctors. The sample will be used for these purposes only. Any unused blood sample will be discarded as per usual laboratory procedures.

11 What if new information arises during this research project?

Sometimes during the course of a research project, new information becomes available about the intervention that is being studied. If this happens, the researcher will tell you about it and discuss with you whether or not you want to continue in the research project. If you decide to withdraw, your study doctor will make arrangements for your regular health care to continue. If you decide to continue in the research project you will be asked to sign an updated consent form.

Also, on receiving new information, the researcher might consider it to be in your best interests to withdraw you from the research project. If this happens, he/she will explain the reasons and arrange for your regular health care to continue.

12 Can I have other treatments during this research project?

Whilst you are participating in this research project, all treatments, including medications that you are receiving as part of your ongoing care will continue.

It is important to tell the research staff about any treatments or medications you may be taking, including over-the-counter medications, vitamins or herbal remedies, acupuncture or other alternative treatments. You should also tell the research staff about any changes to these treatments during your participation in the research project to enable to study staff to understand any changes in your health.

13 What if I withdraw from this research project?

If you decide to withdraw from this research project, please notify a member of the research team before you withdraw.

If your health begins to impact on your participation in this research project, the study doctor may decide that it is in your best interest to withdraw you from the study.

If you do withdraw your consent during the research project or if your consent is withdrawn by the study doctor in the best interest for your health, the study doctor and relevant study staff will not collect further personal information from you. Personal information already collected will be kept, to ensure that the results of the research project can be measured properly and to comply with law. You should be aware that data collected by the research team up to the time you withdraw will form a part of the research project results. If you do not want them to do this, you must tell them before you join the research project.

14 Could this research project be stopped unexpectedly?

This research project may be stopped unexpectedly for a number of reasons. These may include a lack of resources or unforeseen adverse events.

15 What happens when the research project ends?

On completion of the study, dietetic intervention associated with the study will stop. If patients require further dietetic input, they can obtain a referral from their GP.

On completion of the study, the results will be published in peer-review journals and/or presented at relevant scientific meetings. The outcomes from the study will be made available on the Flinders University Nutrition and Dietetics web page (http://www.flinders.edu.au/sohs/sites/nutrition-and-dietetics/). The results will also form a component of Ms Jenni Suen's thesis for completing her Doctor of Philosophy degree.

Part 2 How is the research project being conducted?

16 What will happen to information about me?

By signing the consent form you consent to the study doctor and relevant research staff collecting and using personal information about you for the research project. Any information obtained in connection with this research project that can identify you will remain confidential. The information will be restricted to the use of the immediate group of researchers involved in the study.

All data will be stored on a laptop with a secure hard drive and will be protected by a password lock. It will be backed up on an external hard drive. Data will be stored for five years at Flinders University following the completion of the study. Data will be stored on the secure shared drive of Discipline of Nutrition and Dietetics. The data collected (excluding MBS and PBS data) may be used in the future for other studies that arise from this study based on further ethics application approval. Your information will only be used for the purpose of this research project and it will only be disclosed with your permission, except as required by law.

Information about you may be obtained from your health records held at this and other health services for the purpose of this research. By signing the consent form you agree to the study team accessing health records if they are relevant to your participation in this research project.

Your health records and any information obtained during the research project are subject to inspection for the purpose of verifying the procedures and the data. This review may be done by the relevant authorities, the institution relevant to this Participant Information Sheet, Flinders University, Repatriation General Hospital, Flinders Medical Centre or as required by law. By signing this Consent Form, you authorise release of, or access to, this confidential information to the relevant study personnel and regulatory authorities as noted above.

It is anticipated that the results of this research project will be published and/or presented in a variety of forums. In any publication and/or presentation, information will be provided in such as a way that you cannot be identified, except with your permission. All data will be de-identified and presented as group data. Therefore, individual data will not be able to be identified.

Information about your participation in this research project may be recorded in your health records, along with a copy of your signed consent form.

In accordance with relevant Australian and/or South Australian privacy and other relevant laws, you have the right to request access to your information collected and stored by the research team. You also have the right to request that any information with which you disagree be corrected. Please contact the study team member named at the end of this document if you would like to access your information.

Any information obtained for the purpose of this research project that can identify you will be treated as confidential and securely stored. It will be disclosed only with your permission, or as required by law.

17 Complaints and compensation

If you suffer any injuries or complications as a result of this result of this research project, you should contact the study team as soon as possible. You will be assisted with arranging appropriate medical treatment. If you are eligible for Medicare, you can receive any medical treatment required to treat the injury or complication, free of charge, as a public patient in any Australian public hospital.

As no pharmacological drug is being tested in this research project and relatively non-invasive routine tests or questionnaire –based tests are conducted, there is little chance of any adverse effects. In case of an unexpected adverse effect, compensation may be provided in accordance with the law.

All Medicare and Pharmaceutical Benefits Scheme will be stored at Flinders University on a secure shared drive of the Discipline of Nutrition and Dietetics. It will

be backed up on an external hard drive. This data that is supplied to researchers from the Department of Human Services will be destroyed 6 years after the thesis is published or after 10 years from the date that the information is supplied, whichever is sooner will fall into action. After the time period above, raw data stored on the secure shared drive and the external hard drive will be deleted. Any paper documents such as consent forms containing your information will be thrown in the confidentiality paper bins for disposal. A signed statutory declaration will then be sent to the Department of Human Services to inform them that the data has been destroyed.

18 Who is organising and funding the research?

The research project is being conducted by Flinders University Nutrition and Dietetics and the SALHN Vascular Surgery Department. Funding will be provided by Flinders University.

19 Who has reviewed the research project?

All research in Australia involving humans is reviewed by an independent group of people called a Human research Ethics Committee (HREC). The ethical aspects of this research project have been approved by the Southern Adelaide Clinical Human Research Ethics Committee (SAC HREC).

This project will be carried out according to the *National Statement on Ethical Conduct in Human Research (2007)*. This statement has been developed to protect the interested of people who agree to participate in human research studies.

20 Further information and who to contact

The person you may need to contact will depend on the nature of your query.

If you want any further information concerning this project or if you have any medical problems, that may be related to your involvement in the project, (for example, any side effect), you can contact the principal researcher Michelle Miller on (08) 8201 2421 or any of the following people.

Clinical contact person

Name	*Professor Ian Spark*
Position	*Head of Vascular Surgery*
Telephone	*8204 5445*
Email	*Ian.Spark@sa.gov.au*

For matters relating to research at the site at which you are participating, the details of the local site complaints person are:

Name	Villis Marshall
Position	Director, Office for Research
Telephone	*8204 6453*
Email	*Health.SALHNOfficeforResearch@sa.gov.au*

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

Reviewing HREC name	Southern Adelaide Clinical
Position	Executive Officer
Telephone	8204 6453
Email	*Health.SALHNOfficeforResearch@sa.gov.au*

Local HREC Office contact (Single Site -Research Governance Officer)

Position	Research Governance Administration Officer
Telephone	8204 6453
Email	*Health.SALHNOfficeforResearch@sa.gov.au*

Consent Form - *Adult providing own consent*

Title	Creating efficiencies while improving effectiveness: An evaluation of a student-led
Short Title	Improving outcomes for patients with peripheral vascular disease through student
Protocol Number	*83.17*
Coordinating Principal	Professor Michelle Miller
Associate Investigator(s)	Ms Jolene Thomas, Dr Christopher Delaney, Mrs Amanda Wray, Ms Jenni Suen
Location	Southern Adelaide Local Health Network Vascular Surgery Clinics

Declaration by Participant

I have read the Participant Information Sheet, or someone has read it to me in a language that I understand.

I understand the purposes, procedures and risks of the research described in the project.

I give permission for my doctors, other health professionals, hospitals or laboratories outside this hospital to release information to Flinders University concerning my disease and treatment for the purposes of this project. I understand that such information will remain confidential.

I give permission for the research team to notify my GP that I have consented to participate in this research study.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project as described and understand that I am free to withdraw at any time during the study without affecting my future health

care.

I understand that I will be given a signed copy of this document to keep.

Name of Participant (please print) _____

Signature _____ Date _____

Declaration by Study Doctor/Senior Researcher†

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Name of Study Doctor/

Senior Researcher† (please print) _____

Signature _____ Date _____

† A senior member of the research team must provide the explanation of, and information concerning, the research project.

Note: All parties signing the consent section must date their own signature.

Form for Withdrawal of Participation - *Adult providing own consent*

Title	Creating efficiencies while improving effectiveness: An evaluation of a student-led nutrition service for delaying progression of
Short Title	Improving outcomes for patients with peripheral vascular disease through student
Protocol Number	*83.17*
Coordinating Principal	Professor Michelle Miller
Associate Investigator(s)	Ms Jolene Thomas, Dr Christopher Delaney, Mrs Amanda Wray, Ms Jenni Suen
Location	Southern Adelaide Local Health Network Vascular Surgery Clinics

Declaration by Participant

I wish to withdraw from participation in the above research project and understand that such withdrawal will not affect my routine treatment, my relationship with those treating me or my relationship with Vascular Surgery Unit, Repatriation General Hospital or Flinders Medical Centre.

Name of Participant (please _____

Signature _____ Date _____

In the event that the participant's decision to withdraw is communicated verbally, the Study Doctor/Senior Researcher will need to provide a description of the circumstances below.

Declaration by Study Doctor/Senior Researcher†

I have given a verbal explanation of the implications of withdrawal from the research project and I believe that the participant has understood that explanation.

Name of Study Doctor/

Senior Researcher† (please print)

Signature _____ Date _____

† A senior member of the research team must provide the explanation of and information concerning withdrawal from the research project.

Note: All parties signing the consent section must date their own signature.

Appendix 6: Recruitment email sent to students

In 2018, as a third year bachelor of nutrition and dietetics student, there will be an exciting opportunity for you to gain dietetic experience through a student-led clinic for vascular disease patients throughout 2018. This is a voluntary research opportunity that is provided to assist you in gaining skills and knowledge required by the end of your dietetics course. You may know these skills or knowledge as dietetic competencies.

If you are interested, you have the opportunity to participate in dietetic consultations as well as group education and cooking classes. You can also act as a mentor to first and second year students.

In the dietetics consultations you will have the opportunity to take diet histories and plan the nutritional care of patients with vascular disease, who may also present with other chronic disease requiring dietary counselling.

In the group education and cooking class, you will have the opportunity to co-deliver a short presentation and cooking class with a peer. These classes are designed to focus on key nutrition messages and dietary requirements for those with vascular disease. All materials required will be provided to you.

These opportunities can provide you with exposure to development of skills in communicating with patients, collecting anthropometry measures and diet histories and are consistent with what is taught in 3rd year. Participation in this project provides you with extra opportunities to harness those skills. You may also be able to meet final year students and observe the patient education and review processes that complete the dietetic consultation.

You will be provided with informal non-assessed feedback by an Accredited Practising Dietitian who will supervise you throughout your participation in this project.

Choosing to participate or not will not affect your progress in the course as these skills are taught to you throughout your course. You choice will also not affect your relationship with the staff.

If you're interested please contact Jenni Suen through jenni.suen@flinders.edu.au
She can also answer any questions you have, provide extra details and potential dates for 2018 that are available for this opportunity. Also please keep a look out on the Nutrition and Dietetics General Information FLO Page as updates become available.

In 2018, as second year students enrolled into the Flinders University Bachelor of Nutrition and Dietetics course, you will have an opportunity to gain valuable experience through a student nutrition service for patients with vascular disease. This is a voluntary research opportunity provided to you in an attempt to help you begin gaining skills and knowledge earlier in your chosen program of study. These skills and knowledge are required by the end of your dietetics course and your competency assessed prior to graduation so an opportunity to being building your confidence in these aspects in desirable.

Choosing to participate or not will not affect your progress in the course as you are supported to develop skills throughout your course. Your choice will also not adversely affect your relationship with the staff.

If you are interested in participating you would be involved in dietetic consultations as well as group education and cooking classes. Observing and participating in the delivery of these classes may provide you with insight of what you are to achieve in your final year community placement presentations as well as help with your 3rd year theoretical community nutrition topic where you are required to plan a program.

In the dietetic consultation, you will learn to measure weight, height, waist circumference, blood pressure and walking distances. You may also observe a senior student take a diet history, which will be used to plan the patient's nutritional care.

In the group education and cooking class, you will have the opportunity to co-deliver a short presentation and cooking class with a peer. These classes are designed to focus on key nutrition messages and dietary requirements for those with vascular disease. All materials required will be provided to you.

These opportunities can provide you with early exposure to development of skills in communicating with patients, collecting anthropometry measures and diet histories, which are taught in 3rd year of the Bachelor of Nutrition and Dietetics. You may also be able to meet peers in year levels above yours and learn other knowledge and skills from them.

You will be provided with informal non-assessed feedback by an Accredited Practising Dietitian who will supervise you throughout your participation in this project.

If you're interested please contact Jenni Suen through jenni.suen@flinders.edu.au
She can also answer any questions you have and provide potential dates for 2018 that are available for this opportunity. Also please keep a look out on the Nutrition and Dietetics General Information FLO Page as updates become available.

In 2018, as final year dietetic students, there will be an exciting opportunity for you to gain extra clinical dietetic experience through participation in a student-led clinic for vascular disease patients. This is a non-assessed voluntary research opportunity provided to assist you in gaining skills and knowledge that would assist with you achieving competency as an entry level dietitian.

The dietetic experience will provide you with an opportunity to educate and review four patients in an outpatient setting or through home visits.

Extra community style dietetic experience is also available. You could have the opportunity to deliver a short presentation and cooking class with a peer. All materials required to conduct the class will be provided to you.

Those who are involved in the clinical experience are not also required to participate in the community style experience, unless they wish to.

You will be provided with informal, non-assessed feedback by an Accredited Practising Dietitian who will supervise you.

Choosing to participate or not will not affect your progress in the course as these skills are taught to you throughout your course. You choice will also not affect your relationship with the staff.

If you're interested please contact Jenni Suen through jenni.suen@flinders.edu.au
She can also answer any questions you have, provide more details and potential dates for 2018 that are available for this opportunity. Also keep a look out on the Nutrition and Dietetics General Information FLO Page as updates become available.

Flinders University

Participant Information Sheet/Consent Form –

Student

Interventional Study - *Adult providing own consent*

Title	Creating efficiencies while improving effectiveness: An evaluation of a student-led nutrition service for delaying progression of peripheral vascular disease.
Short Title	Does nutrition counselling combined with a cooking program improve blood vessel function for patients with vascular disease?
Protocol Number	*83.17*
Coordinating Principal Investigator/ Principal Investigator	Prof Michelle Miller, MNutDiet, PhD, Adv APD
Associate Investigator(s)	Dr Christopher Delaney, Ms Jolene Thomas, Mrs Amanda Wray, Ms Jenni Suen
Location	Southern Adelaide Local Health Network, Flinders University

Part 1 What does my participation involve?

1 Introduction

You are invited to take part in this research project titled **Does nutrition counselling combined with a cooking program improve blood vessel function for patients with vascular disease?** This invitation is given to all students enrolled in a dietetics program at Flinders University. The study aims to explore whether participating in a 12-week student-led nutrition service provided to patients with peripheral vascular disease can confer skills that contribute to the development of

competencies required by the Dietitian's Association of Australia (DAA) for all graduates.

This Participant Information Sheet tells you about the research project and explains what is involved. Knowing what is involved will help you decide if you wish to participate.

Please read this information carefully. Ask questions about anything that you don't understand or wish to know more about. Before deciding whether or not to take part, you may wish to talk about it with a relative or friend.

Participation in this research is voluntary. If you do not wish to take part, you do not have to. You will receive the best available support related to your studies whether or not you take part. Participating in this study does not act as a substitute for your placements and does not enable you to get credit towards your dietetics degree.

If you decide you want to take part in the research project, you will be asked to sign the consent form. By signing it, you are telling us that you:

- Understand what you have read or what someone has read to you in a language that you understand;
- Consent to take part in the research project;
- Consent to participating in the components of the research study; and
- Consent to the use of your personal information as described.

You will be given a copy of this Participant Information Sheet and the signed Consent Form to keep.

2 What is the purpose of this research?

Patients with peripheral vascular disease are at risk of poor nutritional health which can affect the patients' ability to have ideal clinical outcomes. The current nutritional care is not enough. A very similar smaller project has previously been conducted (previously approved by ethics under protocol number 177.16) involving two final year nutrition and dietetics honours students. Patients appeared to benefit from the student-led clinic, however testing on a larger scale is required. This research therefore provides an opportunity for more dietetic students to be involved in this experience and to additionally test whether this opportunity can aid students to develop skills required to meet the DAA competencies.

Dietetic students have limited exposure to clinical and community experiences throughout their degree. However, students are required to be competent according to the DAA Competencies' to graduate as a dietitian at the end of their studies. Experiences that complement final year placements can potentially help students to gain the skills that may help them to development competencies more easily in their final year.

This research opportunity provides dietetic students with exposure to clinical and community experiences earlier in their dietetics degree, prior to the final year placements. Additionally, students will be exposed to the DAA competencies and provided with feedback on their development towards competency from an Accredited Practicing Dietitian. Therefore, this research will help to determine if a student-led clinic can aid students in developing competencies and assist with their learning.

This research project has been started by the principal investigator, Professor Michelle Miller from Flinders University.

This research is being conducted by Nutrition and Dietetics, Flinders University and the Southern Adelaide Local Health Network (SALHN), Department of Vascular Surgery. Clinic visits will occur at the established Vascular Surgery Clinics. The cooking program will be held at a community centre conveniently located close to the majority of the participants' place of residence. The concluding interview will be held at Flinders University.

3 What does participation in this research involve?

If you wish to take part, the researchers will provide you with access to an online orientation and training package. In-person orientation to the site and training to gain skills according to research protocols will also be provided. This training is estimated to take 4-6 hours of your time. Once you have adequately completed the training, you may begin to participate in the student-led service.

Patients involved in this study are participants of a randomised controlled trial. Therefore participating involves maintaining patient confidentiality. Details of this trial will be provided to you through online orientation.

Your involvement in this project will depend on the year of Nutrition and Dietetics that you are currently studying at Flinders University. Each year of study focuses on different skills. Involvement in this study gives you an additional opportunity to gain skills that align with your year of study.

Second and third year students or first year masters' students who wish to be involved will have the opportunity to gain experience in measuring weight, height, waist circumference, pain-free walking distance, blood pressure and taking a diet history. Additionally, after gathering this information and the patient has left, students have the opportunity to make a dietary assessment and nutrition care plan under the direction of their supervisor. The opportunity to run patient education and cooking class session/s to a small group of participants also exists. A peer mentoring experience may also be available. The content of the education and cooking class, PowerPoint slides and session outline will be provided to you. In all forms of interaction with patients, you will be supervised where supervision may be gradually reduced, if the supervisor decides that you have attained the skills to complete data collection (e.g., measurement of weight and height) alone. Transport to the education and cooking class will also be provided to you leaving from Flinders University. Students involved in the education and cooking class will also be able to share a meal with the participants. Therefore, all students must inform researchers if

they have any allergies or intolerances. Supervisors will also prompt this discussion.

To give you an opportunity to gain skills that can contribute to your development as a student dietitian, it is expected that students participate in approximately 8 information gathering sessions and 3-6 fortnightly education and cooking class sessions. Overall, this will take approximately 18 -27 hours of your time. The supervisor will schedule your participation in the clinics and education/cooking class according to your availability.

Final year dietetic students who wish to be involved, have the opportunity to conduct patient education based on the dietary assessment and information gathered by the second- or third-year bachelor student or first year masters' student. These education appointments will be conducted via a clinic appointment or home visit. Transport to home visits from Flinders University can be provided. Additionally, final year students will have the opportunity to review their patient at a face-to-face review appointment. The review appointment will involve collecting any changes to medical, surgical, social and dietary intake, a review of the patient goals and nutritional strategies and a renegotiation of strategies if necessary. Negotiation with the patient is a skill that can be gained through this experience. All patient interaction will be supervised by an Accredited Practising Dietitian.

Each final year student will be required to participate in the education and review appointment of at least four patients to be involved in this study. This will take approximately 8 hours of your time.

All students participating in this study will have the opportunity to reflect and gain feedback from the supervising Accredited Practising Dietitian. The style of reflection and feedback used mimics the process conducted in final year clinical and community placements. You will be asked to write your reflections on a form and your supervisor will provide you with written feedback on the same form.

At the end of your participation in this student-led service, you will be asked to complete a short questionnaire and a reflection on the experiences gained that relate to the DAA competencies. Within 2 weeks of the end of your participation researchers will negotiate a time with you for a semi-structured interview. The semi-structured interview will be recorded to assist in gathering the thoughts of all students interviewed. The semi-structured interview will help you and researchers to determine whether the experiences identified have enabled you to develop or achieve DAA competencies and what areas require more work. This will take approximately 2 to 2.5 hours of your time. You will be provided with a certificate of participation.

There are no costs associated with participating in this research project, nor will you be paid. All opportunities provided to you as part of the research project will be provided to you free of charge.

4 What do I have to do?

To be involved in this research study we ask that you attend all information

gathering session/s and education/cooking session/s or the education and review appointments organised for you by your supervisor.

If you agree to be involved in another study or opportunity associated with your education during the time that you are involved in this study, we would appreciate you contacting us to provide us with the details of the research. This allows us to make the required adjustments to our research data to ensure accuracy.

Students involved in the cooking skills and education program are required to inform researchers about any food allergies or intolerances prior to participation. This enables adequate measures to be taken, to prevent any adverse events. Researchers will start this conversation. If you have been prescribed with an EpiPen to relieve any allergic reactions, we ask that you bring it to all cooking sessions as a precaution. This is in case of an unforeseen allergic reaction.

5 Other relevant information about the research project

It is anticipated that 50-100 students may take part in this project that is run at SALHN Vascular Surgery Clinics at Flinders Medical Centre, Repatriation General Hospital, Marion GP Plus and Flinders University. This project involves researchers based at Flinders Medical Centre and Flinders University.

6 Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at any stage.

Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect the usual education provided to you by Flinders University, your relationship with those teaching you or your relationship with Flinders University, Nutrition and Dietetics.

7 What are the alternatives to participation?

You do not have to take part in this research project to gain dietetic experience. Dietetic experience is already provided to you through the final years of your degree. Other options are available including volunteer opportunities within the community. The researcher will discuss the option/s with you before you decide whether or not to take part in this research project.

8 What are the possible benefits of taking part?

We cannot guarantee or promise that you will receive any benefits from this research. However possible benefits may include an increased awareness and understanding of dietetic competencies, skills in collecting information from patients, awareness of peripheral vascular disease as well as the treatment strategies and skills in conducting a group education session and cooking class.

The results of this study will help to determine if additional patient experiences can

benefit dietetic students or not. It will also assess if this form of education is suitable for students. This will help staff to better assist dietetic students in the future, to develop the skills required to be a dietitian.

9 What are the possible risks and disadvantages of taking part?

Participation in this study is unlikely to result in any adverse effects. Orientation and training will be provided to you to ensure you are knowledgeable and comfortable to undertake the patient interaction and measurements. Questionnaires and discussion with teaching staff are also routinely undertaken during the course of your studies. Therefore, there are minimal risks and disadvantages associated with participating in this study.

If you have a food allergy or intolerance, there is a risk that you may have an allergic reaction or feel discomfort, if you were to consume the food that causes your allergy or intolerance. To avoid this, we ask that you inform the researcher and staff about your food allergy or intolerance prior to participation. This will allow changes to be made to prevent these events. Staff and participants will also undergo an induction. This includes occupational health and safety training prior to the education and cooking class.

10 What will happen to my test samples?

Not applicable.

11 What if I withdraw from this research project?

If you decide to withdraw from this research project, please notify a member of the research team before you withdraw.

If you do withdraw your consent during the research project, the researchers will not collect further personal information from you. Personal information already collected will be kept, to ensure that the results of the research project can be measured properly and to comply with law. You should be aware that data collected by the research team up to the time you withdraw will form a part of the research project results. If you do not want them to do this, you must tell them before you join the research project.

12 Could this research project be stopped unexpectedly?

This research project may be stopped unexpectedly for a number of reasons. These may include a lack of resources or unforeseen adverse events.

13 What happens when the research project ends?

On completion of the study, student dietetic experiences associated with the study will stop. If you require further dietetic experiences to aid with your learning, the researcher will discuss options available to you.

On completion of the study, the results will be published in peer-review journals and/or presented at relevant scientific meetings. The outcomes from the study will be made available on the Flinders University Nutrition and Dietetics web page (http://www.flinders.edu.au/sohs/sites/nutrition-and-dietetics/) The results will also form a component of Ms Jenni Suen's thesis for completing her Doctor of Philosophy degree.

Part 2 How is the research project being conducted?

14 What will happen to information about me?

By signing the consent form you consent to the researchers and relevant research staff collecting and using personal information about you for the research project. Any information obtained in connection with this research project that can identify you will remain confidential. The information will be restricted to the use of the immediate group of researchers involved in the study.

All data will be stored on a laptop with a secure hard drive and will be protected by a password lock. It will be backed up on an external hard drive. Data will be stored for five years at Flinders University following the completion of the study. Data will be stored on the secure shared drive of Discipline of Nutrition and Dietetics. The data may be used in the future for other studies that arise from this study based on further ethics application approval. Your information will only be used for the purpose of this research project and it will only be disclosed with your permission, except as required by law.

Information about you may be obtained from your study records held at this university for the purpose of this research. By signing the consent form you agree to the study team accessing study records if they are relevant to your participation in this research project.

Your records and any information obtained during the research project are subject to inspection for the purpose of verifying the procedures and the data. This review may be done by the relevant authorities, the institution relevant to this Participant Information Sheet, Flinders University, Repatriation General Hospital, Flinders Medical Centre or as required by law. By signing this Consent Form, you authorise release of, or access to, this confidential information to the relevant study personnel and regulatory authorities as noted above.

It is anticipated that the results of this research project will be published and/or presented in a variety of forums. In any publication and/or presentation, information will be provided in such as a way that you cannot be identified, except with your permission. All data will be de-identified and presented as group data. Therefore, individual data will not be able to be identified.

In accordance with relevant Australian and/or South Australian privacy and other relevant laws, you have the right to request access to your information collected and stored by the research team. You also have the right to request that any information

with which you disagree be corrected. Please contact the study team member named at the end of this document if you would like to access your information.

Any information obtained for the purpose of this research project that can identify you will be treated as confidential and securely stored. It will be disclosed only with your permission, or as required by law.

15 Complaints and compensation

If you suffer any injuries or complications as a result of this result of this research project, you should contact the researchers as soon as possible. You will be assisted with arranging appropriate medical treatment. If you are eligible for Medicare, you can receive any medical treatment required to treat the injury or complication, free of charge, as a public patient in any Australian public hospital.

As no pharmacological drug is being tested in this research project and questionnaire – based tests or interviews are conducted, there is little chance of any adverse effects. In the case of an unexpected adverse effect, compensation may be provided in accordance with the law.

16 Who is organising and funding the research?

The research project is being conducted by Flinders University Nutrition and Dietetics and the SALHN Vascular Surgery Department. Funding will be provided by Flinders University.

17 Who has reviewed the research project?

All research in Australia involving humans is reviewed by an independent group of people called a Human research Ethics Committee (HREC). The ethical aspects of this research project have been approved by the Southern Adelaide Clinical Human Research Ethics Committee (SAC HREC).

This project will be carried out according to the *National Statement on Ethical Conduct in Human Research (2007)*. This statement has been developed to protect the interested of people who agree to participate in human research studies.

18 Further information and who to contact

The person you may need to contact will depend on the nature of your query.

If you would like any further information concerning this project or if you have any medical problems, that may be related to your involvement in the project, (for example, any side effect), you can contact the principal researcher Michelle Miller on (08) 8201 2421 or any of the following people.

For matters relating to research at the site at which you are participating, the details of the local site complaints person are:

Name	Villis Marshall
Position	Director, Office for Research
Telephone	*8204 6453*
Email	*Health.SALHNOfficeforResearch@sa.gov.au*

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

Reviewing HREC name	Southern Adelaide Clinical
Position	Executive Officer
Telephone	8204 6453
Email	*Health.SALHNOfficeforResearch@sa.gov.au*

Local HREC Office contact (Single Site -Research Governance Officer)

Position	Research Governance Administration Officer
Telephone	8204 6453
Email	*Health.SALHNOfficeforResearch@sa.gov.au*

Consent Form - *Adult providing own consent*

Title	Creating efficiencies while improving effectiveness: An evaluation of a student-led nutrition service for delaying progression of peripheral vascular disease
Short Title	Improving outcomes for patients with peripheral vascular disease through student nutrition services.
Protocol Number	*83.17*
Coordinating Principal Investigator/	Professor Michelle Miller
Associate Investigator(s)	Ms Jolene Thomas, Dr Christopher Delaney, Mrs Amanda Wray, Ms Jenni Suen
Location	Southern Adelaide Local Health Network Vascular Surgery Clinics, Flinders University

Declaration by Participant

I have read the Participant Information Sheet, or someone has read it to me in a language that I understand.

I understand the purposes, procedures and risks of the research described in the project.

I give permission for my lecturers, to release information to the researchers concerning my education for the purposes of this project. I understand that such information will remain confidential.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project as described and understand that I am free to withdraw at any time during the study without affecting my relationship with teaching staff and my grades.

I understand that I will be given a signed copy of this document to keep.

Name of Participant (please print) _____

Signature _____ Date _____

Declaration by Study Doctor/Senior Researcher†

I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Name of Study Doctor/

Senior Researcher† (please print) _____

Signature _____ Date _____

† A senior member of the research team must provide the explanation of, and information concerning, the research project.

Note: All parties signing the consent section must date their own signature.

Form for Withdrawal of Participation - *Adult providing own consent*

Title	Creating efficiencies while improving effectiveness: An evaluation of a student-led nutrition service for delaying progression of peripheral vascular disease
Short Title	Improving outcomes for patients with peripheral vascular disease through student nutrition services.
Protocol Number	*83.17*
Coordinating Principal Investigator/	Professor Michelle Miller
Associate Investigator(s)	Ms Jolene Thomas, Dr Christopher Delaney, Mrs Amanda Wray, Ms Jenni Suen
Location	Southern Adelaide Local Health Network Vascular Surgery Clinics, Flinders University

Declaration by Participant

I wish to withdraw from participation in the above research project and understand that such withdrawal will not affect my grades, my relationship with those teaching me or my relationship with Nutrition and Dietetics, Flinders University.

Name of Participant (please print) _____

Signature _____ Date _____

In the event that the participant's decision to withdraw is communicated verbally, the Study Doctor/Senior Researcher will need to provide a description of the circumstances below.

Declaration by Study Doctor/Senior Researcher†

I have given a verbal explanation of the implications of withdrawal from the research project and I believe that the participant has understood that explanation.

Name of Study Doctor/

Senior Researcher† (please print) _____

Signature _____ Date _____

† A senior member of the research team must provide the explanation of and information concerning withdrawal from the research project.

Note: All parties signing the consent section must date their own signature.

Appendix 8: Patient Clinical Satisfaction Questionnaire

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Peripheral Vascular Disease Student-Led Clinic Questionnaire

Dear participant,

Thank you for taking time to answer the following questions. This questionnaire seeks to find out about your experience of attending this clinic. The information provided will be used to help improve this program. All information provided will remain anonymous. It should take you no more than 10-15 minutes to complete this questionnaire.

Please circle your response to the questions below:

The student-led clinic was accessible (location, time)

1	**2**	**3**	**4**	**5**
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

After this experience, I feel confident coming to a supervised student dietitian for individualised nutrition advice

1	**2**	**3**	**4**	**5**

Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

I felt like the student understood the information they were giving me

1	**2**	**3**	**4**	**5**
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

The student was professional

1	**2**	**3**	**4**	**5**
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

I feel confident to go home and make changes to my diet

1	**2**	**3**	**4**	**5**
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

Please rate the following statements about today's consultation. Please tick the box for each statement and answer every statement

How was the student at ….	Poor	Fair	Good	Very good	Excellent	Does not apply
1. Making you feel at ease… (being friendly and warm towards you, treating you with respect, not cold or abrupt)						
2. Letting you tell your "story"…. (giving in you time to fully describe your situation in your own words, not interrupting or diverting you.)						
3. Really listening …. (paying close attention to what you were saying, not looking at the notes or computer as you were talking)						
4. Being interested in you as a whole person… (asking /knowing relevant details about your life, your situation, not treating you as 'just a number')						

5. Fully understanding your concerns… (communicating that he/she had accurately understood your concerns, not overlooking or dismissing anything)						
6. Showing care and compassion… (seeming genuinely concerned, connecting with you on a human level)						
7. Being Positive…. (having a positive approach and a positive attitude being honest but not negative about your problems)						
8. Explaining things clearly….. (fully answering your questions, explaining clearly, giving you adequate information, not being vague)						
9. Helping you to take control…. (exploring with you what you can do to improve your health yourself, encouraging rather than 'lecturing' you						

10. Making a plan of action with you… (discussing the options, involving you in decisions as much as you want to be involved, not ignoring your views)						

From this experience, I would attend a student-led clinic in the future

Yes / No

Comments:

_____

What was the thing you liked **most** about the clinic?

What was the thing you liked **least** about the clinic?

What are some **improvements** which could be made to the clinic?

Please add any further comments you would like to make:

Thank you for completing the questionnaire, we appreciate your feedback!

Appendix 9: Questionnaire administered following the community sessions

Session 1:

Please tell us about what you have learnt this session by ticking the appropriate boxes

	Before the program						**Right Now**					
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I can identify the foods on the Australian Guide to Healthy Eating	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. I am able to make more healthful food choices using the Australian Guide to Healthy Eating	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. I feel confident in my ability to bake a dessert	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. I feel confident in my ability to fry healthily	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5. How satisfied are you with today's nutrition education and cooking session?

☐ Very unsatisfied

☐ Unsatisfied

☐ Satisfied

☐ Very satisfied

6. How would you rate **the quality of the information presented at the nutrition talk?**

☐ Excellent

☐ Good

☐ Fairly poor

☐ Poor

7. **How useful was the information presented at the nutrition talk?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

8. How would you rate **the student's responses to questions from the audience?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

9. **Was the length of the event too long, too short, or about right?**

☐ Too long

☐ About right

☐ Too short

10. **What did you *like* about the cooking session?**

_____

_____

_____

11. **What did you *dislike* about the cooking session?**

_____

_____

_____

12. **Do you think the resources provided would help you at home**?

☐ Yes ☐ No

If Yes, please indicate which one will help you below. **If No**, please tell us what will help you below:

_____

_____

_____

_____

Thank you very much for your time!

Session 2:

Please tell us about what you have learnt this session by ticking the appropriate boxes

	Before the program						**Right Now**					
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I can identify foods that contain healthy fats (unsaturated fats)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. I can identify foods which contain bad fats (saturated fats)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. I feel confident in my ability to make fish patties	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. I feel confident in my ability to make a salad dressing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5. How satisfied are you with today's nutrition education and cooking session?

☐ Very unsatisfied

☐ Unsatisfied

☐ Satisfied

☐ Very satisfied

6. How would you rate **the quality of the information presented at the nutrition talk?**

☐ Excellent

☐ Good

☐ Fairly poor

☐ Poor

7. **How useful was the information presented at the nutrition talk?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

8. How would you rate **the student's responses to questions from the audience?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

9. **Was the length of the event too long, too short, or about right?**

☐ Too long

☐ About right

☐ Too short

10. **What did you *like* about the cooking session?**

_____

_____

_____

11. **What did you *dislike* about the cooking session?**

_____

_____

_____

12. **Do you think the resources provided would help you at home**?

☐ Yes ☐ No

If Yes, please indicate which one will help you below. **If No**, please tell us what will help you below:

_____

_____

_____

_____

Thank you very much for your time!

Session 3:

Please tell us about what you have learnt this session by ticking the appropriate boxes

	Before the program						**Right Now**					
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I can identify foods that are **lower** in salt	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. I can identify foods which are **higher** in fibre	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. I feel confident in my ability to make a stir-fry	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. I feel confident in my ability to cook rice	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5. How satisfied are you with today's nutrition education and cooking session?

☐ Very unsatisfied

☐ Unsatisfied

☐ Satisfied

☐ Very satisfied

6. How would you rate **the quality of the information presented at the nutrition talk?**

☐ Excellent

☐ Good

☐ Fairly poor

☐ Poor

7. **How useful was the information presented at the nutrition talk?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

8. How would you rate **the student's responses to questions from the audience?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

9. **Was the length of the event too long, too short, or about right?**

☐ Too long

☐ About right

☐ Too short

10. **What did you *like* about the cooking session?**

_____

_____

_____

11. **What did you *dislike* about the cooking session?**

_____

_____

_____

12. **Do you think the resources provided would help you at home**?

☐ Yes ☐ No

If Yes, please indicate which one will help you below. **If No**, please tell us what will help you below:

_____

_____

_____

_____

Thank you very much for your time!

Session 4:

Please tell us about what you have learnt this session by ticking the appropriate boxes

	Before the program						**Right Now**					
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I can identify total energy (calories) per 100g	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. I can identify total fat per 100g	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. I am able to compare between food products using the labels	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. I feel confident in my ability to make homemade pizza	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5. How satisfied are you with today's nutrition education and cooking session?

☐ Very unsatisfied

☐ Unsatisfied

☐ Satisfied

☐ Very satisfied

6. How would you rate **the quality of the information presented at this nutrition talk?**

☐ Excellent

☐ Good

☐ Fairly poor

☐ Poor

7. **How useful was the information presented at this nutrition talk?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

8. How would you rate **the student's responses to questions from the audience?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

9. **Was the length of the event too long, too short, or about right?**

☐ Too long

☐ About right

☐ Too short

10. **What did you *like* about the cooking session?**

_____

_____

_____

11. **What did you *dislike* about the cooking session?**

_____

_____

_____

12. **Do you think the resources provided would help you at home**?

☐ Yes ☐ No

If Yes, please indicate which one will help you below. **If No**, please tell us what will help you below:

_____

_____

_____

_____

Thank you very much for your time!

Session 5:

Please tell us about what you have learnt this session by ticking the appropriate boxes

	Before the program						**Right Now**					
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I understand why antioxidants are helpful to my body	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. I can identify foods which contain antioxidants	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. I feel confident in my ability to cook kebabs/skewers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. I feel confident in my ability to create a quick, no cook dessert	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5. How satisfied are you with today's nutrition education and cooking session?

☐ Very unsatisfied

☐ Unsatisfied

☐ Satisfied

☐ Very satisfied

6. How would you rate **the quality of the information presented at this nutrition talk?**

☐ Excellent

☐ Good

☐ Fairly poor

☐ Poor

7. **How useful was the information presented at this nutrition talk?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

8. How would you rate **the student's responses to questions from the audience?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

9. **Was the length of the event too long, too short, or about right?**

☐ Too long

☐ About right

☐ Too short

10. **What did you *like* about the cooking session?**

_____

_____

_____

11. **What did you *dislike* about the cooking session?**

_____

_____

_____

12. **Do you think the resources provided would help you at home**?

☐ Yes ☐ No

If Yes, please indicate which one will help you below. **If No**, please tell us what will help you below:

_____

_____

_____

_____

Thank you very much for your time!

Session 6:

Please tell us about what you have learnt this session by ticking the appropriate boxes

	Before the program						**Right Now**					
	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I can identify ways to save money when food shopping	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Healthier foods are cheaper than takeaway foods	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. I feel confident in my ability to cook with filo pastry	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. I feel confident in my ability to prepare healthy meals	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

5. How satisfied are you with today's nutrition education and cooking session?

☐ Very unsatisfied

☐ Unsatisfied

☐ Satisfied

☐ Very satisfied

6. How would you rate **the quality of the information presented at this nutrition talk?**

☐ Excellent

☐ Good

☐ Fairly poor

☐ Poor

7. **How useful was the information presented at this nutrition talk?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

8. How would you rate **the student's responses to questions from the audience?**

☐ Very useful

☐ Useful

☐ Fairly useful

☐ No use at all

9. **Was the length of the event too long, too short, or about right?**

☐ Too long

☐ About right

☐ Too short

10. **What did you *like* about the cooking session?**

_____

_____

_____

11. **What did you *dislike* about the cooking session?**

_____

_____

_____

12. **Do you think the resources provided would help you at home**?

☐ Yes ☐ No

If Yes, please indicate which one will help you below. **If No**, please tell us what will help you below:

_____

_____

_____

_____

Thank you very much for your time!

Appendix 10: Knowledge Quiz

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Nutrition education & cooking sessions

Dear participant,

Thank you for taking time to answer the following questions. This survey seeks to find out about your current nutritional knowledge. The information provided will be used to help improve this program. All information provided will remain confidential. It should take you no more than 10-15 minutes to complete this survey.

Australian Guide to Healthy Eating

1. **Do you think the Australian Guide to Healthy Eating recommend that people *eat more, the same amount, or less* of these foods?**
   (Please tick one box per food)

Food	Eat More	Same Eat	Less	Not Sure
Vegetables	☐	☐	☐	☐
Lollies/Chocolate	☐	☐	☐	☐
Reduced Fat Milk	☐	☐	☐	☐
Hot Chips	☐	☐	☐	☐
Fruits	☐	☐	☐	☐
Wholegrain Cereals	☐	☐	☐	☐
Salted Nuts	☐	☐	☐	☐

Wholegrains & Fibre

2. **Do you think these foods are *high* or *low* in fibre?**
   (Please tick one box per food)

Food	High Fibre	Low Fibre	Not Sure
Cornflakes	☐	☐	☐
Porridge (Oats)	☐	☐	☐
Nuts	☐	☐	☐
Mashed Potato	☐	☐	☐
Wholemeal bread	☐	☐	☐
Baked beans	☐	☐	☐
White rice	☐	☐	☐

3. **High fibre foods can be beneficial when trying to lose weight, true or false?**

☐ True ☐ False

Salt:

4. **Where does most of the salt in our diet come from?**

(Tick ONLY 1 box)

☐ Processed foods
☐ Adding salt at the table
☐ Salt added during cooking

5. **We can cut down on sodium by**

(Tick ONLY 1 box)

☐ Using spices instead of salt
☐ Using garlic salt instead of chopped garlic
☐ Adding salt to food before it is tasted

Antioxidants

6. **Why are antioxidants important for our body?**

(Tick ONLY 1 box)

☐ They protect our body from damage
☐ They help us to lose weight
☐ They raise our "good" (HDL) cholesterol

7. **Which of these foods do you think are high in antioxidants?**

(You may tick 1 or more box for this question)

☐ Fruits
☐ Vegetables
☐ Almonds
☐ Olive oil
☐ Reduced fat milk
☐ Lean beef

Label Reading

8. **When reading food labels, sometimes ingredients may be listed by other names. 'Fat' is sometimes listed as:**

(You may tick 1 or more box for this question)

☐ Palm Oil	☐ Shortening	☐ Sodium
☐ Dextrose	☐ Copha	☐ Milk solids

9. **When reading food labels, sometimes ingredients may be listed by other names. 'Sugar' is sometimes listed as:**

(You may tick 1 or more box for this question)

☐ Sucrose	☐ Triglycerides	☐ Malt extract
☐ MSG	☐ Rice syrup	☐ Fructose

Fats

10. **Do you think these foods are *high* or *low* in saturated fat?**

(Please tick one box per food)

Food	High	Low	Not Sure
Fish	☐	☐	☐
Full Cream Milk	☐	☐	☐
Olive Oil	☐	☐	☐
Butter	☐	☐	☐
Margarine	☐	☐	☐
Chocolate	☐	☐	☐
Cheddar Cheese	☐	☐	☐

11. **Do you think these foods are *high* or *low* in omega 3 fatty acids?**

(Please tick one box per food)

Food	High	Low	Not Sure
Sardines	☐	☐	☐
Soy and linseed bread	☐	☐	☐
Oranges	☐	☐	☐
Canned tuna	☐	☐	☐
Olive Oil	☐	☐	☐
Fish fingers	☐	☐	☐

Nutrition & Blood Vessel Disease:

12. **Which of the following should you eat less of in foods to have the greatest effect on your "bad" (LDL) cholesterol?**

(Tick ONLY 1 box)

- ☐ Saturated fat
- ☐ Cholesterol
- ☐ Unsaturated fats

13. **Why are some fats in foods better than others?**

(Tick ONLY 1 box)

- ☐ They have less calories
- ☐ They help with heart/blood vessel health
- ☐ They can help with your blood sugar levels

14. **Our bodies can't make omega-3s and omega-6s, therefore we need to get them from the food we eat. True or false?**

(Tick ONLY 1 box)

☐ True ☐ False

Appendix 11: Student Reflection Forms

Flinders UNIVERSITY

Nutrition and Dietetics
Vascular Nutrition Clinic and Cooking Program

INDIVIDUAL CLINIC CASE REFLECTION AND FEEDBACK FORM

Student's Name ..... ***Date*** ..... *(Week ... of Experience)*

Supervisor: .....

DAA Competency	Reflection and Feedback
DOMAIN 1: PRACTICES EFFECTIVELY	
1.1 Demonstrates Safe Practice	
1.1.1. Reviews and evaluates the impact of own practice on improving nutritional health	
1.1.2. Recognises own professional limitations and seeks assistance as necessary	
1.1.3 Accepts responsibility for & manages, implements and evaluates own personal health & wellbeing	
1.1.4 Shows a commitment to professional development & conduct and lifelong learning	
1.1.5 Consistently demonstrates reflective practice in collaboration with supervisors, peers & mentors	
1.1.6 Accepts responsibility for own actions	
1.1.7 Demonstrates flexibility, adaptability & resilience and the ability to manage own emotions	
1.2 Practices within Ethical & Legal Frameworks	
1.2.1 Exercises professional duty of care with relevant codes of conduct, ethical requirements & other accepted protocols 1.2.2 Demonstrates integrity, honesty & fairness 1.2.3 Prepares appropriate documentation according to standards	
1.3 Demonstrates Professional Leadership	
1.3.1 Uses negotiation & conflict resolution skills when required	
1.3.2 Develops & maintains a credible professional role by commitment to excellence of practice	

1.3.3 Seeks, responds to and provides effective feedback	
1.3.4 Participates in mentoring	
1.3.5 Demonstrates initiative by being proactive and developing solutions to problems	
1.4 Practices Effectively	
1.4.1 Applies effective time management, workload and resource management	
1.4.2 Utilises suitable evaluation tools to review effectiveness of practice	
1.4.3 Identifies & assesses risk, follows risk managements protocols & develops basic risk management strategies for services	
1.4.4 Utilises relevant technology and equipment efficiently & effectively	
1.4.5 Applies principles of marketing to promote healthy eating and influence dietary change	
1.5 Demonstrates Cultural Competence	
1.5.1 Reflects on own culture, values & beliefs and their influence on practice 1.5.2 Seeks culturally specific information to inform practice. 1.5.3 Works inclusively, effectively and respectively with individuals, groups and populations of different cultures	
DOMAIN 2: POSITIVELY INFLUENCES THE HEALTH OF INDIVIDUALS, GROUPS AND/OR POPULATIONS TO ACHIEVE NUTRITION OUTCOMES	
2.1 Applies an evidence-based approach to nutrition & dietetics services	
2.1.1 Collects, analyses & interprets health, medical, social, cultural, psychological, economic, personal, dietary intake & food supply and environmental data to determine nutritional status	
2.1.2 Makes appropriate nutrition diagnoses & identifies nutritional priorities.	
2.1.3 Priorities, formulates goals & objectives, prepares goal centres plans in collaboration with patients/carers/members of HC team	
2.1.4 Implements, evaluates and adapts nutrition care plans with clients & carers.	

2.3 Facilitates optimal food choice and eating behaviours for health	
2.3.1 Applies highly developed knowledge to tailor recommendations to improve health of clients	
2.3.2 Displays effective active listening, interviewing & interpersonal skills	
2.3.3 Uses client-centred counselling skills to facilitate nutrition and lifestyle change and supports clients to self-manage	
Domain 3: Applies critical thinking and integrates evidence into practice	
3.1 Uses best available evidence to inform practice	
3.1.1 Adopts a questioning and critical approach in all aspects of practice	
3.1.2 Gathers, critiques, uses & shares research & information to support sound decision making	
3.1.3 Applies problem-solving skills to create realistic solutions to nutrition problems	
Domain 4: Collaborates with clients & stakeholders	
4.1 Communicates appropriately with individuals, groups, organisation & communities from various cultural, social-economic, organisational and professional backgrounds	
4.1.1 Practises in a manner that encompasses the needs, preferences and perspectives of others	
4.1.2 Demonstrates empathy and establishes trust & rapport to build effective relationships	
4.1.3 Translates technical information info practice advice on food and eating	
4.1.4 Adapts and tailors communication appropriately for specific audiences	
4.1.5 Communicates clearly and concisely	
4.3 Collaborates within and across teams effectively	
4.1.3 Promotes a high standard of nutrition care, while respecting the goals & roles of clients and other professionals, key stakeholders or groups	
4.3.2 Participates in collaborative decision making, shared responsibility & shared vision within a team	

4.3.3 Shares responsibility for team action, recognising the diverse roles and responsibilities other team members play	
4.3.4 Guides & supports other team members and peers	
4.3.5 Actively promotes the role of a Dietitian and the broader profession of nutrition & dietetics	

Signature of Supervisor ..... **Date** .....

Signature of student ..... **Date**.....

Placement Educator Feedback on Student Progress:

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Student Reflection on Feedback:

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Please scan & send the completed form to the Research Team

This form has been substantially based on the 2015 DAA National Competency Standard for Entry Level Dietitians in Australia 22/03/2018

Nutrition and Dietetics
Vascular Nutrition Clinic and Cooking Program
SMALL GROUP EDUCATION

Student's Name:..... **Date** ..... **(Week ... of Experience)**

Session Number/Name ....

Supervisor: ....

Observable tasks	Reflection/Feedback
PLANS EDUCATION SESSIONS FOR SMALL GROUPS	
Identifies the social, cultural and literacy needs of the target group	
Consults with the target group and/or relevant stakeholders, partners and/or co-facilitator	
Documents the group education plan with objectives and strategies, resources, process and impact evaluation, and timing of session	
Organises facilities and uses audio-visual and other resources appropriately	
IMPLEMENTS EDUCATION SESSIONS FOR SMALL GROUPS	
Presents accurate, clear and logical information that is targeted to the audience , including concise explanations and summary of main points	
Practises in a manner that encompasses the needs, preferences and perspectives of others	
Translates technical information into practical advice on food and eating and other relevant topics	
Adapts and tailors communication appropriately for specific audiences	
Communicates clearly and concisely to a range of audiences using a range of media	

Observable tasks	Reflection/Feedback
Reflects on own culture, values and beliefs and their influence on practice. Seeks out culturally specific information to inform practice. Works respectfully with individuals, groups and/or populations from different cultures	
Applies the principles of marketing to promote healthy eating and influence dietary change: encourages participation and engagement; responds appropriately to questions and issues raised	
Delivers group education within planned time	
EVALUATES EDUCATION SESSIONS FOR SMALL GROUPS	
Uses at least one method to evaluate the group education session	

Comments:

.....

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.....

Signature of Supervisor ..... **Date** .....

Please scan and send the completed Assessment Form to the Research Team

Appendix 12: Student Observation Forms

Observation

Student Name:

Date:

Patient Initials:

Student who you observed:

1) What did you observe about **how to communicate with a patient**?

2) What did you observe about how the **session flow**?

3) If you have learnt **something new about what a Dietitian does**, what is it?

4) **Other thoughts** from my observation today:

5) Looking at the **Gibbs cycle** below, write your thoughts down for each of the 6 areas:

Figure: Gibbs' Reflective Cycle (Gibbs, 1998)

Next step:
Provide a copy of this form to your supervisor and organise a time to talk about this session together.

Appendix 13: Patient's Data Collection Pack

Initial Data Collection Form

Participant ID: _____ Participant MRN: _____

Today's Date: _____/_____/_____

Name: _____ [M / F] Age: ____ DOB: _____/_____/_____

MHx:				
☐ Hyperlipidaemia	☐ Hypertension	☐ Smoker	☐ IHD	☐ PVD stage__
☐ Renal Disease	☐ Liver Disease	☐ Stroke	☐ Diabetes	☐ Past CVD events (year /what)
☐ DVT				

☐ Cancer Site:_____ ☐ Not active ☐ Past and current Tx **(Note dates, site/s, duration of Tx)**

☐ Active

Surgery:_____
Chemotherapy:_____
Radiotherapy:_____
Hematopoietic cell transplant:_____
Bone marrow transplant :_____

☐ Food allergies & intolerances (list): _____

Surgical /procedures history (name of surgery, site of surgery, date, indication, results)

Ulcer (present or absent – size/stage of ulcer)

Current stenosis (what arteries/ % stenosis)

Medications: (refer to reverse side for reference)

☐ Hypolipidaemic agents: _____	☐ Diuretics _____
☐ Anti-hypertensive: _____	☐ Antibiotics: _____
☐ Anti-arrhythmics: _____	☐ Anti-thrombotic/ anticoagulants: _____
☐ OHAs: _____	☐ Insulin: _____

☐ Other relevant medications: _____

Social History

☐ Occupation: _____	☐ Physical Activity/Exercise _____
☐ Ethnicity: _____	

Living Situation:

☐ Home alone ☐ Home with _____

☐ Residential Aged Care Facility/ Nursing Home: High level care **OR** Low level care *(please circle)* ☐ Other: _____

Contact number: _____ **Home Address:** _____

Medications:

Hypolipidaemic agents	Atorvastatin calcium (Lipitor) Cholestyramine resin (Questran Lite), Colestipol hydrochloride (Colestid Granules for Oral suspension), Ezetimibe (Ezetrol) Fluvastatin sodium (Lescol Capsules, Lescol XL)	Fenofibrate (Lipidil) Gemfibrozil (Lopid) Pravastatin sodium (Pravachol), Rosuvastatin calcium (Crestor) Simvastatin (Zocor)
Diuretics	Amiloride hydrochloride (Kaluril) Bumetanide (Burinex) Chlorthalidone (Chlorthalidone), Ethacrynic acid (Edecrin)	Eplerenone (Inspra) Frusemide (Lasix) Hydrochlorothiazide (Dihydrex) Spironolactone (Aldactone)
Anti-hypertensive	Amlodipine (Exforge, Norvasc) Candesartan cilexetil (Atacand) Captopril (Capoten) Clonidine hydrochloride (Catapres) Diltiazem hydrochloride (Cardizem CD) Diazoxide (DBL Diazoxide Injection BP) Enalapril maleate (Renitec) Eprosartan mesylate (Teveten) Felodipine (Plendil ER, Triasyn) Fosinopril sodium (Monoplus, Monopril), Minoxidil (Loniten) Hydralazine hydrochloride (Alphapress, Apresoline), Indapamide (Natrilix) Irbesartan (Avapro) Labetalol hydrochloride (Trandate) Lecanidipine hydrochloride (Zanidip)	Lisinopril dehydrate (Zestril) Losartan potassium (Cozaar) Olmesartan (Olmetec, Sevikar) Moxonidine (Physiotens), Perindopril (Coversam, Coversyl) Prazosin (Minipress) Quinapril hydrochloride (Accupril) Nifedipine (Adalat 10, Adalat 20, Adalat Oros) Methyldopa (Aldomet) Ramipril (Tritace) Sodium nitroprusside dehydrate (DBL Sodium Nitroprusside for injection BP) Telmisartan (Micardis), Telmisartan (Twynsta) Trandolapril (Gopten Valsartan hydrochlorothiazide (Co-Diovan) Verapamil (Isoptin)
Antibiotics (Anti-bacterial)	Aminoglycosides (Amikin, Nebcin, Paromomycyin) Cephalosprins Erythromycin Flagyl (metronidazole: amoebicide)	Metronidazole (IV) Methicilin Quinolones Tetracyclines
Anti-arrhythmics	Adenosine (Adenocor) Amiodarone hydrochloride (Cordarone X) Disopyramide (Rythmodan), Flecainide acetate (Tambocor)	Lignocaine hydrochloride (Xylocard) Sotalol hydrochloride (Sotacor) Verapamil hydrochloride (Isoptin Injection)
Anti-thrombotic/ Anticoagulants	Abciximab rmc (ReoPro) Apixaban (Eliquis) Bivalirudin (Angiomax) Clopidogrel (DuoCover, Iscover) Cilostazol (Pletal) Dabigtran etexilate (Pradaxa) Dalteparin sodium (Fragmin) Danaparoid sodium (Orgaran) Dipyridamole (Persantin, Persantin SR) Dipyridamole aspirin (Asasantin SR)	Enoxaparin sodium (Clexane and Clexane Forte), Eptifibatide (Integrilin) Fondaparinux sodium (Arixtra) Heparin Lepirudin (Refludan) Prasugrel hydrochloride (Effient) Rivaroxaban (Xarelto) Ticagrelor (Brilinta) Ticlopidine hydrochloride (Tilodene) Tirofiban hydrochloride (Aggrastat) Warfarin sodium (Coumadin, Marevan)
OHAs	Acarbose (Glucobay) Acetohexamide Chlorpropamide Gliclazide (Diamicron, Glyade, Nidem) Glipizide (Melizide, Minidiab), Glimepiride (Amaryl)	Glicazepide Metformin (Diabex, Diaformin, Glucomet, Glucophage) Miglol (Glyset) Tolbutamide Voglibose
Insulin	Actrapid, Humalog (Lispro) Humulin Hypurin neutral Hypurin Isophane Protophane	Monotard Mixtard (30/80 or 30/70 or 50/50) Novorapid Repaglinide (Meglitinide, Novonorm) Ultratard

Nutrition Assessment Form

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Anthropometric

Weight: _____ Height: _____(m)_____(m^2) BMI: _____(kg/m^2)

Waist circumference

Trial 1: _____ (cm), Trial 2: _____ (cm), Trial 3: _____ (cm) Average of 3 trials: _____ (cm)

Biochemistry: **Date: ___/____/___**

Inflammation	
Nitric oxide	
Nitrite	
Nitrate ions	
Absolute neutrophil	
Lymphocyte	
Monocytes	
Eosinophils	
Basophils	
WBC count	
CRP	
Cortisol	

Lipid Studies (fasting)	
Total cholesterol	
HDL	
LDL	
Triglycerides	

Any other relevant recent biochemistry reported:

Blood Pressure _____ _____ _____ _____

Date: ___/___/____

Time:

Flow Mediated Dilation

Date measured: ____/____/_____

Date received: ____/____/_____

Time to peak dilation	
Maximum diameter	
Absolute change in diameter	
Sheer rate	

Pain-free walking distance: _____m

Nutrition Requirements

Energy

Schofield equation used:

_____

EER: _____kJ/day

Protein

Equation used: _____

EPR: _____ g/day

Fluid

Equation used: _____

EFR: _____ ml/day

Quality of Life Questionnaire

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Under each heading, please tick the ONE box that best describes your health TODAY

MOBILITY

- I have no problems with walking around ❑
- I have slight problems with walking around ❑
- I have moderate problems with walking around ❑
- I have severe problems with walking around ❑
- I am unable to walk around ❑

PERSONAL CARE

- I have no problems with washing or dressing myself ❑
- I have slight problems with washing or dressing myself ❑
- I have moderate problems with washing or dressing myself ❑
- I have severe problems with washing or dressing myself ❑
- I am unable to wash or dress myself ❑

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

- I have no problems doing my usual activities ❑
- I have slight problems doing my usual activities ❑
- I have moderate problems doing my usual activities ❑
- I have severe problems doing my usual activities ❑
- I am unable to do my usual activities ❑

PAIN / DISCOMFORT

- I have no pain or discomfort ❑
- I have slight pain or discomfort ❑
- I have moderate pain or discomfort ❑
- I have severe pain or discomfort ❑
- I have extreme pain or discomfort ❑

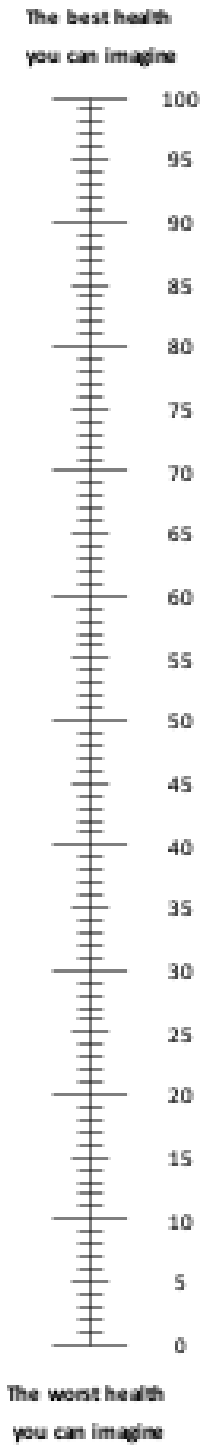
ANXIETY / DEPRESSION

- I am not anxious or depressed ❑
- I am slightly anxious or depressed ❑
- I am moderately anxious or depressed ❑
- I am severely anxious or depressed ❑
- I am extremely anxious or depressed ❑

Adapted from EuroQol Group, 2009, EQ-5D-5L Health Questionnaire-English version for Australia, Netherlands

- We would like to know how good or bad your health is TODAY.
- This scale is numbered from 0 to 100.
- 100 means the best health you can imagine.
  0 means the worst health you can imagine.
- Mark an X on the scale to indicate how your health is TODAY.
- Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY = ☐



Initial Diet History Form

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Time	Usual Food Intake	Food Frequency
		Bread w/meal, white, w/grain BF Cereals Rice/Pasta/Noodles **Milk** FC /LF /Skim Cheeses(Reg/LF/Light) Yoghurt/Custard(Reg/LF) Ice-cream/Cream **Meat**(lean/fat) Chicken(lean/skin) Fish/seafood Processed Meat Legumes/Lentils Eggs **Vegetables**/salad Starchy Vegetables **Fruit** Fresh/Canned/Dried Juices(NAS/sweetened) Tea/coffee Flavoured Milk: FC/LF **EXTRAs** Sugar/sweetener Salt Butter/Margarine Oil(olive/canola/olive) Lard/Dripping Cream Biscuits/cakes Chocolate/lollies Nuts/crisps Crackers Soft drinks/Cordial **Social** Alcohol Takeaway Food prepared? Cooking Methods Supplements

Diet History Form

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

	AGHE Recommended Average Number of Serves					
	Vegetables & legumes/beans	Fruit	Grain (cereal)foods	Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans	Milk, yoghurt, cheese and/or alternatives	Discr.
Men						
19-50	6	2	6	3	2.5	0-3
51-70	5.5	2	6	2.5	2.5	0-2.5
70+	5	2	4.5	2.5	3.5	0-2.5
Women						
19-50	5	2	6	2.5	2.5	0-2.5
51-70	5	2	4	2	4	0-2.5
70+	5	2	3	2	4	

	Vegetables & legumes/beans	Fruit	Grain (cereal)foods	Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans	Milk, yoghurt, cheese and/or alternatives	Discr.
AGHE serves						
Patient serves						
Difference						

Individual Consultation Appointment (Use if required)

Participant ID: _____ Participant MRN: _____ Today's Date: ___/____/___

Attendance: Yes No Reason:_____

Goals
1.
2.
3.
4.

Strategies
1.
2.
3.
4.
5.

6 week review

Note changes in the following:

MHx:				
☐ Hyperlipidaemia	☐ Hypertension	☐ Smoker	☐ IHD	☐ PVD
☐ Renal Disease	☐ Liver Disease	☐ Stroke	☐ Diabetes	
☐ Cancer Site:_____	☐ Not active ☐ Active	☐ Past and current Tx **(Note dates, site/s, duration of Tx)** Surgery:_____ Chemotherapy:_____ Radiotherapy:_____ Hematopoietic cell transplant:_____ Bone marrow transplant :_____		
☐ Food allergies & intolerances (list): _____				
Surgical /procedures history (name of surgery, site of surgery, date, indication, results)				
Ulcer (present or absent – size/stage of ulcer)				
Current stenosis (what arteries/ % stenosis)				
Medications: (refer to reverse side for reference)				
☐ Hypolipidaemic agents:_____	☐ Diuretics _____			
☐ Anti-hypertensive: _____	☐ Antibiotics: _____			
☐ Anti-arrhythmics:_____	☐ Anti-thrombotic/ anticoagulants: _____			
☐ OHAs: _____	☐ Insulin: _____			
☐ Other relevant medications: _____				

Social History	
☐ Occupation:_____	☐ Physical Activity/Exercise _____
☐ Ethnicity:_____	
Living Situation: ☐ Home alone ☐ Home with _____ ☐ Residential Aged Care Facility/ Nursing Home: High level care **OR** Low level care *(please circle)* ☐ Other:_____	

Contact number:_____ **Home Address:**_____

Other changes:

6 week review Diet History Form (use if required)

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Time	Usual Food Intake	Food Frequency
		Bread..... w/meal, white, m/grain BF Cereals..... ..... Rice/Pasta/Noodles ..... **Milk** FC /LF /Skim ..... Cheeses(Reg/LF/Light) ..... Yoghurt/Custard(Reg/LF) ..... Ice-cream/Cream **Meat**(lean/fat) ..... Chicken(lean/skin) ..... Fish/seafood..... Processed Meat..... Legumes/Lentils..... Eggs..... **Vegetables**/salad ..... Starchy Vegetables ..... **Fruit** Fresh/Canned/Dried Juices(NAS/sweetened) ..... Tea/coffee Flavoured Milk: FC/LF ..... **EXTRAs** Sugar/sweetener Salt Butter/Margarine..... Oil(eggo/canola/olive) Lard/Dripping Cream Biscuits/cakes..... ..... Chocolate/lollies..... Nuts/crisps..... Crackers..... Soft drinks/Cordial..... **Social** Alcohol..... Takeaway..... Food prepared..... Cooking Methods..... Supplements.....

6 week Diet History Form (use if required)

Participant ID: _____ Participant MRN: _____ Today's Date: ___/____/___

	AGHE Recommended Average Number of Serves					
	Vegetables & legumes/beans	**Fruit**	**Grain (cereal)foods**	**Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans**	**Milk, yoghurt, cheese and/or alternatives**	**Discr.**
Men						
19-50	6	2	6	3	2.5	0-3
51-70	5.5	2	6	2.5	2.5	0-2.5
70+	5	2	4.5	2.5	3.5	0-2.5
Women						
19-50	5	2	6	2.5	2.5	0-2.5
51-70	5	2	4	2	4	0-2.5
70+	5	2	3	2	4	

	Vegetables & legumes/beans	**Fruit**	**Grain (cereal)foods**	**Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans**	**Milk, yoghurt, cheese and/or alternatives**	**Discr.**
AGHE serves						
Patient serves						
Difference						

6 week review Consultation Appointment (Use if required)

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Attendance: Yes No Reason:_____

Review compliance with previous goals and use below as required.

Goals
1.
2.
3.
4.

Strategies
1.
2.
3.
4.
5.

12 Week Assessment Form

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Anthropometric

Weight: _____(kg) Height: _____(m)_____(m^2) BMI: _____(kg/m^2) Waist circumference_____(cm)

Biochemistry: Date: ___/____/___

Inflammation (fasting)	
Nitric oxide	
Nitrite	
Nitrate ions	
Absolute neutrophil	
Lymphocyte	
Monocytes	
Eosinophils	
Basophils	
WBC count	
CRP	
Cortisol	

Lipid Studies (fasting)	
Total cholesterol	
HDL	
LDL	
Triglycerides	

Any other relevant recent biochemistry tested:

Blood Pressure _____

Date: ___/___/____

Time:_____

Flow Mediated Dilation

Date measured: ____/_____/_____

Date analysis received: ___/_____/____

Time to peak dilatation	
Maximum diameter	
Absolute change in diameter	
Shear rate	

Pain-free walking distance: _____m

Nutrition Requirements
Energy
Schofield equation used:
_____
EER: _____kJ/day
Protein
Equation used: _____
EPR: _____ g/day
Fluid
Equation used: _____
EFR: _____ ml/day

12 week review

Note changes in the following:

MHx:				
☐ Hyperlipidaemia	☐ Hypertension	☐ Smoker	☐ IHD	☐ PVD
☐ Renal Disease	☐ Liver Disease	☐ Stroke	☐ Diabetes	
☐ Cancer Site:_____	☐ Not active ☐ Active	☐ Past and current Tx **(Note dates, site/s, duration of Tx)** Surgery:_____ Chemotherapy:_____ Radiotherapy:_____ Hematopoietic cell transplant:_____ Bone marrow transplant :_____		
☐ Food allergies & intolerances (list):_____				
Surgical /procedures history (name of surgery, site of surgery, date, indication, results)				
Ulcer (present or absent – size/stage of ulcer)				
Current stenosis (what arteries/ % stenosis)				
Medications: (refer to reverse side for reference)				
☐ Hypolipidaemic agents:_____	☐ Diuretics_____			
☐ Anti-hypertensive:_____	☐ Antibiotics:_____			
☐ Anti-arrhythmics:_____	☐ Anti-thrombotic/ anticoagulants:_____			
☐ OHAs:_____	☐ Insulin:_____			
☐ Other relevant medications:_____				

Social History	
☐ Occupation:_____	☐ Physical Activity/Exercise _____
☐ Ethnicity:_____	
Living Situation: ☐ Home alone ☐ Home with_____ ☐ Residential Aged Care Facility/ Nursing Home: High level care **OR** Low level care (please circle) ☐ Other:_____	

Contact number:_____ **Home Address:**_____

Other changes:

12 week review Diet History Form (use if required)

Participant ID: _____ Participant MRN: _____ Today's Date: ___/____/___

Time	Usual Food Intake	Food Frequency
		Bread..... w/meal, white, wholem. BF Cereals..... ..... Rice/Pasta/Noodles ..... **Milk** FC /LF /Skim ..... Cheese(Reg/LF/Light) ..... Yoghurt/Custard(Reg/LF) ..... Ice-cream/Cream **Meat**(lean/fat) ..... Chicken(lean/skin) ..... Fish/seafood..... Processed Meat..... Legumes/Lentils..... Eggs..... **Vegetables**/salad ..... Starchy Vegetables ..... **Fruit** Fresh/Canned/Dried Juices(NAS/'sweetened) ..... Tea/coffee Flavoured Milk: FC/LF ..... **EXTRAs** Sugar/sweetener Salt Butter/Margarine..... Oil(olive/canola/olive) Lard/Dripping Cream Biscuits/cakes..... ..... Chocolate/lollies..... Nuts/crisps..... Crackers..... Soft drinks/Cordial..... **Social** Alcohol..... Takeaway..... Food prepared?..... Cooking Methods..... Supplements.....

12 week Diet History Form(use if required)

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

	AGHE Recommended Average Number of Serves					
	Vegetables & legumes/beans	**Fruit**	**Grain (cereal)foods**	**Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans**	**Milk, yoghurt, cheese and/or alternatives**	**Discr.**
Men						
19-50	6	2	6	3	2.5	0-3
51-70	5.5	2	6	2.5	2.5	0-2.5
70+	5	2	4.5	2.5	3.5	0-2.5
Women						
19-50	5	2	6	2.5	2.5	0-2.5
51-70	5	2	4	2	4	0-2.5
70+	5	2	3	2	4	

	Vegetables & legumes/beans	**Fruit**	**Grain (cereal)foods**	**Lean meat and poultry, fish, eggs, nuts and seeds, and legumes/beans**	**Milk, yoghurt, cheese and/or alternatives**	**Discr.**
AGHE serves						
Patient serves						
Difference						

Doctor referral: REQUIRED NOT REQUIRED

SPOKE TO PT AND SENT: Y N/A Pt declined

12 Week Quality of Life Questionnaire

Participant ID: _____Participant MRN: _____ Today's Date: ___/____/___

Under each heading, please tick the ONE box that best describes your health TODAY

MOBILITY

I have no problems with walking around ❑

I have slight problems with walking around ❑

I have moderate problems with walking around ❑

I have severe problems with walking around ❑

I am unable to walk around ❑

PERSONAL CARE

I have no problems with washing or dressing myself ❑

I have slight problems with washing or dressing myself ❑

I have moderate problems with washing or dressing myself ❑

I have severe problems with washing or dressing myself ❑

I am unable to wash or dress myself ❑

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems doing my usual activities ❑

I have slight problems doing my usual activities ❑

I have moderate problems doing my usual activities ❑

I have severe problems doing my usual activities ❑

I am unable to do my usual activities ❑

PAIN / DISCOMFORT

I have no pain or discomfort ❑

I have slight pain or discomfort ❑

I have moderate pain or discomfort ❑

I have severe pain or discomfort ❑

I have extreme pain or discomfort ❑

ANXIETY / DEPRESSION

I am not anxious or depressed ❑

I am slightly anxious or depressed ❑

I am moderately anxious or depressed ❑

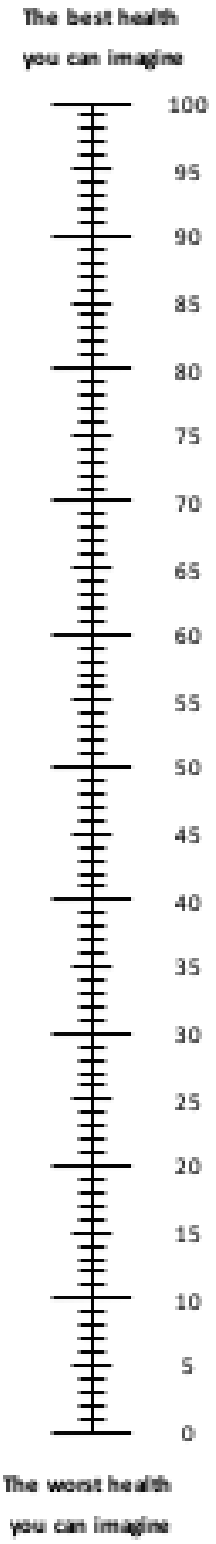
I am severely anxious or depressed ❑

I am extremely anxious or depressed ❑

Adapted from EuroQol Group, 2009, EQ-5D-5L Health Questionnaire-English version for Australia, Netherlands

- We would like to know how good or bad your health is TODAY.
- This scale is numbered from 0 to 100.
- 100 means the best health you can imagine.
  0 means the worst health you can imagine.
- Mark an X on the scale to indicate how your health is TODAY.
- Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY = ☐



Appendix 14: Ulna Length Chart

See BAPEN: the British Association for Parenteral and Enteral Nutrition. The 'MUST' Toolkit: Alternative measurements: instructions and tables. 2018.

Appendix 15: Example of Diet History

Time	Usual Food Intake	Food Frequency
BF.	Sun 1/wk. bacon Cereal 1½ muesli. 1 tsp sugar. 3/7 egg - fried/boiled (overall) nuts. cheese tasty. 4 slices. toast 1 white bread. butter. very light ¼ tsp. fruit tinned slice peach 1½ cup. milky coffee/ ICA2 milk Nestle. 2tsp/3.5 tspn sugar.	**Bread**......................... w/meal, white, m'grain BF Cereals.................... .... Rice/Pasta/Noodles ....
MT.	A2 skim 3/4. mug. 5/7 milky coffee (similar to BF).	**Milk** FC /LF /Skim .... 1 wk ago. Cheeses(Reg/LF/Light) .... Yoghurt/Custard(Reg/LF) ....
L	2 min. noodle soup. (1 sashay). s/w white bread x2, butter. (½ tsp) / 5/7 Strong paste. Fish salty. (Jar) (2 tsp) / cheese egg s/w. sandwich 2/7 soup. milky coffee. (2-3)/day.	Ice-cream/Cream 3/wk. 1 stick. **Meat**(lean/fat) porterhouse steak/ sausage/ Chicken(lean/skin) .... Fish/seafood........ sausage 1/wk. Processed Meat...... bacon 1/wk. Legumes/Lentils.........1/wk. Eggs............................
AT. 4:00.	1 Banana 1 mandarine.	**Vegetables**/salad .... Starchy Vegetables .... **Fruit** orange, apple, banana, mandarin Fresh/Canned/Dried 2x Juices(NAS/sweetened) every 2nd day. ....
530-630.	Rissoles x2. (80-100g) (minced meat, onion, carrot, peas) sprouts. egg. olive oil (2 tbsp) butter. 1tsp 1c prop. beans. (1½ tsp) (1 tsp) milky coffee. 1½ with milk + butter 100g. Always: mashed potato / meat / pea. Salmon. Fillet, fish (fortnight) + salad. 2c. Roll every Fri. w/ ham. cheese tomato lettuce. walnut. ½ c.	Tea/coffee 2-4 Flavoured Milk: FC/LF .... **EXTRAs** Sugar/sweetener Salt Butter/Margarine............ Oil(vege/canola/olive) Lard/Dripping Cream Biscuits/cakes...... ginger. 2x nuts (X mon) .... Chocolate/lollies............. Nuts/crisps...... 1C / month Crackers...................... Soft drinks/Cordial............ schooner 2x schooner **Social** 2x Alcohol....... 4/wk. Takeaway....................... Food preparer?............... Cooking Methods.......... Supplements.................

Appendix 16: Nutrition Resources Used

Resource created with Bridget Faulkner:

Omega-3 and Heart Health

What are Omega-3 fats?

Omega-3 fats are a healthy fat found in a variety of foods. As part of a healthy diet, omega-3 can help to reduce the risk of heart disease and stroke by:

- Decreasing inflammation in your body
- Thinning the blood
- Decreasing your bad cholesterol (LDL) and increasing your good cholesterol (HDL)

Daily Marine-Sourced Omega-3 and ALA Recommendations

The Heart Foundation recommends that "all Australians aim to include **2-3** serves of fish (including oily fish) per week as part of a heart healthy diet. This provides around **250-500** milligrams of marine-sourced omega-3s per day". This is equal to around **1750-3500** milligrams per week. The Heart Foundation also recommends consuming one gram per day (7g per week) of plant-sourced omega-3 (ALA).

The Australian Guide to Healthy Eating (AGHE) classifies one serve of fish as 100g (raw) or 115g (cooked). The traffic light system used outlines the number of serves you need to have per week of different foods to meet your omega-3 requirements.

=1-2 serves per week =2-3 serves per week =More than 3 serves per week

Meeting your Omega-3 Targets

Sources of omega-3s in different fish varieties

The following is a guide to the amount of omega-3 in different fish varieties commonly consumed in Australia. Omega-3 quantities are per one serve (100g) as per the AGHE. The number of AGHE serves and grams of fish required to meet your omega-3 recommendations per week is provided for each fish variety.

	Fish Varieties	Total Omega-3 (mg) per serve	Serves Required to meet weekly requirement	Estimated Cost Per Serve (100g)*	Seasonal Availability
🟢	Atlantic Salmon	2170	1 (100g)	$2.16-$4.60	Oct-April
🟢	Rainbow Trout	1490	1.2 (120g)	$2.00-$2.85	All Year
🟢	Mackerel	1603	1.1 (110g)	$3.30	Spanish: Sept-Oct Grey: July-Aug
🟢	Silver Perch	1258	1.4 (140g)	$1.40-1.70	All year
🟢	Bream	968	1.8 (180g)	$4.99*	All Year (Sept-Oct peak)
🟢	Morwong	992	1.8 (180g)	$2.50- $3.40*	All Year
🟡	Swordfish	806	2.2 (220g)	$4.50*	June-August
🟡	Garfish	786	2.2 (220g)	$2.30- $4.50*	All year (Nov-May peak)
🟡	Sardine	612	2.6 (260g)	$1.69*	All Year
🟡	Mullet	577	3 (300g)	$0.60*	Sea: March-June Other: All year (June-Aug peak)
🔴	Mulloway	486	3.6 (360g)	$2.50*	All year (peak Nov-Feb)
🔴	Australian Herring	360	4.8 (480g)	NA	All Year
🔴	Trevally/ King Fish	327	5 (500g)	$1.80-$3.00	All year

Did you know: Deep fried and Take-Away fish and seafood contains less omeg-3 fatty acids compared to fish that is boiled, baked, steamed or microwaved!!

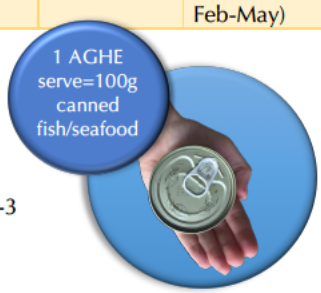
*Estimated fish prices per serve based on Coles Online (https://shop.coles.com.au/a/a-national/everything/browse, Viewed October 30 2017). Where supermarket prices were unavailable, fresh market prices have been used and indicated with *

Fish prices provided are averages and should be used as a guide only to source the most affordable option. Prices may vary considerably from supermarkets to fresh fish markets and with seasonal availability.

Other Marine-sources of Omega-3

The following are examples of other marine Omega-3 sources (seafood) Omega-3

	Other Marine Sources	Total Omega-3 (mg) per serve	Serves Required per week to meet requirement	Estimated Cost Per Serve (100g) *	Peak Seasonal Availability
●	Blue Mussels	614	2.9 (approximately 12 mussels)	$1.30	All Year
	Green Mussels	599	2.9	$0.60	All Year
●	Mixed seafood	527	3.3	$1.20-$1.50	All Year
	Oysters	476	3.7 (approximately 25 oysters)	$1.80-$2.50	Sydney Rock: Oct-Apr) Pacific: May-Sept
	Squid/Calamari	333	5	$1.20-$1.90	All Year (Peak: Feb-May)



Sources of Canned Omega-3s

The following are examples of canned foods that contain Omega-3

	Canned Fish & Seafood 1 AGHE serve=100g (one small can)	Total Omega-3 (mg) per serve	Serves Required per week to meet requirement	Estimated Cost Per Serve (100g)
●	Sardines, canned, drained	1512	1.2	$1.36-$3.13
	Salmon (unflavoured), canned in water, drained	1504	1.2	$1.15-$3.00
	Smoked Oysters, canned in oil, drained	1360	1.3	$3.87
	Atlantic Pickled Herring, canned, drained	1485	1.2	$1.47-$1.99
●	Tuna (unflavoured), canned in water, drained	751	2.3	$0.78-$2.89
	Smoked mussels, canned in oil, drained	839	2.1	$2.18
	Anchovies, canned, drained	769	2.3	$4.89-$7.90
●	Flavoured Salmon, canned, drained	364	4.8	$1.15-$2.60

Sources of plant-based ALA omega-3s

The following are examples of foods that contain ALA omega-3s

ALA-Plant Based Omega-3s One AGHE Serve	ALA-Plant based Omega-3 Sources	Total ALA (g) per serve	Serves Required per week to meet requirement	Estimated Cost Per Serve
 One small Handful = 1 AGHE Nuts & Seeds serve (30g)	Walnuts	1.8	3.8	$0.30-$1.05
	Chia Seeds	5.4	1.3	$0.65-$0.90
	Flaxseeds/Linseed	6.9	1	LSA mix: $0.40-$0.80 Flaxseed meal: $0.20
 2 Teaspoons = 1 AGHE Oils serve (7g)	Canola oil	0.6	11	$0.02-$0.05
	Soybean oil	0.5	14	NA
	Flaxseed/ Linseed oil	3.8	1.8	$0.30-$0.40
	Vegetable Oil	0.7	10	$0.02-$0.04
 2 Teaspoons = 1 AGHE Spreads serve (10g)	Margarine, regular polyunsaturated	0.5	14	$0.05-$0.06
	Margarine, regular monounsaturated	0.1	70	$0.04-$0.07
 2 Large Eggs = 1 AGHE Serve (60g)	Omega-3 enriched eggs	0.3	23	$1.10
 1 Slice of Bread = 1 AGHE Breads/Cereals Serve	Bread, Soy and Linseed	1.24	5.6	$0.20-$0.30

Omega-3 levels are based on data obtained from Food Standards Australia New Zealand 2014, AUSNUT 2011–13, Australian Food Composition Database. Available at: www.foodstandards.gov.au. Accessed 27 October 2017.
Australian Healthy Food Guide (2017), Portion Size Guide. Available at: http://www.healthyfoodguide.com.au. Accessed 27 October 2017.
The Heart Foundation 2015, the heart foundation, Omega-3 Fatty Acid: The Importance of Fat in a Healthy Diet, Available at: https://www.heartfoundation.org.au/news/omega-3-fatty-acid-the-importance-of-fat-in-a-healthy-diet, Accessed 27 October 2017.
National Health and Medical Research Council 2015, Australian Dietary Guidelines-Serve Sizes, Available at: https://www.eatforhealth.gov.au/food-essentials/how-much-do-we-need-each-day/serve-sizes, Accessed 27 October 2017.

Resources available on the internet:

- National Health and Medical research Council, n.d. Australian Guide to Healthy Eating Brochure, Department of Health
- Dietitian/Nutritionist from the Nutrition Education Materials Online, 2016, Understanding the Carbohydrate Portion, Queensland Government
- Dietitian/Nutritionist from the Nutrition Education Materials Online, High Energy and Protein Foods, Queensland Government

Appendix 17: Community Class Session Outline Example

Small Group Education and Cooking Skills Program
Session 1

30 minute education session:

Energy balance and carbohydrates

Recipes:

Turkey & Cranberry Burger

Crunchy Baked Bananas

Session Outcomes:

- Increased knowledge and awareness of
  - Energy balance
  - Australian Guide to Healthy Eating and daily requirements
- Increased skills in
  - Using mince in cooking
  - Frying healthily
  - Baking desserts

Time-plan

Session component	Time
Team meet at Flinders Medical Centre	1:30pm or 9:30am
Team arrival at community centre	2:00pm or 10 am
Set-up (education session seats, ingredients in the fridge, kitchen bench top set up)	2:00-2:15pm or 10:00-10:15am (15mins)
Group arrival time	2:15pm or 10:15am
Welcome, pre-survey and registration	2:15-2:30pm or 10:15-10:30am (15 mins)
Orientation to site (fire safety, emergency exits, toilets etc.)	2:30-2:35pm or 10:30-10:35am (5mins)
Education session	2:35- 3:05pm or 10:35-11:05am

	(30 mins)
Cooking session (clean as we go)	3:05-4:10pm or 11:05-12:10pm (65 mins)
Eat/ questionnaire/ wrap up and close	4:10pm-4:40pm or 12:10-12:40pm (30 mins)
Clean up/ pack up	4:40pm -5pm or 12:40-1pm (20mins)

Cooking skills timeline and key notes

Pre-cooking steps:

- Ovens pre-heating to 200 deg

Recipe step	Time
Make burgers - Demonstrate combine ingredients in bowl and use hands to mix. - Demonstrate dividing evenly (half mixture then halve again) - Explain this is to cook evenly – **discuss mince safety, uncooked meat is unsafe** - Set aside – explain 2 hours rule Nutrition points to discuss: - Making burgers at home has less fat and salt, you control the salt - Mince can be cheap, choose healthy versions (lean mince, chicken or turkey)	5 mins - 2 mins demo –combine & divide 3 mins sample cook of patty
Slice tomato and prepare lettuce - Demonstrate safe slicing technique - Wash lettuce and shake dry All patients - Slice and prepare lettuce - Add salad into individual salad bowl Nutrition points to discuss: - Adding salad veg into burger meets some vegetable serves for the day - Other vegetables to add: grated carrot, sliced onion, sliced cucumbers	5 mins – 1 min demo 4 mins cook
Prepare dessert - Peel and slice bananas lengthways - Place in shallow casserole dish or baking tray - Place chopping board and knives in dish washer* - Bring dessert ingredients to main bench (facilitator) - Pour over orange juice and drizzle with honey - Mix cinnamon, sultanas and walnuts in small bowl - Sprinkle mixture over bananas. - Set trays aside on bread bench Nutrition points to discuss: - Using fruit sugars to bring sweetness to dessert, broken down more	10 mins – 4 mins demo 6 mins cook

slowly - Honey is broken down more slowly than sugar however only have in small amounts Walnuts add good fats to the recipe – will explore further in later weeks.	
Cook burgers - Heat pan and pour 1T oil into pan. Explain that some oil is okay, 1 teaspoon per person in this recipe - Cook patties, show how to check if cooked through Nutrition points to discuss: - Oils part of AGHE, healthy in small amounts. - Use non-stick pan to reduce need for too much oil	10 minutes Begin step, then once cooking, others begin
Assemble burger - Cut roll in half - Layer spread of cranberry sauce, burger, lettuce and tomato onto roll. Nutrition points to discuss: - Using wholegrain roll, as suggested in AGHE, high fibre carbohydrate - There is sugar in cranberry sauce however 1 tsp per person in recipe, small amount overall. Don't need much to get the taste. - Overall this meal covers all food groups.	5 mins 1 min demo 4 mins cook
Bake dessert - Before sitting down to eat place dessert in top shelf of oven. **Eat main**	15-20 mins
Eat dessert	10 minutes

Resources

Utensils/group 4

1 large bowl	Medium vegetable knife	Large frypan	Chopping board
Measuring spoons	Bread knife	Shallow casserole dish	
Measuring cups	Spatula/egg flip	Oven mitts	

Printed resources

- Recipes
- Shopping lists
- Education session slides
- Activity handout

Resources needed per participant & demonstrator:

- Education session slides printout
- Education session activity printout
- Recipes + shopping lists for participants: Turkey Burger and Crunchy Baked Banana
- Ingredients as per below
- Cooking utensils as per below
- Pens
- Projector & computer

Appendix 18: Focus group guide

Note to Moderator:

Bolded text should be communicated to the patients. Non-bolded text serves as guide. Take notes of any interactions and information (e.g., interpersonal interactions and non-verbal information) expressed that will not be captured in the recording. Encourage all participants to have their voice heard to gain a group consensus at the end.

Introduction:

Hello. My Name is_____.

We are here to understand what your thoughts as a group are about the nutrition support provided by this project. I will begin the discussion but because we are here as a group, please do talk to each other as you would usually do.

I will need to record this conversation to collect the information and use it for research. Although we are recording this conversation no one will know who said what during this conversation. This means all comments will be anonymous. Therefore, anything that you say will not change your relationship with the research team or staff at Flinders Medical Centre or Marion GP Plus.

Do you have any questions before we begin?

Interviewer to specify interview recording, date, time and number of people present

Opening question

The nutrition support provided in this project included home visits, phone calls or text messages and this 6 session group program.

What did you think about the nutrition support provided?

(Aim is to gain overall thoughts to then probe based on responses)

Probes for opening question:

Why do you think it was (good, bad, okay)?

Which components do you think were (good, bad, okay)?

What do you think about the _____(other components that are not discussed)?

Note to Moderator - Discussion topics

Please ensure the discussion moves to cover the following topics with the aim of gathering ideas about what part of the intervention helped to influence any diet change made. The questions may be asked as they are or modified to facilitate a discussion based on the responses provided.

1. **<u>How</u> did the nutrition support provided in this project <u>influence your diet</u>?**

2. **<u>What parts of the program /s</u> do you think where most helpful in <u>influencing your diet</u>?**

3. **<u>How</u> did these component/s <u>help you</u>?**

4. **Were there <u>any parts</u> that you think were <u>not really necessary</u> in assisting you to change your diet (or eating pattern)?**

   Probe: How valuable or necessary do you think it is for you to complete the entire program?

5. **During the project, you worked with students. What are your thoughts about working with students?**

   <u>Probes:</u>
   Did the students contribute or detract from your nutrition program? How?
   How do you think the program would have differed if students weren't present?
   Did the students bring something to the program that might have been absent if they hadn't been involved?
   Did working with students change your willingness to participate and complete the program?

6. **Students involved were working to develop the skills to work as a Dietitian.**

   What did you see as your role in contributing to the students' development?

7. **This program was structured in a way where you are provided with one clinic appointment followed by one home visit for individual nutrition support, enrolment into this 6 session group program, one review home visit, fortnightly messages or phone calls then ending with a final clinic appointment.**

   What are your thoughts about this program structure?

Probes:

What do you think about the information provided by the program (home visits, group sessions and fortnightly messages?

What do you think about the times available for the program?

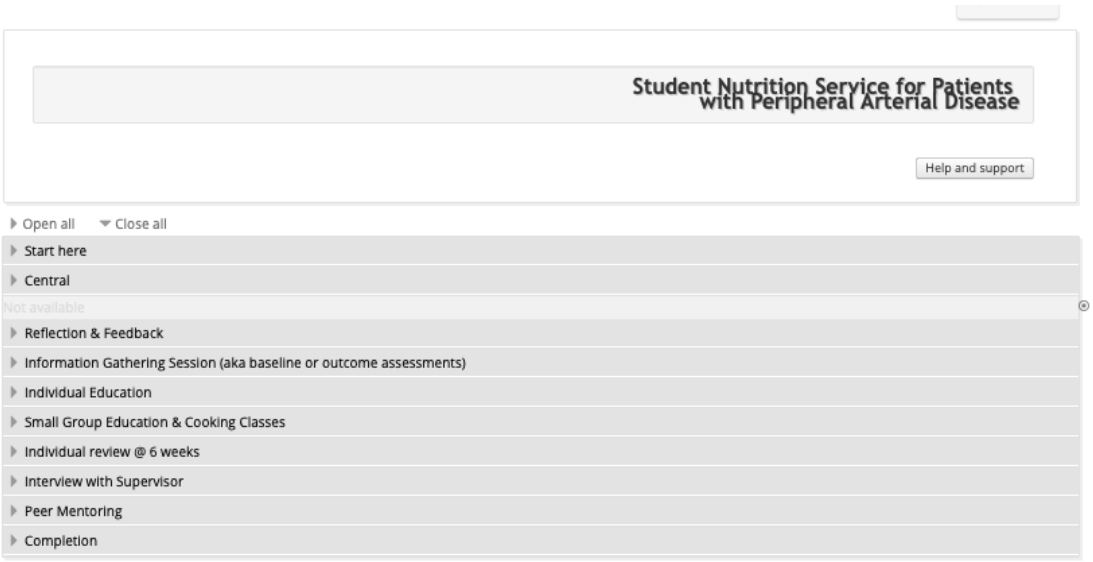
What do you think about the location of the group sessions and the facilities available?

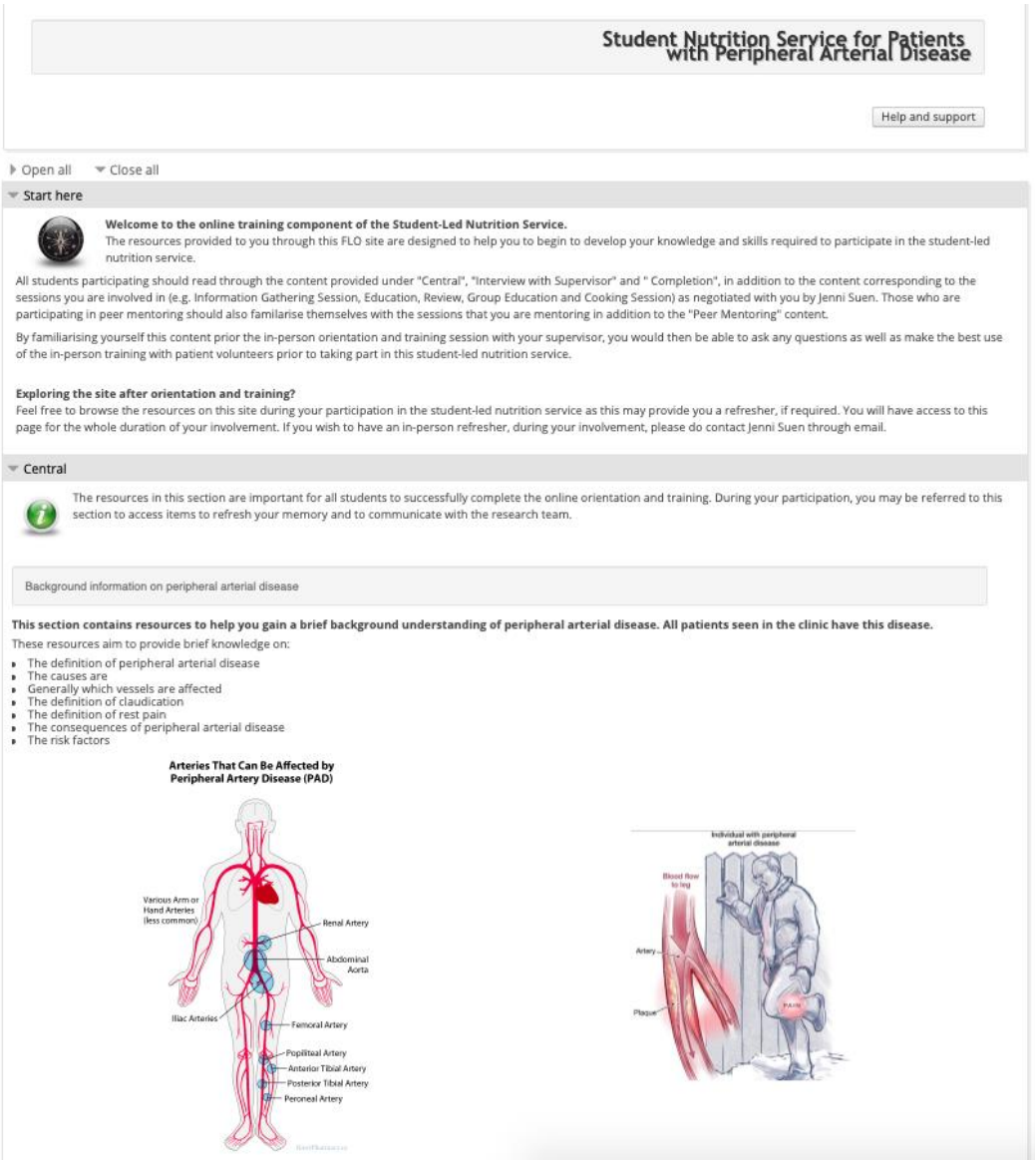
What do you think about the contact time (or involvement)?

Closing Question

In relation to the thoughts discussed about the nutrition support so far, is there anything that you think we haven't discussed, that you feel would be important for me to hear about?

Appendix 19: Online Orientation Module on Flinders Learning Online





Whilst watching the video below, aim to jot down notes on each dot pot above. Gaining a brief understanding of the disease will help you talk to the patient (as it helps to to understand one aspect of their life) and cultivate conversation and actions that are mindful of their limitations. It will also help to understand the information you collect from the patient, how you might educate the patient (if applicable), why particular nutrients are of important and how we have included it in the small group education program!

Open all Close all

- Start here
- Central

Not available

- Reflection & Feedback

After every patient interaction, to help you make the most our of this learning experience you will be asked to find a time with your supervisor to:

- have a verbal reflective discussion with your supervisor
- write some points from reflecting and fill in a form to align your reflection of the experience to the DAA Competencies

Reflection should follow the Gibbs Cycle (below) that is predominately used in the Nutrition & Dietetics course.

Gibbs Reflective Cycle

Both verbal and written reflections should occur within the same day of the experience and if not possible, it should occur on the next day.

The DAA competency forms that you will be provided depend on your experience and are listed below.

If you were to participate in the Information Gathering Session and Education for the same patient- only one form needs to be filled in!

After the forms are filled in, you would then:

1. Provide them to your supervisor who will add their written feedback to your form
2. Your supervisor should return the form to you so you can fill in your reflection based on the feedback provided
3. A copy will be then created so that you and your supervisor both have copies!

(These forms will come in handy when you are writing your cover letter or preparing your interview and need some experiences to talk about!)

Clinical Form 557.3KB PDF document

Used for:

- Information Gathering Sessions
- Education Sessions
- Review Sessions

Community Form 154.4KB PDF document

Used for Small Group Education and Cooking Classes

All 265.1KB PDF document

At the end of your involvement, complete this form as it would help you to align you whole experience and perhaps see were it might fit across all the competencies. Some examples are provided in the form. **This should be complete prior to your Interview.**

- Information Gathering Session (aka baseline or outcome assessments)
- Individual Education
- Small Group Education & Cooking Classes
- Individual review @ 6 weeks
- Interview with Supervisor
- Peer Mentoring
- Completion

Open all Close all

Start here

Central

Not available

Reflection & Feedback

Information Gathering Session (aka baseline or outcome assessments)

Individual Education

In this section you will:

- Provide a diet disease link
- Provide the patients with feedback on their eating from the assessment of the diet history
- Negotiate goals and strategies with the patient so the patient may work on these for the next 6 weeks
- Provide the patient a summary of their goals and strategies as well as any educational resources to assist them in their learning
- Decide on the encourage message that they will receive through phone call or SMS every fortnight until their review appointment

Preparation task summary:

1. Watch the video below thinking about the tasks above.

2. Familiarise yourself with the general resources provided by the clinic. If you patient has a dietary consideration that is not covered by the resources below, your supervisor will let you know in as soon as possible to help you prepare. If you choose to use a resource not listed below, please send you supervisor the resource prior to the day of the education to enable the resource to be printed by your supervisor.

NOTE: **If you have any questions about this section, please ask your supervisor during the in-person orientation.** If your question comes to you after your in-person orientation, please email the query to your supervisor as soon as possible.

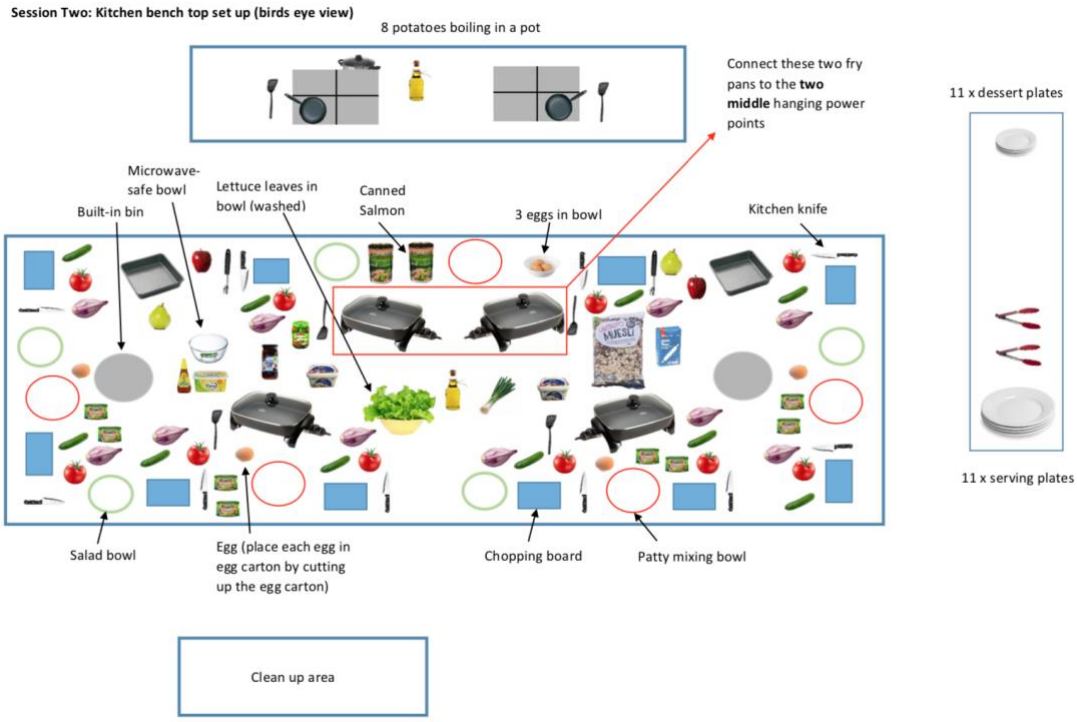
General resources

- Australian Guide to Healthy to Eating Brochure (Adults) 2.4MB PDF document
- Meeting Omega -3 Targets for patients with CVD risk 9.4MB PDF document
- NDSS - Healthy eating with Diabetes 20.2MB PDF document
- Salt, blood vessels and kidneys 471.5KB PDF document
- High protein high energy diet 83.9KB PDF document
- High protein high energy diet (one page summary) 42KB PDF document

Extra information

- List of milk substitutes
- Dairy Substitutions guide

Appendix 20: Kitchen Set Up Example



Appendix 21: Student Semi-Structure Interview Guide

Semi-structured Student Outcome Interview Guide

NOTE TO INTERVIEWER:

Please ensure you cover the questions in bold. The questions not in bold are probing questions which you may reword according to the student's response. In each interview begin with the introduction, the opening questions and end with the closing questions. The "key areas to discuss" can be discussed in any order and can be led by the student's response.

Introduction:

This interview provides you with:

- A chance to express your thoughts and opinions on the experience provided by the Student Nutrition Service for Peripheral Arterial Disease patients
- To explore if you were able to gain skills and if these skills contribute to your development of the competencies required from the Dietitian's Association of Australia and areas you feel that you need to continue working on.

At the end we will have an understanding about your thoughts about this experience and if it relates to your development of the dietetic competencies.

The data collected from this interview will help the researchers understand the experience from the eyes of the students involved. The information will be treated confidentially and will not affect your relationship with the staff or researchers involved. It will also not affect your grades positively or negatively.

Do you have any questions before we begin?

Interviewer to specify the following details of the interview in the recording:

Date, time and ID number*

Before we delve into discussing the experience can you firstly tell me **what year level** you are in, **the course** that you are studying and at **what point in your studies** did you begin this experience?

<u>Opening Questions:</u>

To start, I'd like to know what you thought about the experience.

(Overall thoughts structure, experience, skills, helpfulness)

- Is there anything that particularly stood out in this experience for you?
- Is there anything about the experience that could be improved or changed to assist your learning?

1. **Each student has a unique experience. What was your experience?**

   Were you involved in the <u>clinical component or community component or both</u>?
   Other experiences such as peer mentoring, research assistant work or working in a team?

2. **Tell me about what you learned during this experience?**

   How do you think this experience might contribute to your learning across your (two or four year) Dietetics program?

How has this experience shaped your understanding of the role Dietitians can have?

If required probe around:

Transferrable skills:

How does this experience transfer to: your theoretical education provided by the course you are studying/ placement or other learning situations?

Career:

What does this mean for your career as a dietitian?

Does this change your interest in beginning a dietitian?

Does this change the area of dietetics that you are interested in (e.g., clinical vs. community vs. research)?

- These areas of learning that you've identified are a part of learning to be a dietitian When you apply skills or knowledge related to being a dietitian in your practice are can develop yourself as a competent dietitian. Therefore, when you apply skills and knowledge that you've learned you might well be developing the dietetic competencies. So, thinking about what you have learnt during this experience,

3. **How might have your experience apply to your development of the DAA competencies?**
   (Ask the question above before providing the document)

   (Provide student with DAA competencies document)

   In this experience you were given feedback based on clinical and/or community opportunities. Looking at this document of all the DAA competencies, discuss any additional competencies that may apply to your

experience.

(Probe around the 'Areas of learning to discuss' if no response is provided)

Areas of learning to discuss:

- **Communication** – (Exclude 1st years)
  Communication with patients involved were incorporated to some extent in this experience. I'd like to know more about the verbal communication.
  *How did verbal communication with a patient impact on your learning?
  Was your communication different from the beginning to the end?

  If this changed, what led to the change in the way you communicated with patients? (? Feedback, understanding of patients' background – empathy, understanding what is appropriate to ask patients).

  (All) Verbal communication with your supervisor was involved in the experience.
  *What are your thoughts about the communication between you and your supervisor?
  What made it easy and what made it hard to communicate with your supervisor?
  How do you think the communication could be improved?

- **Being a safe practitioner** (e.g., understanding their scope of practice, critical incident reflection, familiar with evidence-based guidelines e.g. AGHE, recognises problem list, recognises participant barriers) – One area that is often involved in interactions with patients as a professional is whether our practice is safe of not.
  *What is your understanding about safe practice?
  Was there an opportunity that enables you to demonstrate safe practice?
  If so, explain. If not, what limited in this demonstration?

  Was prioritising the patient's problem list, one of your tasks?
  If yes: What did this task involve?
  What are your thoughts about this task?
  How did prioritizing the patient's problem list contribute to or hinder your learning (depending on response to initial question).

What impact has this had on your clinical reasoning?
Was it any different from what you had theoretically learnt?

- **Peer- mentoring** – Did you have the chance to participate in peer mentoring?
  What are your thoughts about your peer mentoring experience?
  How did peer mentoring contribute or inhibit your learning (depending on the response to the previous question).
  Are there any aspects of peer mentoring that stood out for you? If so, what was it?

- **Teamwork** – I understand that you worked as a team with your supervisor and possibly other staff. What impact did this aspect have on your learning? (depending on response) What did you learn from this experience?
  OR How could have this experience helped you learn?

- **Practising ethically within code of practice** (e.g., documentation, following protocols, maintaining patient integrity) - Orientation, both online and in-person was provided; what impact do you think this had on your participation in the information gathering sessions? What was the best aspect of the orientation provided?
  What aspect needs more work?
  Are there any aspects that you think should have been provided to help you to learn?
  Did the orientation help you to practice according to the protocols?
  If so, what aspect?
  If not, did you gain the confidence during the information gathering sessions and if so, how?

- **Continual learning skills as proactive learner** (e.g., develops solutions to problems) – Problems can occur in real-life settings, did you encounter any problems or unexpected situations during the experience?
  How were these problems solved?
  Who was involved in solving the problem?
  Having problems occur or unexpected situations, did this aspect impact on your learning?
  If so, how?

  There was a time commitment attached to this experience. What are your thoughts on the time commitment?
  How did time commitments contribute or hinder your learning (based on response from previous question)?
  Did this time commitment change in any way? If yes, what changed?

Where did you find yourself spending extra time?
What impact do you think this had on your leaning?

- **Cultural competence** (e.g., can work with people from different social economic backgrounds)- Did you have the chance to work with people from different cultures or social economic backgrounds?
  If yes, please share your thoughts on this experience?
  If no, did you observe interactions between patients from a culture of social background from yours?
  Is there any aspect of this experience that impacted on your learning?
  What effect does this this experience have on your practice?

- (For final year students) **Effectively educate patients** using appropriate language and summary of key points – From providing education to patients, what was your initial thought about this task?
  Has your thought changed since completing your involvement in the service?
  Did the task of educating patients' impact or hinder your learning in anyway?
  What did you learn?
  What effect does this have on your practice/confidence/knowledge?

- **Reflective practice** – Reflections both written and verbal were incorporated in the experience. How did you use reflection in this experience?
  How did reflection contribute to or hinder your learning (depending on response to initial question).
  Then, how could reflection be used to better support your learning?

4. **What do you think are some learning areas that you think require more work?**

   Are there any areas that you would like to continue working on?
   Which competencies do you think these skills align to?

5. **This experience provided you with an opportunity to service patients that usually are not individually seen by a dietitian.**

   What impact do you think this opportunity has on the patient's health?

   How does your participation impact the patient's health/service?

   Do you think your participat**ion, positively or negatively affects the patient's health/service?**

6. **What are your thoughts about the structure of this experience?**
   (Included an online/in-person orientation followed by participating in clinic)

   What are your thoughts about the structure of the clinical experience?
   What are your thoughts about the structure of the community experience?
   What impact did different experiences provided have on your learning?
   (Focus on the session flow, time allocated, peer mentoring)

Closing Question

Is there anything that we haven't discussed today that you feel is important for me to hear about, in relation to the experience or your learning?