# New Zealand GPs and nutrition care: Perceptions, perceived competence, and barriers to provision.

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A thesis submitted in fulfilment of the requirements for the degree of

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# Table of Contents

# List of Figures and Tables

## Statement of originality

This thesis describes original research conducted by Jennifer Crowley in the Faculty of Medical Health Sciences at The University of Auckland. This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge, this thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Jennifer Crowley

## Acknowledgements

This research would not have been completed without the support and input of a number of people. I would like to thank my supervisors for their input: Clare Wall, Bruce Arroll, and Lauren Ball. All of my supervisors have been excellent role models in every regard, from the practical aspects of running studies, analysis, interpretation and presentation of study results. I am extremely grateful for their advice and support. To Lauren Ball, who initially was a fellow PhD candidate and then became a supervisor, I owe a huge debt of gratitude for her enthusiasm and mentoring throughout my research journey.

I wish to acknowledge Michael Leveritt for his broad overview when guiding writing up the research. I also want to acknowledge the assistance of Dug Yeo Han with statistical analysis when difficult questions arose and Lorraine Neilson with referencing assistance. To Pam Watson from the Royal New Zealand College of General Practitioners, I wish to thank for her endorsement of the research, through which I gained access to General Practitioners to participate in the research.

Personally, I would like to thank my sons Jacob and Nathan for their encouragement and support throughout what at times appeared to be an everlasting project. Finally, to my husband Paul, you are the "rock" from which I launched my first tentative steps as a mature PhD candidate. I have benefitted from your wisdom and support during my research, despite other pressing demands on your time. Thank you.

# Abstract

**Aim** The aim of this thesis was to investigate New Zealand (NZ) General Practitioners' (GPs) attitudes towards, and barriers to, providing nutrition care to their patients.

**Methods** Six studies were designed using principles of programmatic research. Study 1, a literature review, explored different approaches to providing nutrition care in general practice. Study 2, focus groups, were conducted with NZ GPs to explore their attitudes and barriers regarding provision of nutrition care. Study 3, the development of nutrition competence was investigated through a review of undergraduate nutrition education requirements in NZ and five other countries. Study 4, a validated 65-itemquestionnaire was used to determine medical students' attitudes and confidence in providing nutrition care. Study 5, a validated 65-item questionnaire was used to determine and compare medical students, GP registrars and GPs attitudes and confidence in providing nutrition care. Study 6, a previously used questionnaire from the United States of America, was adapted to investigate the impact of an undergraduate course for medical students on their dietary intake and confidence in providing nutrition care.

**Results** Study 1, demonstrated that a variety of approaches exist to enhance GPs' capacity to provide nutrition care. In study 2, 48 GPs indicated routinely providing basic nutrition care to patients but perceived that they had limited capacity to provide extensive nutrition care due to limited time, and lack of nutrition competence. In study 3, all 6 countries except one, have curriculum guidelines to inform undergraduate nutrition education, however, implementation of guidelines is not widespread, nor mandatory. In study 4, 183 students believed that incorporating nutrition care into practice was important; were confident in general nutrition skills; but less confident in skills related to general food knowledge. In study 5, 183 students, 51 GP registrars and 57 GPs displayed positive attitudes and moderate confidence towards incorporating nutrition care into practice. GPs' greater experience in providing nutrition care

may contribute to confidence. In study 6, at the completion of the course 61 medical students reported a higher frequency of wholegrain food intake ($p$=0.0229) compared to the start of semester, yet were less comfortable making nutrition recommendations (p=0.008). Most medical students (63.9%) had an increased awareness of dietary choices, and some (15.3%) reported an increased likelihood to counsel patients on lifestyle behaviour.

**Conclusions** There is a need to improve the nutrition education provided to medical students and GPs in NZ to enhance their knowledge and skills in providing nutrition care.

**List of Abbreviations use in the Thesis**

**%** Percent

**ABOM** American Board of Obesity

**ABPNS** American Board of Physician Nutrition Specialist

**ACGME** Accreditation Council for Graduate Medical Education

APD Accredited Practising Dietitian

**ACN** American College of Nutrition

**AMSA** American Medical Student Association

**ASCN** American Society of Clinical Nutrition

**BMI** Body Mass Index

**CBNS** Certification Board for Nutrition Specialists

**CDM** Chronic Disease Management

**CME** Continuing Medical Education

**CPHCF** Cochrane Primary Health Care Field

**CVD** Cardiovascular Disease

**ESCN** European Society for Clinical Nutrition

**ESPEN** European Society of Parenteral and Enteral Nutrition

**GP** General Practitioner

**IOM** Institute of Medicine

**IPNEC** Intersociety Professional Nutrition Education Consortium

**MeSH** Medical Education Subject Heading

**mmHg** Millimetres of Mercury

**MOPS** Maintenance of Professional Standards

**n** Number of Participants

**NAA** Nutrition Academic Award

**NAS** National Academy of Sciences

**NBNSC** National Board of Nutritional Support Certification

**NEPP** Nutrition Education for Practicing Physicians

**NHG** Dutch General Collage of General Practitioners

**NIM** Nutrition in Medicine Programme

**NTF** Nutrition Task Force

**OSCE** Objective Structured Clinical Examination

**PEARLS** Practical Evidence About Real Life Situations Summaries

**PHO** Public Health Organisation

**PILS** Patient Information Letters

**PIP** Practice Incentives Program

**PN** Practice nurse

**RNZCGP** Royal New Zealand College of General Practitioners

**RR** Response Rate

**UK** United Kingdom

**USA** United States of America

**WHO** World Health Organisation

## Publications and Presentations in Support of this Thesis

The research outlined in this thesis has resulted in six peer-reviewed publications that align with each chapter. My contribution to each paper is outlined at the front of each publication. The publications are co-authored with other researchers, and include five original research papers and one opinion piece manuscript. The details of these publications are listed in the order they appear in the thesis:

1. **Crowley J**, Ball L, Wall C, Leveritt M. Nutrition beyond drugs and devices: a review of the approaches to enhance the capacity of nutrition care provision by general practitioners. *Aust J Prim Health*, 2012. 18(2):p90-95.
2. **Crowley J**, Ball L, McGill, A-T, Buetow S, Arroll B, Leveritt M, Wall C. New Zealand General Practitioners' views on providing nutrition care: a focus group study. *J Prim Health Care* 2015 (under review).
3. **Crowley J,** Ball L, Laur C, Wall C, Arroll B, Poole P, Ray S. Nutrition guidelines for undergraduate medical curricula: a six country comparison. *Adv Med Educ Pract* 2015.6:p127-133.
4. **Crowley J**, Ball L, Han D, Arroll B, Leveritt M, Wall C. New Zealand medical students have positive attitudes and moderate confidence to counsel in providing nutrition care to patients: A cross-sectional survey. *J BioMedEduc* 2015**.** 6:p127-133.
5. **Crowley J,** Ball L, Han D, McGill A-T, Arroll B, Leveritt M, Wall C. Doctors' attitudes and confidence towards providing nutrition care in practice: Comparison of New Zealand medical students, GP registrars and GPs. *J Prim Health Care* 2015 (in press).
6. **Crowley J,** Ball L, Leveritt M, Arroll B, Han DY, Wall C. Impact of an undergraduate course on medical students' self-perceived nutrition intake and

self-efficacy to improve their health behaviours and counselling practices. *J Prim Health Care* 2014. 6(2):p101-107.

In addition to these six publications, my emerging international collaborations have resulted in 2 publications that align with the topic of this thesis. My contribution to these publications are as an associate and each of the publications can be found in the Appendix.

7. Ball L, **Crowley J,** Laur C, Rajput-Ray M, Gillam S, Ray S. Nutrition in medical education: Reflections from an initiative at the University of Cambridge. *J Multidiscip Healthc* 2014.7:209-15.
8. Douglas P, Ball L, McGuffin L, Laur C, **Crowley J,** Rajput-Ray M, Gandy J, Ray S. Hydration: Knowledge, attitudes and practices of UK dietitians. *J Biomed Educ* 2015;(E pub in advance).
9. Ray S, Rajput-Ray M, Ball L, **Crowley J**, Laur C, Roy S, Agarwal S, Ray S. Confidence and attitudes of doctors and dietitians towards nutrition care and nutrition advocacy for hospital patients in Kolkata, India. *J Biomed Educ* 2015 (E-pub in advance)

The research outlined in this thesis has resulted in six conference presentations, five at international conferences and one at a national conference, based on the research conducted for this thesis.

The details of the presentations are listed in order of recency:

**Crowley J,** Ball L, Han D, McGill A-T, Arroll B, Leveritt M, Wall C. Doctors' attitudes and confidence towards providing nutrition care in practice: Comparison of New Zealand medical students, GP registrars and GPs (Poster).

Primary Health Care Research and Information Service Conference, Adelaide, Australia, 2015.

**Crowley J**, Ball L, McGill, A-T, Buetow S, Arroll B, Leveritt M, Wall C. New Zealand General Practitioners' views on providing nutrition care: a focus group study (Oral). Primary Health Care Research and Information Service Conference, Adelaide, Australia, 2015.

Douglas P, Ball L, McGuffin L, Laur C, **Crowley J,** Rajput-Ray M, Gandy J, Ray S. Hydration and dietetic practice in the United Kingdom (Poster) Experimental Biology, American Society of Nutrition Conference, Boston USA, 2015.

**Crowley J**, Ball L, Han D, Arroll B, Leveritt M, Wall C. New Zealand medical students' attitudes and confidence in addressing nutrition in patient care (Poster). Australia and New Zealand Health Professional Education Conference, Gold Coast, 2014.

**Crowley J**, Ball L, Leveritt M, Arroll B, Han DY, Wall C. Impact of an undergraduate course on medical students' self-perceived nutrition intake and self-efficacy to improve their health behaviours and counselling practices (Oral). Primary Health Care Research and Information Service Conference, Sydney, Australia, 2013.

**Crowley J,** Ball L, Leveritt M, Arroll B, Wall C. Nutrition in lifestyle counselling - successes in the general practice setting (Poster). Joint Australia and New Zealand Nutrition Society Conference, Queenstown, 2012.

**Crowley J,** Ball L, Leveritt M, Arroll B, Wall C. Evidence-based practice or practice-based evidence? (Poster) Primary Health Care Research and Information Service Conference, Canberra, 2012.

# Chapter 1. Introduction

## 1.1 Introduction to the Problem

Chronic disease contributes to morbidity and mortality and its worldwide prevalence is increasing (1). Chronic disease is described by the World Health Organization (WHO) as a global epidemic; it includes cardiovascular disease (CVD), diabetes, cancer and chronic respiratory disease (2). In New Zealand, chronic disease is estimated to contribute to 40 percent of deaths each year, and this figure is expected to increase (3). People with chronic disease are high users of health care services (4). At present, the overall cost of chronic disease in New Zealand has not been calculated because single-condition estimates do not account for the overlap of services for co-morbidities (4). For example, the hospital costs for a person with diabetes are on average 2.5 times greater than those for someone without diabetes (5). This indicates that New Zealand needs to identify and implement strategies to help reduce the prevalence and impact of chronic disease.

Many factors contribute to the increasing prevalence of chronic disease. These include the outcomes from an ageing population and the adoption of adverse lifestyle behaviours such as smoking, physical inactivity, harmful alcohol behaviour and poor nutrition behaviour (6). Long-term nutrition behaviour is recognised by the WHO as a major modifiable determinant in the prevention and management of chronic disease (6). In recognition of this, it is recommended by the WHO that national healthcare systems focus on individual and population approaches for the reduction of disease; the provision of nutrition information and counselling are included among the best population approaches to the problem (6). Clearly, there is a need to focus on implementing and supporting such population approaches in New Zealand.

General practitioners (GPs) are often patients' initial contact point with medical services, providing care to 80 percent of the adult New Zealand population every year (7). Internationally, treatment in primary care provides the most beneficial - and potentially the most cost-effective - outcomes for patients with chronic disease (8), making the management of chronic disease an increasing component of GPs' workloads (4). Evidence from the international literature suggests that GPs experience barriers which prevent their provision of nutrition care. In this context, nutrition care is defined as any care that aims to improve the nutrition behaviours and subsequent health outcomes of patients (9). These perceived barriers include lack of nutrition education (10-12), lack of knowledge (9-11, 13), and lack of confidence in counselling patients (11). Evidence also suggests that there needs to be an improvement in GPs' self-efficacy and attitudes toward nutrition care practices in order to increase the quantity and quality of nutrition care provided to patients (14-16).

Any measures that seek to examine and address nutrition care in New Zealand must be appropriate for the New Zealand context. However, little is known about whether New Zealand GPs are competent to provide nutrition care during standard consultations and this warrants further investigation. Competence is defined as the ability of an individual to perform a task. Competence includes three components: knowledge of the task; skill to perform the task; and attitude that enables task performance (17). There is a clear need to investigate the competence of New Zealand GPs in providing nutrition care.

## 1.2 Medical Education

There are two pathways available for medical training. The first is undergraduate training whereby after completing a core of foundation health science papers students are selected into the medical school programme. This is the most common method of entry into the two medical schools in New Zealand, although each year both schools do select some students

who have completed an undergraduate degree before applying for entry into medical school. The second pathway, more common internationally, is graduate medical training. For such programmes, all students complete an undergraduate degree before applying for entry into a graduate medical training programme. Australia is an example of a country that has both undergraduate and graduate medical training programmes. In this thesis, postgraduate medical education refers to training after initial medical training and is undertaken to become eligible to enter a chosen medical speciality.

Medical education aims to provide a foundation of competency for knowledge, attitudes and skills that graduate doctors build upon throughout their careers (18). It is also recognised that competence in medical practice is built upon the accumulation of codified and tacit knowledge, and that competence progresses with experience and practical application (19). With regard to nutrition education, the foundation of nutrition competence is reflected in the Accreditation Standards for Medical Courses in Australia and New Zealand, which specifies that medical practitioners, (ie GPs and other doctors) need to have appropriate knowledge and skills in identifying nutritional issues for patients to aid in the prevention and treatment of common chronic diseases (19).

In New Zealand, there are currently no designated nutrition knowledge, attitude and skills competencies in medical education, although a joint Australian and New Zealand Competency Framework has been completed and waits formal adoption (20). This framework includes four nutrition knowledge-based goals and five nutrition skill-based goals, and describes the learning outcomes for each competency for medical graduates (20).

The Summary Nutrition Knowledge and competency statement states that:

> *A competent medical graduate demonstrates the knowledge, skills, and attitudes to assess patients' basic nutritional requirements and develop an appropriate nutrition management plan, including referral to other professionals, particularly dietitians as required*. (21)

The knowledge- and skills-based nutrition competency goals are presented in Table 1.1.

**Table 1.1: Knowledge of nutrition and skills-based nutrition competency (21)**

| **Knowledge of nutrition and skills-based nutrition competency** | |
|---|---|
| A medical graduate should be able to: | |
| **Knowledge: Demonstrate sufficient knowledge of nutrition to ensure safe practice** | |
| **1** | Demonstrate knowledge on the interactive role of nutrition in health and the prevention of disease. |
| **2** | Demonstrate knowledge of evidence-based dietary strategies for prevention and treatment of disease. |
| **3** | Demonstrate awareness of food sources of specific nutrients, food habits and the cultural and social importance of food. |
| **Skills: Formulate a management plan with nutritional management strategies, in collaboration with other health professionals where appropriate** | |
| **1** | Demonstrate skills in the identification of nutritional risk: nutritional deficits and excesses. |
| **2** | Demonstrate ability to interpret nutrition information in a critical and scientific manner. |
| **3** | Demonstrate ability to develop and apply basic dietary strategies for the prevention and treatment of disease and trauma, and recognise when to refer for specialist management by a dietitian. |
| **4** | Demonstrate ability to work effectively in a team with other health professionals to deliver optimal nutrition care. |
| **5** | Demonstrate the ability to apply principles of ethics related to nutritional management of patients. |

## 1.3 Why target medical students and GPs?

Medical students are the target of nutrition education initiatives, such as the Australian and New Zealand Competency Framework, because of documented insufficient nutrition knowledge, attitudes and skill competencies currently developed in medical training (20). In line with this, GPs are the target of nutrition education initiatives due the recognition of their role in providing an important intervention point for improving both individual health and the health of a population (22).

The preface of the nutrition syllabus included in the GP registrar training curriculum suggests that when a socioeconomic basis is used, there are individuals and communities in New Zealand that have nutritional deficiencies and imbalances or entirely inappropriate nutrition (22). These factors have been identified as major causes to chronic and lifestyle related-illness and disease (22). The nutrition syllabus also indicates that GPs require sufficient knowledge of nutritional factors involved in promoting health and preventing disease to be able to discuss this with patients and incorporate into management and treatment, for improved patient outcomes and to support public and population health policy initiatives (22). GPs can consider a range of nutrition treatment options for patients depending on the diagnosis. Options can include referrals to a hospital, medical specialists or other health professionals (23). Given the limited number of dietitians employed in the New Zealand health care system, approximately 1.67 fulltime equivalent per head of population (24), the expectation on GPs to provide some nutrition care is growing. Australian GPs perceive their role as co-ordinators of patient care (25), that is providing initial assessment and then directing towards the appropriate health professional. However, the perceptions of New Zealand GPs are currently unknown, including their capacity to provide nutrition care, and support required for optimal care.

## 1.4 The scope of practice for medicine

The scopes of practice in medicine and its specialties are defined in the Health Practitioners Competence Assurance Act 2003 (26) and are very broad. The three categories include: general and provisional which includes: resident doctors or resident medical officers and doctors in vocational training; vocational which includes doctors who have completed their vocational training and have been awarded (or gained) a postgraduate qualification and

special purposes which includes doctors visiting New Zealand for a specific reason such as a locum tenens for up to 12 months (26).

General practice, as a vocational scope of practice is defined as “An academic and scientific discipline with its own educational content, research, evidence base and clinical activity, and a clinical specialty oriented to primary care. It is personal, family, and community oriented comprehensive primary care that includes diagnosis, continues over time, and is anticipatory as well as responsive (26). In this respect, nutrition care is relevant to all components of health care that GPs provide, and therefore has an important role in influencing the health outcomes of patients.

## 1.5 Scope of practice of health professionals associated with nutrition

Dietitians and nurses are the health professionals most likely to be associated with assisting patients make changes to their dietary and lifestyle behaviours.

## 1.6 Dietitians

The scope of practice for dietitians specifies that “Dietitians apply scientific knowledge about food and nutrition to individuals and groups in states of health and disease to promote optimal health outcomes within the social, economic, and cultural context of the New Zealand population” (27).

## 1.7 Nurses

New Zealand nurses scope of practice varies according to their nursing qualification.
For example, the scope of practice for registered nurses specifies that, “Registered nurses utilise nursing knowledge and complex nursing judgment to assess health needs and provide

care, and to advise and support people to manage their health. They provide comprehensive assessments to develop, implement and evaluate an integrated plan of health care, and provide interventions that require substantial scientific and professional knowledge, skills and decision making. This occurs in a range of settings in partnership with individuals, families, whanau and communities" (28).

## 1.8 New Zealand health system function

In New Zealand, The public health system works on a community- oriented model with 3 key sectors – District Health Boards (DHB), funded by the government and responsible for providing or funding health and disability services in their district primary health care; primary health care (PHC) covering a broad range of out-of-hospital services, including general practice and Public Health Organisations (PHOs), the local structures for delivering and co-ordinating primary health care services (26).

As a generalist in many areas of medicine, GPs have broad understanding of many health issues (23). This positions them well to play an important role in primary/preventive health care in NZ's public health system, which provides essential health care to all New Zealanders. In this gatekeeper role, GPs require appropriate knowledge, attitudes and skills to recognise when there is a need to refer patients onto other health professionals.

## 1.9 Thesis aim

Based on the three components of competence, knowledge, attitudes and skills, this thesis explores New Zealand GPs' perceptions of, and perceived competence in, nutrition care by investigating if the barriers to the provision of nutrition care identified in the international literature (in medical and GP training) similarly exist in New Zealand. This thesis did not aim

to investigate the way in which nutrition education is taught in medical training or postgraduate medical education. Instead, undergraduate and postgraduate nutrition education was utilised to explore the nutrition competence of medical graduates and GPs.

This thesis incorporates six aims, developed using the principles of programmatic research (29). Each research project was developed by logical progression from the previous project in order to create a complementary body of literature.

The six research aims are as follows:

1 Review the international approaches previously undertaken to improve nutrition care provision by GPs.

2. Explore New Zealand GPs' opinions and practices regarding providing nutrition care to patients.

3. Assess nutrition curriculum guidelines for undergraduate training in New Zealand and five other countries with similar educational and health care systems.

4 Investigate New Zealand medical students' attitudes to, and self-perceived skills in, providing nutrition care in practice, as well as the perceived quantity and quality of nutrition education received in training.

5 Describe and compare New Zealand medical students', GP registrars' and GPs' attitudes towards incorporating nutrition care into practice, and their self-perceived skills in providing nutrition care.

6 Investigate the impact of an undergraduate course on New Zealand medical students' self-perceived nutrition intake and self-efficacy in improving their health behaviours and counselling practices.

The thesis aims are presented in Figure 1.1 the Study Flow diagram.

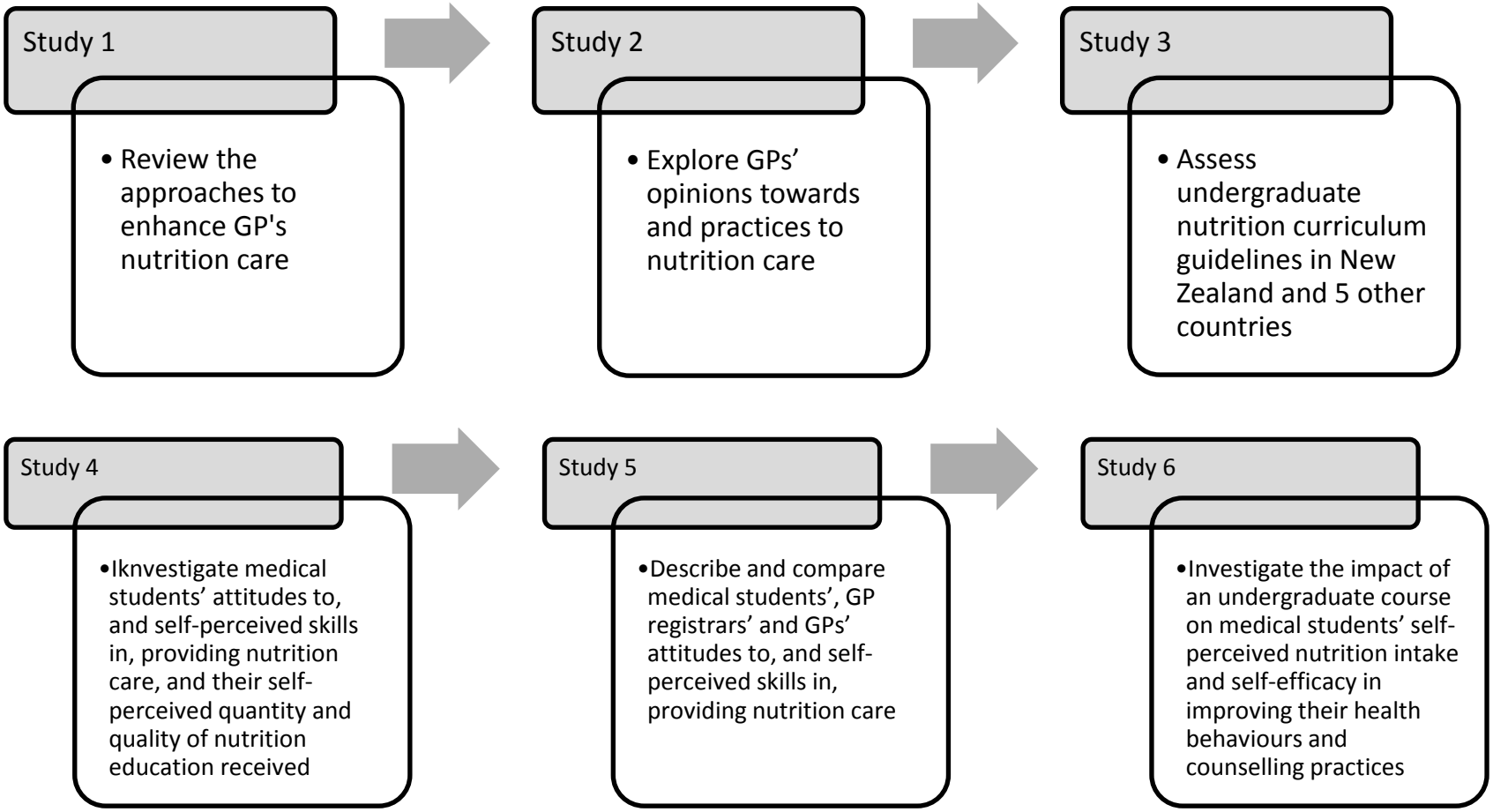


**Figure 1.1: Study Flow Diagram**

The six aims of this research were:

**Aim 1:** Review the international approaches previously undertaken to improve nutrition care provision by GPs.

This review investigated the approaches to improving nutrition care provision by GPs. It was important to determine which approaches were appropriate for the New Zealand context. Four approaches were identified: nutrition in medical education; continuing medical education (CME); GP-centred; and practice-setting approaches.

A review of the international literature was appropriate for this research as it identified the different approaches to improving nutrition care provision by GPs. These approaches were then critically investigated for strengths and weaknesses and their applicability to the New Zealand context.

This study is presented in Chapter 3, and is entitled "Study 1 — *Nutrition beyond drugs and devices: a review of the approaches to enhance the capacity of improving nutrition care provision by general practitioners.*"

**Aim 2:** Explore New Zealand GPs' opinions and practices regarding the provision of nutrition care to patients.

The second study was developed to explore GPs' opinions and practices regarding the provision of nutrition care. This study examined a wide range of GPs' opinions and practices, because little is known about the provision of nutrition care in the New Zealand context.

A qualitative focus group design was the most appropriate for this research because the study attempted to explore opinions from a cross-section of Auckland GPs. The methodology involved the development of a facilitator protocol and semi-structured questions to guide

facilitators in their conduct of the focus groups. These protocols and questions allowed the facilitators to ensure that participants could freely express their ideas and opinions.

This study is presented in Chapter 4, and is titled "Study 2 — *GPs' opinions and practices regarding providing nutrition care to patients*."

**Aim 3:** Assess nutrition curriculum guidelines for undergraduate training in New Zealand and five other countries with similar educational and health care systems.

This research was undertaken in response to the perception of New Zealand GPs' that a lack of nutrition education is a barrier to providing nutrition care; similar findings have been reported in other countries (11). Specifically, this study examined the nutrition curriculum guidelines for undergraduate training in New Zealand and compared them with guidelines from five other countries. As nutrition education is important in undergraduate training, it was appropriate to identify the New Zealand content and its placement and mandatory requirement, if any, in comparison with those of five other countries. This analysis would help determine if the current requirements in New Zealand undergraduate training are appropriate.

A review of the appropriate literature from each country since 2000 was utilised for this study. This allowed for each set of curriculum guidelines to be evaluated for each organisation's or group's role in undergraduate medical education, the extent of nutrition-related recommendations, and the requirement for mandatory implementation. The five countries selected as comparators were chosen because of their comparable tertiary education systems, continuing medical education (CME) programmes, language of delivery, and population health care needs.

This study is presented in Chapter 5 and is entitled "Study 3 — *Nutrition guidelines for undergraduate curricula: a six-country comparison.*"

**Aim 4:** Investigate New Zealand medical students' attitudes to, and self-perceived skills in, providing nutrition care in practice, as well as the perceived quantity and quality of nutrition education received in training.

As there is no compulsory requirement for nutrition education during medical training in New Zealand, the fourth aim was to investigate medical students' attitudes to, and self-perceived skills in, providing nutrition care at the time of graduation. Additionally, students' perceptions of the quantity and quality of nutrition education received during training was investigated to determine if these aspects of nutrition education influenced attitudes and confidence.

A quantitative approach was the most appropriate for this research, because the study sought to investigate the influence of perceived quantity and quality of nutrition education on attitudes to, and self-perceived skills in, providing nutrition care in practice. Self-perceived skills and attitudes in medical students are an accepted indicator of competence when objectives are clearly specified (16, 30).

A questionnaire, previously used in the United States of America (USA), was adapted for use in the New Zealand context. The study sample consisted of 183/351 (response rate 52.1%) medical students about to graduate from Auckland School of Medicine. To increase the study sample, students from two consecutive years were recruited.

This study is presented in Chapter 6 and is entitled "Study 4 — *Medical students' attitudes to, and self-perceived skills in, providing nutrition care in practice as well as perceived quantity and quality of nutrition education received in training.*"

**Aim 5:** Describe and compare New Zealand medical students', GP registrars' and GPs' attitudes towards incorporating nutrition care into practice, and their self-perceived skills in providing nutrition care.

The fifth research aim was developed in response to the finding that graduating medical students have low self-efficacy in providing nutrition care. Specifically, this study sought to compare attitudes to nutrition care and levels of confidence in counselling patients in nutrition care between three groups: medical students, GP registrars and GPs. This research is important because the development of self-efficacy needed for appropriate workforce preparation (14-16) and attitudes to providing nutrition care can decline after graduation (31-33).

Quantitative methodology was the most appropriate approach to this research because a comparison of responses from the three groups - medical students, GP registrars and GPs - was required. Data obtained from the medical students were compared to data obtained from GP registrars and GPs. The questionnaire used in Study 4 was repeated with GP registrars and GPs.

This study is presented in Chapter 7 and is entitled "Study 5 — *Doctors' attitudes and confidence towards providing nutrition care in practice: Comparison of New Zealand medical students, GP registrars and GPs.*"

**Aim 6:** Investigate the impact of an undergraduate course on New Zealand medical students' self-perceived nutrition intake and self-efficacy in improving their health behaviours and counselling practices.

The final study aim was developed in response to the findings that the best time to provide nutrition education is during undergraduate training (34, 35). It was important to investigate this in the New Zealand context. A second-year medical course, "The Digestive System", was chosen as the intervention because it contains most of the undergraduate nutrition education, is taught by a dietitian, and includes some healing-oriented approaches, which are in line with current trends in teaching disease prevention and health promotion (36-39). Biomedical

science students at the same year level taking a course that did not include nutrition content ("The Physiology of Human Organ Systems") served as a control group.

Quantitative methodology was appropriate for this research as the approach allowed for pre- and post-course questionnaires to be completed. The methodology involved adapting an existing questionnaire used in a USA medical school survey of self-perceived nutrition intake and self-efficacy in improving health behaviours and counselling practices; the questionnaire included baseline and post-course measurements for the two student groups.

This study is presented in Chapter 8 and is entitled "Study 6 — *Impact of an undergraduate course on medical students' self-perceived nutrition intake and self-efficacy in improving their health behaviours and counselling practices.*"

## 1.7 Research framework

Two contexts have been used to guide this thesis. The first is the aim of medical education to provide a foundation of competency for knowledge, attitudes and skills (18, 19). The second context is the recognition that competence in medical practice is built upon the accumulation of knowledge, and progress in terms of experience and practical application. This context is provided by the Royal College of New Zealand General Practitioners' (RNZCGP) nutrition syllabus, which indicates that GPs need to be equipped with sufficient knowledge of those nutritional factors involved in promoting health and preventing disease, to be able to discuss these factors with their patients and to incorporate their knowledge into patient management and treatment in order to improve patient outcomes (7).

Figure 1.2 represents the model for knowledge, attitudes and skills in medical education used in this thesis. At the top of the model, factors that influence how nutrition is taught in the medical curriculum are identified. These include policy, tradition, evidence-base and medical

education trends. Following this, the focus of the model is on the question "Does the nutrition curriculum influence competency?" To address this question, the thesis investigates the knowledge, attitudes and skills of medical students, GP registrars and GPs to determine if they are competent in providing nutrition care to patients. The terms "competence" and "confidence" have been used interchangeably in the literature with no established correlations between them (40). Evidence from literature related to procedural skills provides the best evidence for using these terms interchangeably (41, 42). Graduates who are deemed competent in a specific procedure can express confidence in carrying it out by having had ongoing opportunities to repeat the procedure (41, 42). There is also evidence that a student's positive self-belief can be encouraged by reassurance from tutors, peer interaction, and an appropriate degree of autonomy (43). New Zealand medical education is not yet competence-based; therefore, to avoid the need to define and describe the term, "competence" was not used in the questionnaires in Studies 4 and 5. Instead the term "confidence" was used for nutrition-specific procedural skills, and participants indicated their perceived level of confidence in providing nutrition care using a 5-point Likert scale by choosing between "Not at all confident", "Not confident", "Unsure", "Confident", or "Very Confident".

Finally, the model focuses on better practice and patient outcomes, and identifies the implications and considerations beyond medical training. This relates to investigating how to promote better practice to improve patient outcomes. This is a two-way process, as better practice will lead to improved patient outcomes and improved outcomes will lead to better practice. The impact of these processes on how competencies should be developed is investigated.

Therefore, research needs to be undertaken that (i) reviews approaches to the improvement of nutrition care provided by GPs; (ii) explores GPs' opinions and practices regarding providing

nutrition care to patients; (iii) assesses nutrition curriculum guidelines for undergraduate training in New Zealand and other countries; (iv) investigates medical students' attitudes to, and self-perceived skills in, providing nutrition care in practice, as well as the perceived quantity and quality of nutrition education; (v) describes and compares New Zealand medical students', GP registrars', and GPs' attitudes and skills towards incorporating nutrition care into practice, and their self-perceived skills in providing nutrition care; and (vi) assesses the impact of an undergraduate course on medical students' self- perceived nutrition intake and self-efficacy in improving their own health behaviours and counselling practices.

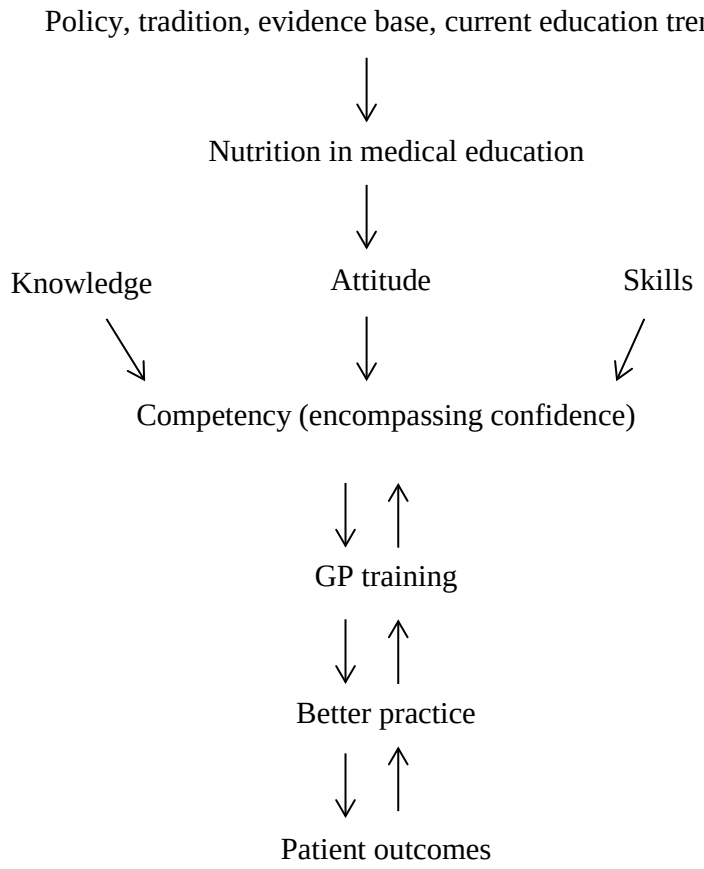


**Figure 1.2: Framework for nutrition in medical education**

This framework then guided the studies used in this research as presented in the Flow Diagram in Figure 1.2.

## 1.8 Thesis structure

This thesis has been formatted in accordance with the 2011 University of Auckland PhD thesis regulations concerning published work. The first chapter of this thesis is the introductory chapter to the field. The second chapter contains a literature review.

The third, fourth, fifth, sixth, seventh and eighth chapters comprise the following:

- A brief introduction
- Results in the form of either a published article or a manuscript for submission
- A discussion, where applicable, on the impact of the work since publication

The ninth chapter is the overall summary of the thesis.

The appendices and references follow chapter 9.

The six aims, all predicated in the international literature, have been met by the six research studies.

# Chapter 2. Literature review

## 2.1 Literature review terms

A literature search was conducted using MEDLINE® and Pub Med databases for the period May, 2011 to March, 2015. The following search terms and Medical Subject Headings (MeSH) were used to identify relevant publications:

- For postgraduate nutrition education: graduate medical education OR postgraduate nutrition education OR continuing medical education
- For medical nutrition education: medical nutrition education OR medical curriculum
- For general practitioner: general practitioners (MeSH) OR primary care physicians (MeSH) OR family doctor OR family practice OR general practice
- For nutrition: nutrition knowledge OR nutrition education

## 2.2 World health problems

The leading causes of death in the world are chronic diseases (6). These chronic diseases include conditions such as CVD, asthma, obesity, cancer and type 2 diabetes (2). In 2008, 36 million (63%) of the 57 million deaths globally were due to chronic disease and in 40 percent of these cases, of death occurred prematurely (before 70 years of age) (44). The number of deaths from chronic diseases is predicted to increase in the future (44).

Many chronic diseases, especially those causing premature death, are largely preventable through the reduction of shared risk factors: tobacco use; physical inactivity; harmful alcohol use; and unhealthy diet (6). The 25 × 25 project is an international initiative in which participating countries have agreed to aim for a 25 percent reduction in the rates of premature mortality from the four main chronic diseases: CVD; chronic respiratory diseases; cancers; and diabetes (the target is for 2025 vs 2010 rates of disease) (45). Participating countries have also agreed on targets for selected chronic disease risk factors, including tobacco use, harmful

alcohol use, salt intake, obesity, raised blood pressure, raised blood glucose levels and diabetes, and physical inactivity (45). If these globally agreed targets are achieved, 16 million premature deaths will be delayed or prevented, and a further 21 million deaths will be avoided in people aged 70 years or older (45). Nutrition directly affects four of the six main risk factors for chronic disease, (salt intake, obesity, raised blood pressure and raised blood glucose levels) which illustrates the need for nutrition intervention at national and international levels (45).

The WHO recommends the adoption of achievable and low-cost interventions at the individual and population levels to reduce and eliminate risk factors and reduce the incidence of chronic diseases; the provision of nutrition information and counselling in health care meets the WHO's criteria for such interventions (6). Recognition of the importance of nutrition intervention is based on the evidence accumulated during the second half of the 20$^{th}$ century, which indicates that much of the morbidity and mortality associated with lifestyle diseases may be preventable through dietary and lifestyle modifications. This evidence includes landmark studies such as the Dietary Approaches to Stop Hypertension Study (46), the Lyons Diet Heart Study (47) and the Diabetes Primary Prevention Trials (48), and has sparked the development of new national dietary guidelines to allow health care providers to facilitate the achievement of overall public health benefits (49).

## 2.3 Chronic disease in New Zealand

In New Zealand, the incidence of chronic disease is rising (50). The New Zealand Burden of Diseases, Injuries and Risk Factors 2006–2016 study aims to quantify health loss (or burden of disease) in disability-adjusted life years (51). Results to date indicate that leading risk factors, including physiological factors (high blood pressure, high blood cholesterol, high blood glucose and low bone mineral density) accounted for 13.7 percent of deaths annually

(51). In addition, dietary risk factors (high salt intake, high saturated fat intake, low vegetable and fruit intake) and excess energy intake (reflected by high body mass index [BMI]) accounted for 11.4 percent of health loss (3). These figures illustrate the need for interventions that support New Zealand adults to have healthy dietary behaviours.

### 2.4.1 New Zealand dietary guidelines

In New Zealand, evidence-based dietary guidelines exist for the management and treatment of adult obesity (52) and for CVD and diabetes in clinical practice (53). In both sets of guidelines, nutrition is a recognised component of lifestyle interventions, with the nutrition advice based on "The Heart Foundation of New Zealand Food-Based Dietary Statements: A Guide to Healthy Eating" (54-56). Three categories of lifestyle advice are included: the general category of lifestyle advice includes giving guidance for healthy eating; the specific category of lifestyle advice includes both nutrition guidance and quantities of food for healthy eating; and the intensive lifestyle intervention recommends referral to dietitians as part of the lifestyle assessment (52, 53). The Heart Foundations' general and specific lifestyle advice categories illustrate the growing expectation on GPs to provide nutrition care.

Despite the recognised importance of nutrition for positive health outcomes, there is evidence that New Zealanders are not following the recommended dietary guidelines (51). For example, nutrition is thought to be a factor in approximately 9000 (40%) deaths each year (3). This figure includes 85 percent of deaths due to ischaemic heart disease, 70 percent of deaths due to stroke associated with the combined effects of nutrition-related risks, more that 80 percent of deaths from diabetes attributable to higher than optimal BMI and suboptimal BMI and fruit and vegetable intake, and 6 percent of deaths due to cancer (3). This makes nutrition-related risk factors among the leading contributors to premature mortality in New

Zealand (3), thereby underlining the importance of nutrition in the prevention, treatment and management of chronic disease.

## 2.5 The importance of nutrition

Evidence exists of the importance of nutrition in the prevention of chronic disease (3). For example, small changes in weight, blood lipid profiles and other characteristics at a population level have a significant impact on the burden of chronic disease (3). Knowler et al., (57) have reported that improvements in nutrition and lifestyle factors can be more effective than medication for the management of some chronic diseases. Analyses of the Burden of Disease projections for 1997–2011 (3) illustrate the impact of small changes in diet-related factors on the incidence of chronic disease, and reinforce the benefits of preventive counselling in nutrition care. The effects of small dietary changes on the burden of disease are presented in Table 2.1.

**Table 2.1: Impact of small dietary changes on the burden of disease (3)**

| Altered parameters | Health benefits | Impact of lowered blood pressure on chronic disease | Avoidable mortality/year |
|---|---|---|---|
| Salt intake | Decreasing the daily sodium intake from ~150 mmol/day to100 mmol/day could lower SBP by up to 6 mmHg, depending on age and baseline blood pressure. | Reductions in SBP of 1 mmHg are associated with a 6.3% reduced risk of ischemic heart disease in young adults (1.1% reduced risk in adults aged ≥75 years). | Ischemic heart disease = 179<br>Stroke = 103 |
| Alcohol intake | Given the dose-response effect of alcohol on SBP, reducing alcohol intake by one drink/day in high alcohol users lowers SBP by 1.0 mmHg. | Reductions in SBP of 1 mmHg are associated with 5.6% reduced risk of stroke in young adults (1.8% reduced risk in adults aged ≥75 years). | |
| Body weight | For each 1kg of body weight lost, there is a lowering of at least 0.5 mmHg of SBP. | | |

*SBP, systolic blood pressure: Hg, mercury*

Clearly, strategies are required to improve nutrition behaviours of New Zealanders in order to reduce the incidence of chronic disease.

## 2.6 Nutrition knowledge

## Preface

Not only do doctors need a foundational competency in nutrition knowledge, attitudes and skills for chronic disease management (19), they also need nutrition knowledge for other roles in medicine, such as providing nutrition support.

### 2.6.1 Nutrition support

Nutrition support is an integral component of care for critically ill patients and those malnourished through underlying illness such as cancer (58). Starvation and major stress, such as that resulting from surgery, can lead to a host of metabolic and physiologic changes; if such effects remain unchecked, they can have adverse consequences (59). During the last 20–30 years, our understanding of the metabolic changes associated with starvation, stress and sepsis have improved. This understanding, along with an increased knowledge of cellular biology and biochemistry, has led to improvements in critically ill patients' outcomes through the use of nutrition support (60). The administration route for nutrition support depends upon the individual characteristics of the patient and their illness, and can include oral nutrition support, enteral nutrition or parenteral nutrition.

Oral supplements, for example, are taken in addition to usual food and include options such as fortified food, snacks and/or sip feeds. Enteral nutrition involves providing complete nutrition directly into the stomach or small bowel. It is administered to patients with decreased appetite, those who have difficulty swallowing, or patients for whom surgery has interfered with eating (61). Parenteral nutrition is the intravenous delivery of nutrition,

provided when the gastrointestinal tract is not functioning because of interruption in its continuity or impairment of its absorptive capacity (60). Nutrition knowledge is essential for those providing nutrition support and for those managing energy and protein requirements in hypermetabolic patients, as the failure to meet the energy requirements can lead to a loss of lean body mass and subsequent negative nitrogen balance (60). Conversely, overzealous nutrition support also needs to be avoided (60). This means that doctors must possess adequate nutrition knowledge to allow them to calculate energy and substrate needs and to conduct ongoing assessment of the appropriateness of the nutrition support.

## 2.7 Primary Care

### Preface

Primary care refers to health care provided in the community, which is usually provided by a GP, practice nurse (PN), pharmacist, or other health professionals working within a general practice (62). Primary health care covers a broad range of services which include diagnosis and treatment, health education, counselling, disease prevention and screening (62).

### 2.7.1. Chronic disease and primary care

In New Zealand, GPs are often the initial patient contact point within the healthcare system (62). The following examples illustrate how the WHO recommendations for the prevention and treatment of chronic disease are implemented in New Zealand by the Department of Health.

Firstly, in line with WHO recommendations for the prevention and treatment of chronic disease (6), the New Zealand 2001 Primary Health Care Strategy (63) identified the need for a population approach to health care provision to reduce the prevalence of chronic diseases and their subsequent impacts, including economic. Included in this approach was recognition

that the historical healthcare model used in New Zealand, which is centred round acute and secondary care, is no longer sustainable because of financial and demographic pressures (8). This means that alternative, cost-effective ways of managing with the growing burden of chronic diseases are needed (8). The aim of the Primary Health Care Strategy is to allow people to live independently for longer and to avoid the need for high-cost hospital admissions (63). Internationally, treating patients in the primary care sector in order to prevent hospital admissions is proving to have the most beneficial effects on health outcomes, in addition to providing cost-effective means for dealing with chronic diseases (6).

Secondly, the government sets health targets and national performance measures, specifically designed to improve the performance of health services that reflect significant public and government priorities (64). One of the six targets for the 2013–2014 period was "More heart and diabetes checks", in recognition that CVD and diabetes create substantial health burdens and together represent the greatest cause of mortality in New Zealand (64). These chronic diseases are being targeted because it is likely that the prevalence of these conditions will increase as the population ages and because lifestyle modification can substantially decrease the risk for these conditions (3) when incorporated into primary care.

Lastly, the prevalence of obesity has increased across all ages and ethnic groups in New Zealand over the last 20 years (52). There are currently 1.2 million obese people in New Zealand; 31 percent of adults are obese and 11 percent of children are obese (51). Cardiovascular and metabolic health conditions are disproportionately more prevalent in Maori and Pasifika groups and areas of lower socio-economic status (51). The geographic location of some at-risk groups means that the greater health needs are more easily met by primary care providers. These examples illustrate the need to ensure that nutrition care is an integral component in the management of patients with chronic diseases.

### 2.7.2 Importance of GPs

GPs are a large workforce in New Zealand; there are 3614 registered GPs in the country providing a ratio of one GP for every 1140 patients (65). Approximately 80 percent of the population visits their GP at least once a year (51). In New Zealand, many GPs have their own patients, for whom continuity of care provides the opportunity to build and reinforce relationships (66), and GPs are the only professionals within the health care system who have this continuous contact with almost all of the population (67). GPs are, therefore, ideally placed to influence and intervene in patient attitudes and behaviours towards nutrition, and to recommend or refer patients to other health professionals as appropriate (67, 68). To achieve these positive outcomes, GPs require sufficient knowledge and skills and an appropriate attitude towards nutrition (7, 69).

Patients have a high level of trust in their GPs for providing nutrition advice and GPs are patients' main sources of information about nutrition (70-73). Interestingly, despite this reported level of trust among patients, and despite the fact that patients expect advice and guidance from their GPs (74-77), GPs generally remain unaware of the extent to which patients value their lifestyle advice (78) and are often unaware of, and underestimate, patients' interest in receiving health education (79). In addition, there is evidence that doctors' nutrition care is well accepted by patients during illness visits (80) and that having doctors advise changes to dietary habits is a strong predictor of attempts to change lifestyle habits (81). Overall this suggests that GPs are well placed to provide nutrition care.

Internationally, there are reports that only a minority of the population receives nutrition care (74, 82), even among obese patients (83). Other reports suggest wide variations in nutrition and body weight counselling during GP visits, and that counselling does in fact occur more often with obese patients or those who have chronic conditions related to diet or obesity (84-

87). In the USA, estimates for the number of nutrition-related primary care provider visits vary from 20–25 percent (85, 88), while in Australia it is estimated that GPs provide nutrition care to only 10 percent of patients with identified poor nutrition behaviours (89).

The structure of general practice, which varies by country, can influence the type of nutrition care that can be provided (90). GPs who have continuity of care for patients and are gatekeepers for specialised medical services are better placed to build relationships with patients and have more occasions to talk about nutrition. When GPs occupy this position within the health system, it is appropriate for them to initiate nutrition education and counselling (90). However, barriers exist to the provision of this care which need to be identified and addressed.

## 2.9 Barriers to nutrition care

Surveys have demonstrated disparity among doctors regarding the importance given to diet and nutrition in health maintenance and disease prevention and the delivery of nutrition counselling (10, 11, 76, 87). Other surveys indicate that GPs are not adequately prepared to provide dietary counselling to patients (10, 11, 91-93). Surveys that document deficits in nutrition knowledge by practicing doctors attribute this lack to poor nutrition education in medical schools (94, 95). A lack of confidence in counselling skills is related to poor nutrition knowledge and doctors' lack of nutrition knowledge and poor nutrition counselling skills have been recurrent themes in the literature since the 1980s (70). This information clearly demonstrates the need for nutrition education for GPs so they may provide good nutrition care for their patients. Therefore, it is important that GPs and medical students are trained in clinical nutrition (96, 97).

## 2.10 Advances in nutrition evidence

GPs need to ensure that their nutrition knowledge is up-to-date. They need to be able to understand nutrition evidence from studies which include a variety of designs, interventions and outcomes, and to apply the evidence to patients whose cultural and psychosocial situations may differ significantly (98). They may need to translate nutrition interventions into practice, translate interventions to the primary care setting, or provide care in situations where there is a lack of clinical evidence to guide them (99). A key difficulty in using data from nutrition interventions is due to the delay between the application of an intervention and the observation of its effectiveness; this interval may be many years (99).

Additionally, the prevention paradox needs to be considered. The prevention paradox describes the situation in which small changes in individual behaviours can have substantial and measurable consequences at the population level, but fail to lead to relevant changes in the health status of individuals (100). To assist GPs in providing appropriate, up-to-date, evidence-based nutrition information, research data and clinically applicable evidence needs to be translated into recommendations for nutrition care. For example, since 2004, the Cochrane Collaboration has accommodated the Cochrane Diet and Nutrition Sub Field within the Cochrane Primary Health Care Field (CPHCF) to ensure that reviews relevant to primary care are made available (101). The CPHCF allows for the inclusion in Cochrane reviews of evidence from non-randomised studies, which represents an important component of the evidence for the role of nutrition that is not usually included (100).

An example of the CPHCF bringing Cochrane Reviews into GPs consulting rooms includes the use of Practical Evidence About Real Life Situations Summaries (PEARLS). Each PEARLS document includes a question and answer in the title, such as “Vitamin C supplementation may have preventive effects in populations with a high incidence of

pneumonia and may have therapeutic effects in populations with low plasma vitamin C levels" (100). However, to date, only five such summaries exist, indicating that further work is required in this area.

## 2.11 International Heelsum Collaboration

The International Heelsum Collaboration (IHC) was the driving force behind accommodating the Diet and Nutrition Sub Field within the CPHCF (99). The IHC Workshops were built on collaboration between the University of Wageningen and the University of Nijmegen in The Netherlands. The workshops were initiated because of the recognised link between diet and health problems in the community, the evidence that patients often asked GPs for dietary advice, and the evidence that GPs had little existing evidence upon which to base their practice (102). Since the first IHC workshop in 1995, the focus of these triannual workshops has been on food, diet and nutrition in the family practice setting – what individuals eat, how this influences their health status and in what way food habits can be changed – by bringing together medical, behavioural, communication, epidemiological and nutrition perspectives (103). The end objective of this organisation is to provide evidence-based nutritional advice and counselling (102) from the qualitative and quantitative evidence-based nutrition education and communication research projects to improve the understanding of the interaction between the GP and the patient over the issue of nutrition (103). Examples of studies presented at the IHC that assist the provision of nutrition care in general practice are presented in Table 2.2.

**Table 2.2 Ways to assist GPs' use of nutrition care in the practice setting**

| Year | Topic | Description |
|---|---|---|
| | **Assessment tools** | **Brief nutrition assessment tools** |
| 2012 | | MEALSONWHEELS: mnemonic for treatable causes of weight loss in patients (104) |
| | **Online technology** | **New technologies provide (important) information on alternatives for GPs to:** |
| 2005 | | Help patients identify reliable nutrition websites (105) |
| 2005 | | Enhance patients' knowledge and involvement in decision making (105) |
| 1997 | | Support patients' use of computer-tailored nutrition programmes and social support sites (71) |
| | **Collaborative approaches** | **GPs as patients' preferred source of nutrition information can:** |
| 2005 | | Refer patients to dietitians for nutrition counselling (105) |
| 2012 | | Engage ongoing counselling for PNs and others (106) |
| | | **Other multidisciplinary approaches include:** |
| 2012 | | Preventive Consult (Prevention Consultation) for cardiometabolic diseases (107) |
| 2012 | | Partnership Overweight Netherlands (PON), making the obesity standard operational (108) |
| | **Evidence-based nutrition** | **Electronically generated resources** |
| 1999 | | Arbor Clinical Nutrition Updates: catalogue of nutrition resources (109) |
| 2003 | | Patient Information Letters (PILS) Dutch General College of General Practitioners (NHG) lifestyle nutrition advice (110) |

Table 2.2 Ways to assist GPs' use of nutrition care in the practice setting continued

| Year | Topic | Description |
|---|---|---|
| | **Assessment tools** | **Brief nutrition assessment tools** |
| 2008 | | Practice Evidence About Real-Life Situations Summaries (PEARLS) Cochrane Library's single-page summaries (100) |
| 2012 | | Practice Guidelines for Obesity: NHG-integrated healthcare standard for obesity (111) |
| 2012 | | National Primary Care Cooperational Agreement for Undernutrition: NHG short nutritional assessment questionnaire for older adults (104) |
| | **An adapted model for Stages of Behavioural Change model** | **GPs can increase effectiveness of nutrition counselling by:** |
| 2005 | | Frequently asking patients about readiness for change (105) |
| 2005 | | Tailoring lifestyle counselling to patients' stage of change to contribute relevance (112) |
| 2008 | | Tailoring lifestyle counselling to patients' stage of change to contribute relevance (113) |
| 2005 | | Conducting motivational interviewing and specific client-centred counselling, to help patients explore and resolve ambivalence to lifestyle issues (114) |
| | **Communication styles** | **GPs' nutrition communication styles** |
| 2005 | | A motivational nutritional advice style, the predominant communication style in standard situations, can change to a confrontational style with overweight patients (115) |
| | **Frequency of patient care** | **Encounters for common illnesses** |
| 2008 | | Obese patients are more likely to experience illnesses other than those related to their chronic conditions (116) |

*GP = General Practitioner; PN = Practice Nurse.*

## 2.12 Competency

## Preface

If doctors are the authority to whom most patients turn to for information on health, they need to be equipped for this role (69). At the first IHC workshop, it was acknowledged that the standards, recognition and efficacy of nutrition work in primary care was linked to the status of clinical education in teaching hospitals (117). When nutrition is taught within the medical education environment, it sensitises medical students to the relevance of nutrition in the prevention and treatment of disease (118). Therefore, it is important that nutrition education is a core curriculum subject in order to influence the attitudes of students to nutrition during clinical practice and post-graduation.

### 2.12.1 Measuring nutrition competence

Competence is a measure used to assess the ability of an individual to perform a task (119). In the context of medical education, the measurement of competency aims to improve the quality of health care provided to patients (119). Competence in a given task comprises three components: knowledge of the task; skill to perform the task; and attitude that enables task performance (119). Competence in attitude refers to a state of readiness towards a task (120). Attitude, originally not deemed a component of competence (120, 121), is now recognised as an essential aspect of competence in health care provision (17, 119, 122, 123).

Competency standards have been adopted by many New Zealand health professions to improve the quality of health care provided to patients (27, 124-127). This has been deemed necessary because the competence of doctors in matters of nutrition has been questioned (128). In a recent survey in the USA, only 14 percent of resident physicians reported feeling adequately trained to provide nutrition counselling (129). In the United Kingdom (UK), lack

of nutrition knowledge among physicians has also been reported (130). Clearly, further research is required into the competency of New Zealand GPs in this regard. The following review explores the literature that relates to the competence of GPs and medical students in providing nutrition care to patients; competence is categorised into the components of "knowledge", "attitudes" and "skills".

## 2.13 Nutrition in Medical Education

At the first IHC workshop, information was collated on doctors' nutrition guidance patterns, values and beliefs for the 11 European countries represented (109). This information was then used to illustrate the need for effective interventions to improve nutrition counselling practices (76); the doctors who attended the workshops came from central European countries with well-developed medical institutions, and yet these doctors were only vaguely aware of the link between diet and health and were frustrated at their lack of practical knowledge of nutrition (131). This example illustrated a vast dichotomy between the perception of the public, who regarded doctors as a source of reliable nutrition information, and the understanding of the medical profession on their role in providing proper nutrition advice for the maintenance of health and prevention of disease (109). In addition, doctors' reluctance to provide nutrition advice was suspected to be a major factor that led patients to seek help from less orthodox sources, such as naturopaths, who were more willing to provide guidance (132).

At that time, there was little uniformity regarding the format of and the amount of time devoted to nutrition education in undergraduate training, both within countries (95) and between countries (73, 133). However, nutrition as a component of undergraduate medical education provides medical students and future GPs with foundation knowledge (134). As will be outlined in the following section, there is evidence that deficits exist in GPs' and medical students' nutrition knowledge, attitudes and skills in providing nutrition care.

### 2.13.1 Nutrition-related knowledge of GPs

Internationally, GPs are perceived as a highly trusted source of health information (71, 135). However, a lack of nutrition knowledge and counselling preparation is a reported barrier to GPs providing nutrition care (11, 12, 87, 129, 136). Eleven studies spanning the 14-year period 1983 to 1997 have examined the nutrition-related knowledge of GPs. Although these studies had diverse research objectives, some common themes have emerged: one was that most studies reported inadequate nutrition knowledge among GPs. It is 7 years since the publication of the most recent study indicating that it would be appropriate to investigate GPs' nutrition knowledge. A summary of studies investigating the nutrition-related knowledge of GPs is presented in Table 2.3.

**Table 2.3 Summary of literature investigating the nutrition-related knowledge of GPs**

| Author and year | Country | Aim | Method | Outcome |
|---|---|---|---|---|
| Hiddink et al., 1997[137] | The Netherlands | Investigate the **knowledge**-seeking behaviour of primary care physicians and the implementation of nutrition guidance strategies for patients. | Survey of a random sample of 1000 primary care physicians with 5–15 years of clinical experience in The Netherlands. 63% RR. | The two most utilised sources of nutrition information were dietitians (72%) and literature (34%). Almost all respondents said they gave nutrition information to patients and asked patients to see a dietitian. |
| Kushner at al., 1995[11] | USA | Identify physicians' perceived barriers to delivering nutrition counselling to patients. | Survey of 2250 randomly selected primary care physicians. | Perceived barriers to delivery of nutrition counselling were lack of time, patient noncompliance, inadequate teaching materials, lack of counselling training, lack of knowledge, inadequate reimbursement and low physician confidence. |
| Kirby et al., 1995[138] | USA | Explore family practice residents' **knowledge** and understanding of nutrition concepts, as well as discuss a method for teaching nutrition in a residency programme. | Family practice residents participated in four teaching sessions during a 5-month period conducted by a fellow resident dietitian. Nutrition knowledge was tested before and after the course. | Participants showed a significant improvement in test scores after nutrition training. Influential factors included increasing residents' interest in nutrition and providing support for their knowledge and its application. |
| Ockene et al., 1995[86] | USA | Assess the influence of a 3-hour training programme on primary care trainees' short-term changes in nutrition | Survey of physicians randomised into three intervention conditions: usual care, lipid | While participants' knowledge did not increase, their skills in counselling for dietary change and their attitudes regarding confidence to intervene improved. |

Table 2.3 Summary of literature investigating the nutrition-related knowledge of GPs continued

| Author and year | Country | Aim | Method | Outcome |
|---|---|---|---|---|
| | | **knowledge,** attitude and assessment skills. | intervention training and lipid intervention training plus practice management. | |
| Hopper and Barker, 1995[13] | UK | Investigate Sheffield GPs' and PNs' level of dietary advice, methods used, and **knowledge** and attitude towards nutrition. | 58 interviewer-conducted surveys in 46 practices. | PNs gave advice more frequently than GPs. GPs were more likely to give only verbal advice, whereas PNs tended to take diet histories and give verbal and written advice. There is a need to improve nutrition education and training in dietary counselling. |
| Temple, 1990[139] | Canada | Assess the nutrition **knowledge** of primary care physicians. | Multi-choice nutrition questionnaire completed by 248 Canadian primary care physicians. 36.1% RR. | Participants indicated gaps in nutrition knowledge. Physicians require more nutrition training. |
| Jack et al., 1990[32] | USA | A follow-up survey of family physicians' interest in and **knowledge** of nutrition. | Survey of 42 practicing family physicians' previously surveyed by the authors. The survey included 33 nutrition topic areas. | The physicians rated nutritional skills as less relevant on the second questionnaire than on the first. More emphasis on nutrition medical education may be required. |
| Shea et al., 1990[140] | USA | Assess primary care physicians' **knowledge** of and adherence to the National Cholesterol Education Programme | Survey of primary care practitioners one year after publication of Adult Treatment Panel report. | Gaps in knowledge found and inconsistencies between Adult Treatment Panel recommendations and clinical practices. |

Table 2.3 Summary of literature investigating the nutrition-related knowledge of GPs continued

| Author and year | Country | Aim | Method | Outcome |
|---|---|---|---|---|
| | | Adult Treatment Panel guidelines. | | |
| Mlodinow et al., 1989[31] | USA | Assess the nutrition **knowledge** of family practitioners and medical students before they receive medical nutrition education. | Survey of a random sample of 243 family physicians and 218 general internists, and all 24 medical students at UCLA about to commence a class in nutrition. | Family physicians scored higher than medical students. A significant negative correlation was found between the number of years since graduation from medical school and respondents' knowledge of nutrition. |
| Dappen et al., 1986[141] | USA | Examine the nutrition **knowledge** of residents in family practice settings. | Survey of 199 residents from eight family practice residences in California. | Low level of nutrition knowledge (54% of questions answered correctly). No differences amongst residents according to year of training or receipt of formal nutrition education. |
| Young et al., 1983[142] | USA | Determine core competencies of nutrition **knowledge** and skills for primary care physicians. | Survey of 445 practicing physicians and 752 department chairpersons in every US medical school. 46% RR. | 50 nutrition competencies were identified as essential, and were intended to be used as guidelines for medical education in nutrition. |

*GP = General Practitioner; PN = Practice Nurse; RR = Response Rate; UCLA = University of California, Los Angeles*

Evidence of GPs' lack of nutrition knowledge include the following: Temple's (139) survey of Canadian primary care physicians' nutrition knowledge; Hopper and Barker's (13) survey of UK GPs' level of nutrition knowledge as provided to patients; Dappen et al's., (141) USA survey of family practice physicians' nutrition knowledge; and Shea et al's., (140) USA survey of primary care physicians' adherence to the national cholesterol education advice for adults. In a landmark USA survey, Kushner (11) noted that the barriers to delivering nutrition counselling to patients, as reported by physicians, were a lack of knowledge as well as a lack of time, patient noncompliance, inadequate teaching materials, lack of counselling training, inadequate reimbursement and low physician confidence.

Two studies from the USA investigated strategies for improving GPs' nutrition knowledge. In the study by Kirby et al., (138) resident physicians recorded foods they had eaten and analysed their own diets to successfully engage an interest in nutrition. Ockene et al., (86) found no short-term changes in nutrition knowledge following a 3-hour training programme among primary care trainees, suggesting that the programme was too brief to allow the participants time to process the information. Three studies from the USA examined the correlation between general internists' nutrition knowledge and years since graduation. Mlodinow et al., (31) reported a negative correlation between the number of years since graduation from medical school and family practitioners' knowledge about nutrition. Jack et al.,'s (32) follow-up survey of Mlodinow et al's., (31) study of family physicians reported that the number of years since graduation from medical school was associated with a lower physician rating of the relevance of nutrition skills. Kirby et al's., (138) survey also reported a negative correlation between time since graduation and nutrition knowledge. Hiddink et al., (137), from The Netherlands, surveyed the knowledge-seeking behaviours of primary care physicians and reported that the most utilised sources for nutrition knowledge were the medical literature and dietitians. Finally, Young et al., (142) identified 50 core competencies

needed to provide primary care physicians in the USA with the knowledge and skills necessary for medical education guidelines.

Lack of nutrition knowledge is similarly reported by doctors (14, 129, 143-146) . Other studies have found that the perceived level of nutrition education received by GPs during medical training is insufficient to allow them to develop the required skills to provide nutrition care to patients (135, 139, 147). GPs also view their perceived level of nutrition knowledge as a reason for their lack of involvement in nutrition care (12). Therefore, nutrition care may not be provided as often as is appropriate.

The studies presented generally recommend that GPs' nutrition knowledge should be improved (31, 32, 139-141). Although GPs perceive themselves as not possessing sufficient nutrition knowledge (12), it is difficult to determine whether this perceived lack of knowledge in fact represents a true lack of knowledge, at least in the absence of standardised criteria that can act as benchmarks in the comparisons of curricula and learning outcomes.

Recently, doctors' and nurses' self-reported knowledge in nutritional practice was evaluated against the European Society of Parenteral and Enteral Nutrition (ESPEN) guidelines for nutritional screening, assessment and treatment (145). However, comparison of self-reported knowledge in nutrition practice against the criteria of the ESPEN guidelines infers that the guidelines contain a pre-determined, sufficient level of knowledge required for practice. As with most other studies presented, a key finding from this study was that the lack of nutrition knowledge among doctors was a common cause for insufficient nutrition care.

It is not known if New Zealand GPs possess sufficient nutrition knowledge to provide effective nutrition care to patients. Investigation into the level of nutrition knowledge that exists among New Zealand GPs is required and to establish whether GPs perceive that they have sufficient knowledge to provide nutrition care.

## 2.13.2 Nutrition-related attitudes of GPs

Several studies from the USA (using different methodologies) have reported that GPs have positive attitudes to providing nutrition care. An early study by Wells et al., (148) reported that GPs' positive attitudes to nutrition counselling were related to "better" personal health habits. Kottke et al., (149) reported that GPs' positive attitudes to providing nutrition care were inhibited by the perception that their patients would respond negatively. Levine et al., (10) reported that while GPs had favourable attitudes towards nutrition care in practice, they rarely reviewed patients' nutrition status. Kushner (11) reported that although primary care physicians consider nutrition care important (reflecting attitudes held), they spent fewer than 5 minutes of consultation time discussing diet with patients. From Europe, Brotons et al., (150) reported that GPs' attitudes to obesity management were affected by the perceived difficulty of the task (self-efficacy). According to Bandura, self-efficacy is confidence in one's ability to perform a task or achieve an outcome (151). Finally, a recent Canadian study by Wynn et al., (152) reported that the management and prevention of obesity requires adequate training and evidence-based interventions related to nutrition.

Three studies have assessed strategies for improving GPs attitudes to providing nutrition care. Katz et al., (153) reported that participation in an interactive course improved family practitioners' attitudes to the management of obesity. Ockene et al., (86) reported that primary care providers are responsive to the teaching of special skills important for initiating health behaviour change in patients. Flocke et al., (154) reported that family practitioners' weight loss advice to obese patients and those with chronic conditions rarely included recommended components that could lead to positive health behaviour change.

The view that GPs possess a positive attitude towards nutrition was not unanimously shared. Hiddink et al., (12) reported that GPs do not uniformly have satisfactory attitudes towards nutrition. The differing methodologies used in these studies may have contributed to the different findings. For example, a study that incorporated the use of a questionnaire (25) was unable to appropriately address important contextual information that may have been better explored through a qualitative study. However, Nicholas et al's., (25) study investigating the attitudes of Australian GPs in providing nutrition care for a range of nutrition-related chronic conditions reported that GPs were less likely to consider the provision of nutrition care for patients with hypertension and ischaemic heart disease and those who were overweight than for those with diabetes, lipid disorders and obesity. This suggests that patients' medical conditions may influence GPs' readiness (attitude) to provide nutrition care (25).

The importance doctors place on nutrition is reported to decline after graduation (31, 32). Others report that interventions attempting to increase the importance placed on nutrition by conducting short educational courses in nutrition have been successful in improving the nutrition-related attitudes and self-efficacy of the participating medical students and GPs (15, 153). Further investigation is required to assess the impact of these improvements in attitude on the provision of nutrition care and, ultimately, patients' health outcomes.

**Table 2.4 Summary of literature investigating the nutrition-related attitudes of GPs**

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| Wynn et al., 2010[152] | Canada | Investigate the role of family physicians in management of patients with nutrition-related issues and the feasibility of including nutrition counselling in primary care practices. | Survey of 451 family physicians regarding **attitude** to the role of nutrition in patient health. 59.6% RR. | Management and prevention of obesity requires access to adequate training, compensation and evidence-based interventions related to nutrition. |
| Katz et al., 2005[153] | Israel | Test whether family practitioners' self-efficacy and **attitude** to obesity is enhanced after participating in an interactive course on obesity management. | 29 family practitioners participated in an interactive obesity management course comprising six 4-hour sessions over 6 months. | Post-course efficacy appraisals were significantly higher than pre-course appraisals. |
| Nicholas et al., 2005[25] | Australia | Determine whether GPs consider **(attitude)** nutrition counselling for chronic conditions. | Mail survey to Hunter Urban Division GPs (n=399). 50% RR. | GPs were less likely to consider nutrition counselling for hypertension, ischaemic heart disease and overweight than for diabetes, lipid disorders and obesity. |
| Flocke et al., 2005[154] | USA | Assess family physicians use of **(attitude)** the 5As | 300 family medicine visits were observed by eight first-year medical | Physicians target exercise and weight loss advice for obese patients and those with chronic conditions, but |

Table 2.4 Summary of literature investigating the nutrition-related attitudes of GPs continued

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| | | heuristic (ask, assess, advise, assist and arrange). | students. | the advice rarely includes the recommended components that could initiate health behaviour change. |
| Brotons et al., 2003[150] | 10 European countries | Assess GPs' knowledge and **attitudes** in implementing disease prevention and health promotion activities. | Survey completed by 1976 GPs on beliefs and attitudes in disease prevention and health promotion. | GPs think that obesity is difficult to manage in practice, and that nurses can play an important role in advising patients about dietary practices. |
| Hiddink et al., 1997[137] | The Netherlands | Investigate the implementation of nutrition guidance strategies for primary care patients. | Survey of a random sample of 1000 primary-care physicians with 5–15 years' experience in clinical practice in The Netherlands. 63% RR. | Almost all respondents said they provided personal nutrition information for patients (**attitudes**) and asked patients to make an appointment with a dietitian to receive nutrition education. |
| Ockene et al., 1995[86] | USA | Assess the influence of a 3-hour training programme on primary care trainees' short-term changes in nutrition knowledge**,** **attitude** and assessment skills. | Physicians were randomised into three intervention conditions: usual care, lipid intervention training and lipid intervention training plus practice management. | Health management physicians are responsive to the teaching of specialised skills important for initiating health behaviour change in patients. |

Table 2.4 Summary of literature investigating the nutrition-related attitudes of GPs continued

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| Kushner 1995[11] | USA | Assess the **attitudes**, practice behaviours and perceived barriers to the delivery of nutrition counselling by primary-care physicians. | Survey of 2250 primary-care physicians in USA. 49% RR. | Nearly three-quarters of respondents felt that dietary counselling is important and the responsibility of the physician; however, most respondents spend fewer than 5 minutes discussing diet with patients. |
| Hopper and Barker, 1995[13] | UK | Investigate Sheffield GPs' and PNs' level of dietary advice, the method used, and knowledge of and **attitude** towards nutrition. | 58 interviewer-conducted surveys completed in 46 practices. | PNs gave advice more frequently than GPs. GPs were more likely to give only verbal advice. PNs tended to take diet histories and give verbal and written advice. There is a need to improve nutrition education and training in dietary counselling. |
| Levine et al., 1993[10] | USA | Determine nutrition-related **attitudes** of primary-care physicians. | Survey of 30,000 primary-care physicians to assess demographics, attitudes and behaviour. 11% RR. | Physicians reported a favourable attitude towards nutrition in practice, but rarely reviewed nutritional status with their patients. |
| Jack et al., 1990[32] | USA | A follow-up survey of family physicians' interest (**attitude**) in, and knowledge of, nutrition. | Survey of 42 practicing family physicians previously surveyed by the authors. Survey of 33 nutrition topic areas. | Physicians rated nutritional skills as less relevant on the second questionnaire than on the first. More emphasis on nutrition counselling skills may be appropriate in medical |

Table 2.4 Summary of literature investigating the nutrition-related attitudes of GPs continued

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| | | | | education. |
| Kottke et al., 1984[149] | USA | Assess family practice physicians' **attitudes** and activities to initiate nutritional counselling in patients. | Survey of family practice physicians regarding nutritional intervention practices. | Family physicians consider it appropriate to give nutritional advice to patients not necessarily seeking it, but the perception that patients do not want, and would not follow, the advice inhibits them from delivering nutrition messages in private practice. |
| Wells et al., 1984[148] | USA | Examine physicians' health habits and **attitudes** to counselling about smoking, weight, exercise and alcohol. | Survey of random sample of members of a county medical society (201 respondents). | Physicians with "better" personal health habits and more positive attitudes toward counselling were more likely to provide counselling to a broader range of patients. |

*GP = General Practitioner; USA = United States of America; RR = Response Rate; PN = Practice Nurse*

### 2.13.3 Nutrition-related skills of GPs

There has been limited research exploring the nutrition-related skills of GPs. The study by Katz et al., (153) indicates that there has been a change in focus from nutrition knowledge to nutrition skills. A summary of literature investigating the nutrition-related skills of GPs is presented in Table 2.5.

**Table 2.5 Summary of literature investigating the nutrition-related skills of GPs**

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| Katz et al., 2005[153] | Israel | Test the hypothesis that family practitioners' self-efficacy (**skills**) relating to obesity are improved after participating in an interactive course on obesity management. | 29 family practitioners participated in an interactive obesity management course comprising six 4-hour sessions over 6 months | Post-course efficacy appraisals were significantly higher than pre-course appraisals. |
| Guo et al., 2002[155] | USA | Investigate the nutrition and physical activity counselling **skills** and practices of family practice residents. | Survey of 110 family practice residents from four clinics in Texas, USA. 93% RR | Family practice residents do not perform nutrition care at optimal rates. Skill performance may be influenced by attitudes of family practice residents. |
| Nawaz 2000[156] | USA | Determine the rate of physician/patient discussions regarding diet, exercise, and smoking, and to assess the effect of these **skills** and discussions on behaviour change. | Telephone survey of 433 adults who had a routine check-up in the previous year. They were asked about whether their physicians asked about dietary habits, exercise, or smoking, or any efforts to modify these behaviours | Diet was addressed with 50% of the patients, exercise with 56% and smoking status with 77%. Respondents who were asked about their diet were more likely to have modified their fat or fibre intake in the previous year than those not asked, and were somewhat more likely to have lost weight. |
| Hiddink et | The | Investigate GPs' | Survey of a random sample of | Almost all respondents said they |

Table 2.5 Summary of literature investigating the nutrition-related skills of GPs continued

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| al., 1997[137] | Netherlands | implementation of nutrition guidance strategies **(skills)** with primary care patients. | 1000 primary care physicians practicing with 5–15 years' experience in The Netherlands. 63% RR. | provided personal nutrition information to patients and asked patients to make an appointment with a dietitian to receive nutrition education. |

*RR = Response Rate; USA = United States of America*

Most studies have focused on the rate of nutrition care provision. For example, Guo et al., (155) reported less-than-optimal rates for nutrition care among family practice residents. Nawaz (156) reported a greater likelihood of dietary change when patients discussed dietary habit modifications with their physicians, and Hiddink et al., (12) concluded that primary care providers should provide nutrition information (skills) in practice. While GPs perceive nutrition as a high priority for patient care, it appears that its delivery to patients is less than optimal (10). This may be because of a lack of appropriate skills in recognising when to implement nutrition care, or perhaps that GPs do not implement appropriate nutrition care skills even though they possess them.

Personal factors such as insufficient knowledge or an inappropriate attitude to nutrition (12) may contribute to a lack of nutrition skills, along with external factors such as time restrictions and the existence of conflicting treatment priorities (141, 157). When GPs' counselling skills are not well developed, GPs may choose not to counsel patients (158) or they may not be able to motivate patients sufficiently to change behaviour (159). Evidence to support this comes from Ammerman et al., (146), who demonstrated that doctors were more likely to report behaviourally focused diet counselling practices if they felt prepared to counsel, were confident in their counselling skills, or personally followed a prudent diet. The barriers experienced by GPs to the provision of nutrition care are explored further in Chapter 4 in the focus group study.

## 2.14 From GPs to undergraduate medical education

A discussion and review of the literature on GPs' knowledge, skills and attitudes in providing nutrition care has been provided above. This thesis also includes an evaluation of the place of nutrition care in medical education. Therefore, it is appropriate to investigate literature that reports the knowledge, skills and attitudes of medical students towards providing nutrition care.

## 2.15 Medical nutrition education

## Preface

Studies of medical students' nutrition knowledge reinforce the findings of those of GPs and suggest that neither medical students nor GPs have adequate nutrition knowledge (13, 16, 31, 32, 135, 139-141, 147, 160). Similarly, studies of medical students' nutrition knowledge endorse the findings from those of GPs insofar as students' perceived level of nutrition knowledge is insufficient for providing nutrition care to patients (13, 16, 31-33, 135, 139-141, 147, 160-162), and is therefore a fundamental cause of the lack of involvement by physicians in patient nutrition guidance (12, 33).

### 2.15.1 Medical students' nutrition knowledge

Medical students training in nutrition has been shown to be inadequate for many years (163). For example, a lack of nutrition knowledge was reported in a Scottish study involving clinical medical students and junior doctors in the 1980s (160). More recently in the 1990s, Hu et al., (162) surveyed senior medical students from nine medical colleges in Taiwan and reported that medical students' knowledge was not at the required standard to provide nutrition care to patients. Other recent studies in the USA, Canada and Croatia provide further evidence of inadequate nutrition education in medical training. Forster et al., (68) reported that first-to-

third year medical students' nutrition knowledge with regard to cardiovascular risk factors needed improving, and Makowske and Feinman (164) reported nutrition knowledge deficits in first-year medical students. Finally, a study by Gramlich et al., (58) reported dissatisfaction with nutrition education in undergraduate training.

Two studies have identified opportunities for improving nutrition knowledge. In the first, Carson et al., (15) reported that incorporating nutrition concepts and computer-based training into a clinical rotation improved nutrition knowledge. In the second, Jovanovic et al., (165) noted the importance of nutrition programmes for providing opportunities for students to learn about their own dietary and lifestyle behaviours, as a means to becoming more knowledgeable and convincing when counselling future patients.

Results reported from a USA study in the 1980s demonstrated the variation in nutrition education across medical schools (95)**.** This study involved 11 medical schools in the Southeast Regional Medical-Nutrition Education Network, and included students from three different training levels (entry, end of year two and middle of year four). These studies reinforce the need for nutrition to be included in undergraduate training and for recognised standards to be achieved. A summary of literature investigating the nutrition-related knowledge of medical students is presented in Table 2.6.

**Table 2.6 Summary of literature investigating the nutrition-related knowledge of medical students**

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| Jovanovic et al., 2011 [165] | Croatia | Determine medical students' nutrition **knowledge** regarding dietary factors and risk of cancer and cardiovascular disease (and its effect on their dietary intake). | Survey of 390 medical students in all years of undergraduate training, assessing diet and nutrition knowledge. 95.1% RR. | A higher dietary fibre intake among students was associated with lower obesity rates (and lower intake of energy, sweets, coffee and alcohol). |
| Gramlich et al., 2010[58] | Canada | Evaluate medical students' overall satisfaction with nutrition education **(knowledge)** in undergraduate training and perceived ability to counsel patients on the role of nutrition in heath maintenance. | A web-based survey of second- and third-year students from nine medical schools. Perceptions regarding content, time spent on, and preferred approach to nutrition education were assessed. | Many students were dissatisfied with the nutrition education received and their ability to provide nutrition counselling. |
| Makowske and Feinman, | USA | Assess first year medical students' | 105 of 111 first-year medical students were surveyed | Students' answers showed knowledge deficits in fundamental |

Table 2.6 Summary of literature investigating the nutrition-related knowledge of medical students continued

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| 2005[164] | | **knowledge** of nutrition and metabolism. | regarding nutrition and metabolism knowledge. 94.6% RR. | areas of nutrition. |
| Carson et al., 2002[15] | USA | Determine impact of administering a cardiovascular nutrition training module on nutrition **knowledge**, attitudes and self-efficacy of fourth-year medical students. | Nutrition knowledge, attitudes and self-efficacy were measured at the beginning and end of a 4-week ambulatory care rotation. | Incorporation of cardiovascular nutrition concepts during an ambulatory care rotation including the use of computer-based cases improved student knowledge and self-efficacy. |
| Foster et al., 2002[68] | USA | Assess medical students' readiness to engage in lifestyle counselling regarding nutrition, physical activity and health behaviours. | 290 first-to-third-year students completed a self-report survey of knowledge of risk factors for CVD, nutrition knowledge, beliefs about efficacy of physician advice, and attitudes toward lifestyle counselling and nutrition and physical activity. | Medical students have adequate **knowledge** of the risk factors for CVD such as poor diet, lack of exercise and obesity. Improved knowledge is required in areas of weight screening, nutrition and physical activity. Medical students believe it is within their role to counsel patients regarding lifestyle changes. |
| Hu et al., | Taiwan | Assess nutrition | National survey of 528 | Knowledge, attitudes and |

Table 2.6 Summary of literature investigating the nutrition-related knowledge of medical students continued

| Author and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| 1997[162] | | **knowledge**, attitudes and practices among senior medical students in Taiwan. | Taiwanese senior medical students. | practices of senior medical students suggest improved strategies for attaining nutrition competence are needed. |
| Weinsier et al., 1986[95] | USA | Investigate the relationship between medical schools' nutrition training programmes and medical student **knowledge**. | 236 senior students from 11 medical schools were surveyed to determine their perceived importance of nutrition topics for physicians. 40% RR. | Significant variation existed in the nutrition knowledge of the medical students. |
| Brett et al., 1986[160] | Scotland | Assess nutritional principles **(knowledge)** and attitudes to nutrition education in medical students and junior hospital doctors. | 80 clinical medical students and 40 junior doctors completed a 28-question survey (given without notice). | Both groups considered their education inadequate and almost all requested education in applied nutrition. |

*RR= Response Rate; CVD = Cardiovascular Disease*

### 2.15.2 Medical students' attitudes to nutrition care

The nutrition-related attitudes of medical students have been widely investigated, often along with their personal dietary experiences, using a variety of methods to demonstrate the relationship between nutrition knowledge and attitude. A study by Scott et al., (166) in the 1960s examined pre and post-clinical training changes in medical students' attitudes towards preventive care services aimed at maintaining health, and reported increased confidence in providing services in the post-clinical analysis. In a UK study from around the same time conducted by Brett et al., (160), students were found to have positive attitudes towards providing nutrition care by acknowledging their responsibility in counselling patients in diet and lifestyle changes and requesting education in applied nutrition (160).

In a study by Heimburger et al., (167) in the 1990s, first-year medical students' computer analysis of personal dietary patterns at the beginning and end of a course showed improved attitudes towards their own nutrition behaviours and demonstrated that dietary assessment is a useful tool for teaching clinical nutrition in medical schools. In a more recent study in 2004, Conroy et al., (168) reported that increasing nutrition education achieved through students' awareness of their personal nutrition habits improved attitudes and confidence in nutrition counselling. Carson et al., (15) reported that nutrition tuition during a clinical rotation increased students' knowledge and self-efficacy (attitude) in nutrition concepts. Foster et al., (68) assessed first and third-year medical students' knowledge of nutrition risk factors for CVD and reported that while students had adequate knowledge and believed it was within their role to counsel patients regarding lifestyle changes (attitude), they lacked the skills needed for nutrition screening. Another study in Taiwan by Hu et al., (162), that assessed nutrition knowledge and attitudes among senior medical students, suggested that better strategies aimed at improving confidence were needed.

Only one study has investigated gender differences in attitude towards nutrition care. In that study of first and fourth-year medical students, it was reported that females more positive attitudes towards nutrition than males were not moderated by medical school socialisation (169). Interestingly, a recent study by Kushner et al., (170) reported that students taking a Healthy Living unit, which required them to complete and evaluate a behaviour change plan, enabled students to practice strategies and skills and to experience the obstacles that exist to changing health behaviour.

These studies illustrate the importance of reinforcing nutrition care throughout medical training. Other studies show that without this reinforcement during training, the perceived relevance of nutrition counselling declines (171) after training (31-33). A summary of literature investigating the nutrition-related attitudes of medical students is presented in Table 2.7.

**Table 2.7 Summary of literature investigating the nutrition-related attitudes of students**

| Author name and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| Kushner et al., 2011[170] | USA | Describe an innovative approach to teaching medical students' principles and practice of health behaviour change and self-care using a behaviour change plan (BCP). | As part of a required Healthy Living unit, 343 students completed a BCP for selected personal habits. | Completing a BCP enabled students to practice strategies and skills and experience obstacles of changing health behaviour. |
| Conroy et al., 2004[168] | USA | Evaluate the impact of a preventive medicine and nutrition course in second-year medical students. | Survey of 30 control and 137 intervention students regarding diet and exercise habits and confidence (**attitude**) in ability to address diet and exercise issues pre- and post-course. | Students perceived improvements in their own dietary habits and greater confidence in diet and exercise counselling after the course. |
| Schulman and Karney, 2003[169] | USA | Assess gender differences in **attitude** towards nutrition therapy in first- and fourth-year medical students. | Computerised self-administered survey of 128 first- and fourth-year medical students' attitudes towards nutrition therapy. 55% RR. | Attitude differences exist between male and female medical students, which are not moderated by medical school socialisation. |

Table 2.7 Summary of literature investigating the nutrition-related attitudes of students continued

| Author name and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| Carson et al., 2002[15] | USA | Determine the impact of a cardiovascular nutrition module on knowledge, **attitudes** and self-efficacy of fourth-year medical students. | Nutrition knowledge, attitudes and self-efficacy were measured at the beginning and end of a 4-week ambulatory care rotation. | Incorporation of cardiovascular nutrition concepts in ambulatory care rotation, including the use of computer-based cases, improved student knowledge and self-efficacy. |
| Foster et al., 2002[68] | USA | Assess medical students' readiness **(attitude)** to engage in lifestyle counselling regarding nutrition, physical activity and health behaviours. | 290 first-to-third-year students completed a self-report survey of knowledge of risk factors for CVD, nutrition knowledge, beliefs about efficacy of physician advice, attitude toward lifestyle counselling and nutrition and physical activity. | Medical students have adequate knowledge about risk factors for CVD such as poor diet, lack of exercise and obesity. Improved knowledge is required in the areas of weight screening, nutrition and physical activity. Medical students believe it is within their role to counsel patients regarding lifestyle changes. |
| Hu et al., 1997[162] | Taiwan | Assess nutrition knowledge, **attitudes** and practices among senior medical students in Taiwan. | Written survey of 528 senior medical students in Taiwan. | Knowledge, attitudes and practices of senior medical students suggest improved strategies for nutrition competence are needed. |
| Heimburger et | USA | Assess dietary habits | Over 4 years, 616 medical | Dietary analysis is useful for |

Table 2.7 Summary of literature investigating the nutrition-related attitudes of students continued

| Author name and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| al., 1994[167] | | of first year medical students at the beginning of the course and for some also at the end of the course. | students completed a 24hour computer analysis of their diet. | teaching clinical nutrition in medical schools and can influence students to favourably alter **(attitude)** their dietary patterns. |
| Scott et al., 1986[166] | USA | Examine pre- and post-clinical training changes in **attitudes** toward preventive care services in medical students. | A cohort of 175 students completed the pre- and post-intervention survey at orientation and 30 months later. | Importance ratings for preventive care remained stable. Confidence in ability to provide services increased. |
| Brett et al., 1986[160] | Scotland | Assess nutritional principles and **attitudes** to nutrition education in medical students and junior hospital doctors. | 80 clinical medical students and 40 junior doctors completed a 28-question survey given without notice. | Both groups considered their teaching inadequate and almost all requested education in applied nutrition. |

*BCP = Behavioural Change Plan; RR = Response Rate; CVD = Cardiovascular Disease*

### 2.15.3 Medical students' nutrition skills

Competence in skills refers to the ability to execute a required task (123). It is important to distinguish between knowledge and skills: a person may possess knowledge about a skill, yet lack the ability to perform the task. Skills required for the effective provision of nutrition care includes an ability to identify patients who require nutrition care; that is, the ability to identify any patient who may experience improved health outcomes from improved nutrition behaviour. The competent provision of nutrition care may include skill with components of the dietetic nutrition care process, such as using standardised processes that reduce variation and provide greater predictability in terms of outcomes (172). Other skills recognised as contributing to the quality of nutrition care may include those needed for conducting motivational interviewing and counselling.

Medical students' skills in nutrition care have been investigated in two studies. In one study, students' perceptions of, and level of satisfaction with, their education in nutrition indicated dissatisfaction in their ability (skills) to provide appropriate nutrition counselling (58). In the second study, students reported improved self-efficacy when specific nutrition concepts and experiences were included in a clinical rotation (15). A summary of literature investigating the nutrition-related skills of medical students is presented in Table 2.8.

**Table 2.8 Summary of literature investigating the nutrition-related skills of medical students**

| Author name and year | Country | Aim | Method | Outcomes |
|---|---|---|---|---|
| Carson et al., 2002[15] | USA | Determine the impact of a cardiovascular nutrition module on nutrition knowledge, attitudes and self-efficacy **(skills)** of fourth-year medical students. | Nutrition knowledge, attitudes and self-efficacy were measured at the beginning and end of a 4-week ambulatory care rotation. | Incorporation of cardiovascular nutrition concepts in ambulatory care rotation, including the use of computer-based cases, improved student knowledge and self-efficacy. |
| Gramlich et al., 2010[58] | Canada | Evaluate medical school students' overall satisfaction with nutrition education in undergraduate training and their perceived ability **(skills)** to counsel patients on the role of nutrition. | A web-based survey of second- and third-year students from nine medical schools assessed student perceptions regarding the content, time spent on, and preferred approach to nutrition education. | Many students were dissatisfied with the nutrition education received and their ability to provide nutrition counselling. |

Clearly, research is required into the nutrition knowledge, skills and attitudes of New Zealand medical students to determine if they feel that they are adequately prepared to provide nutrition care. At this juncture, the literature review moves from a focus on international literature regarding nutrition in medical education to the literature of specific countries that have tertiary education systems, language of delivery and population health care needs comparable to those of New Zealand.

## 2.16 Nutrition in medical education in the USA

During the 20th century, advances in the science of nutrition offered compelling evidence of the importance of diet in the maintenance of health and in disease prevention and treatment (173). Recommendations were made in both the public and private sectors that doctors include nutritional assessments, counselling and therapy in the treatment of their patients (134, 173-180). At that time, medical schools included limited or no curriculum content relating to nutrition, and investigations consistently showed deficiencies in the medical school curricula and relative immobility in reforming nutrition education (134, 175, 181). Three examples illustrate the long history of the inadequacy of nutrition in medical education. First, a lack of nutrition education in medical schools was acknowledged by the American Medical Association as long ago as the 1950s (182). Secondly, in the landmark 1985 National Academy of Sciences (NAS) report, which was commissioned to evaluate the status of nutrition training and education of physicians, nutrition education programmes in USA medical schools were considered largely inadequate to meet the present and future demands of practicing physicians (134). Finally, prompted by the publication of the 1985 report, the requirement for nutrition to be included in medical education was mandated by the 1990 National Nutritional Monitoring and Related Research Act (183).

The NAS report included recommendations for a separate 25-hour nutrition course in medical education (134). Following the release of the NAS report, nutrition experts proposed core nutrition topic areas for medical students and doctors that built on those outlined in the report (134). These core nutrition topics were later incorporated into the Nutrition Curriculum Project, a national consensus report published in the 1990s by the American Medical Student Association (AMSA) (173).

Another important development in the inclusion of nutrition in medical education in the USA followed with the Nutrition Academic Awards (NAA), introduced across a network of medical schools to support the development of nutrition education programmes by the National Heart, Lung and Blood Institute (184). Twenty-one medical schools were funded from 1998 to 2005 to implement changes in the nutrition components of their medical education programmes (185). The emphasis of this curricula intervention was on preventing CVD, obesity, diabetes and other chronic diseases (186), and the curricula design varied among the medical schools (184). The Curriculum Committee of the NAA created a consensus document that outlined the knowledge, skills and attitude learning objectives for medical nutrition education with an emphasis on outcomes-based educational objectives, to be covered at undergraduate, graduate, postgraduate physician training programmes (185). Topics included in the NAA nutrition curriculum are presented in Table 2.9.

**Table 2.9 Topics deemed essential for developing physicians' competencies in nutrition (173)**

**Biochemistry, Physiology and Pathophysiology**

Deficiency of vitamins and minerals
Sources of antioxidants
Sources of $B^{12}$
Sources of calcium
Sources of complex carbohydrates
Sources of fats
Sources of fibre
Sources of iron
Sources of potassium
Sources of protein
Sources of sodium
Energy balance
Gastrointestinal tract: an overview
Deficiency of calories
Deficiencies of A,C, D, K, B complex
Deficiencies of Zn, Fe
Deficiency of protein
Criteria of an adequate diet
Hormonal control of nutrient metabolism
Lipids (including cholesterol)
Nutrition in immunity
Physiology of hunger and satiety
Water and electrolytes
Tract minerals

**Nutrition Assessment**
Body composition
Waist: ratio
Diet history taking
Nutrition physical examination
Biochemical examination
Anthropometrics
Assessment of vitamin intake and balance
Assessment of mineral intake and balance
Assessment of electrolyte intake and balance
Assessment of protein intake
Assessment of carbohydrate intake
Assessment of fat intake
Assessment of energy balance
Assessment of fibre intake
Osteoporosis
Obesity
Hypertension
Criteria for an adequate diet
National nutrition programmes and goals
Nutritional supplements
Low-sodium diet
Vegetarianism

**Nutrition and Disease**
Bulimia
Anorexia
Depression
Schizophrenia
Failure to thrive
Nutritional anaemias
Diabetes
Cancer
Hypertension

Osteoporosis
Hyperlipidaemia and atherosclerosis
Coronary artery an cerebrovascular disease
Reflux disease
Peptic ulcer disease
Water, electrolytes and acid-base balance
Hospital malnutrition
Surgery, trauma and infection
Food-borne illness
Drug-nutrient interactions
Allergies
Cystic fibrosis
Rheumatoid disease
Oral cavity

Inborn errors of metabolism

Acquired immunodeficiency syndrome

Tests of digestive function

**Nutritional Therapy**
Digestive enzyme therapy
The MD-RD team

Table 2.9 Topics deemed essential for developing physicians' competencies in nutrition (167) continued

| | |
|---|---|
| **Biochemistry, Physiology and Pathophysiology** | |
| Plotting growth | |
| **Diet and Prevention** | |
| Pregnancy | Nutritional supplements |
| Lactation | Alcohol abuse |
| Growth and Development | Enteral nutrition support |
| Geriatrics | Parenteral nutrition support |
| Cardiovascular disease | |
| Cancer | Writing nutrition prescription |
| | Writing nutrition referrals |
| | Cultural issues |

The nutrition educators at medical schools who were awarded the NAA embraced the opportunities provided by the new approaches to the nutrition education learning environment; it was demonstrated that nutrition education could be comprehensively integrated into medical training without the need for substantial time or financial input (187, 188). Some educators focused on the modes of delivery of nutrition education, including the integration of the nutrition curriculum across the pre-clinical and clinical years (187, 189), computer and web-based nutrition education (190-193), and case-based curricula (194). During the latter 1990s, in line with new approaches to medical education, many medical schools moved from a didactic lecture-style content towards case-based and computer-based approaches (188, 195, 196). The trend to de-emphasise lectures and emphasise problem-based learning has continued to gain ground (197). While the current trend among medical schools has been to integrate nutrition education into existing science and clinical nutrition courses and clerkship rotations (198), one medical school in the USA has integrated the principles of wellness, disease prevention and therapeutics and critical care with medical nutrition, taught within the existing courses of all four years of medical school use (195).

### 2.16.1 Time allocated to nutrition and adequacy of nutrition content

In the 1980s, the results from a joint survey conducted by the AMSA and the American Society of Clinical Nutrition (ASCN) of graduating senior AMSA members indicated that the overwhelming majority of students felt that the current medical education system failed to adequately train them in nutrition (174, 199).

In a study conducted in the 1980s, students were asked to evaluate medical curricula and consistently requested more hours devoted to nutrition (200). Further evidence for the dissatisfaction of graduating medical students came from the AMSA annual surveys of students at the conclusion of their training (196). For example, for the years 2000, 2001 and 2002, 64.4 percent, 56.3 percent and 53.5 percent of students indicated inadequate nutrition education, respectively (196).

The Association of American Medical College's data demonstrated the impact of NAA medical nutrition education programmes (201). During the years of NAA funding, the number of medical students' who perceived that nutrition-related instruction was adequate increased at a greater rate in NAA schools than in non-NAA schools (201). For example, from 2002–2004, the proportions of students at NAA schools who reported adequate nutrition instruction was greater (48%, 66% and 64%, respectively) that those at non-NAA schools (35%, 33% and 44%, respectively) (201). This demonstrates that NAA funded medical schools were effective with their innovative approaches to medical nutrition education.

The amount of time devoted to nutrition education has remained an issue. Since 2000, nation-wide surveys have been conducted regarding the nutrition education that students receive across their four years of medical training (197). The most recent survey showed that nutrition education continues to be very limited in most medical schools (197). For example,

at present, medical students receive on average 19.0 contact hours of required nutrition instruction in four years of medical school (197). This figure has gradually declined since the landmark 1985 NAS recommendation of a minimum of 25 hours of nutrition education (202). Lack of training appears to affect comfort and confidence in providing nutrition care to patients (70). This view has been endorsed by Adams et al., (203) who suggest that fewer than 25 hours of nutrition instruction is inadequate to cover the necessary content with regard to a knowledge base, confidence and clinical skills to identify the nutrition issues present in patients and to prescribe effective nutrition interventions for graduate medical students. There are limited data on the time devoted to nutrition in medical education in New Zealand. Clearly, the research from the USA indicates this is an area worthy of investigation.

In addition to the time devoted to nutrition education in the curriculum, recent evidence underscores the importance of medical educators' awareness and utilisation of current resources to inform and guide students in their appropriate use. Wong et al., (204) reported that while most educators consider nutrition to be an important component of medical practice, few provided feedback to students on this topic and many educators either neglected to reference or could not remember the nutrition guidelines used in patient care or while teaching.

### 2.16.2 Lifestyle courses

In the USA, a recent report from the Institute of Medicine (IOM) (205), highlighted the issue of doctor well-being and the need to teach medical students how to care for themselves. It appears that while medical students generally have better health behaviours that other adults, adjustment to the standards and expectations of medical school can lead to undesirable changes in these behaviours and lead to burnout (171, 206). Additional evidence that medical students need to know how to care for themselves came in response to a course that focused

on the impact of unhealthy behaviours on health and wellness, to increase students' understanding of the multiple factors that affect behaviour, in addition to providing the tools to facilitate patient behaviour change (207). In line with the IOM recommendations, nutrition is now a component of a lifestyle course related to medical student well-being at one university in the USA (36, 37, 170).

In lifestyle courses, medical students learn behaviour change skills and techniques to recognise the challenges inherent in changing personal behaviours; these skills can also be of use to their future patients (170). This is important, because when patients seek doctors' guidance about diet and the relationship between nutrition and disease, doctors can exert their influence as role models. This suggests that New Zealand medical students' perceptions of the impact of their nutrition medical education course on influencing personal eating habits and lifestyle behaviours should be investigated.

### 2.16.4 Current developments in contemporary undergraduate medical training

Many USA medical schools reportedly fail to prepare their graduates for the everyday challenges (197) including an ability to recognise the association between lifestyle and chronic disease, take a diet and exercise history and effectively intervene in promoting a healthy lifestyle (208). Resolving this disconnect is critical given that the majority of USA health care costs are spent on chronic diseases associated with health risk behaviours (209, 210). Many medical professional organisations recommend clinical practice guidelines that include dietary recommendations to avoid lifestyle chronic diseases. (211-216). There is a consistent theme between these medical organisations and government lifestyle recommendations with dietary guidelines: consume a healthy diet, exercise regularly, maintain a desired body weight, avoid smoking and drink in moderation (211-215, 217-219).

Therefore medical students need to receive nutrition education and be confident in their ability to counsel patients in nutrition and lifestyle so that as future doctors, they can assist patients implement these guidelines (208).

While acknowledging the factors contributing to the ongoing problems of nutrition in medical education, such as competing curricular requirements, lack of suitably qualified staff to teach nutrition and coordinate nutrition within the curriculum, recent literature demonstrates how learner-directed nutrition content can meet six of the Liaison Committee on Medical Education (LCME) accreditation standards (208). Using one of the standards as an example, 6.3 “Self-Directed and Life-Long Learning”, the standard states that: “The faculty of a medical school ensures that the medical curriculum includes self-directed learning experiences and time for independent study to allow for medical students to develop the skills for lifelong learning. Self-directed learning involves medical students’ self-assessment of learning needs; independent identification, analysis, and synthesis of relevant information; and appraisal of the credibility of information sources” (220). Nutrition education from “Medical Nutrition and Disease: A Case-Based Approach”, an electronic textbook (221) or “Nutrition in Medicine Modules”, an online nutrition curriculum (222) provide the content required to meet this standard, in addition to meeting NAA learning objectives. Both resources contain basic nutrition concepts to provide a foundation for reading the literature and for life-long learning, in addition to highlighting the rapidly expanding field of therapeutics that current medical students will need to understand to take advantage of (223-225). Hark et al., (208) also demonstrated how the other five LCME accreditation standards could be met using examples from nutrition education.

## 2.17 Nutrition in medical education in the UK

Historically, in the UK, there has been long-standing concern over the lack of an adequate level of nutrition knowledge within the medical profession (73). This was illustrated in the Black report on inequalities in health, which identified that a large part of the burden of ill health in the UK could be linked either directly or indirectly to nutritional considerations (226). At that time, the little education on nutrition provided in undergraduate or postgraduate curricula was rarely presented in a systematic way and was often not recognised as relevant or lacked coordination between the different levels of training (227). Most doctors who trained then readily acknowledged that they had little or no understanding and knowledge of nutrition and few had received any instruction in the area (73).

As in the USA, there is evidence of dissatisfaction among UK medical students, GPs and hospital doctors regarding both their undergraduate and postgraduate training in nutrition (13, 135, 160). The release of the government's white paper on this issue, "The Health of the Nation", and the consequent establishment of the Nutrition Task Force (NTF) to recommend the actions needed to measurably improve healthcare delivery, reinforced the need for nutrition education within the medical curriculum (73). The NTF had responsibility for investigating the training of health professionals in nutrition (73), and published the "Core Curriculum for Nutrition in the Education of Health Professionals" statement, which was intended for use by doctors and other allied health professionals during training (228). The learning outcomes for the nutrition curriculum are presented in Table 2.10, and Table 2.11 contains the content for nutrition education and training.

**Table 2.10 Core nutrition learning outcomes for health professionals' education (228)**

| |
|---|
| 1. Appreciate the importance and relevance of nutrition to the promotion of good health and the prevention and treatment of disease. |
| 2. Describe the basic scientific principles of human nutrition. |
| 3. Identify nutrition-related problems in individuals and in the community. |
| 4. Give consistent and sound dietary advice to people in an appropriate manner, and know when and where to refer to a State Registered Dietitian for more specific advice. |
| 5. Know and be able to explain the current dietary recommendations and the advantages of breast-feeding. |
| 6. Provide appropriate support and sound clinical nutritional support, and know when to and how to refer to a State Registered Dietitian or another specialist in clinical nutrition. |
| 7. Understand the relative costs and benefits of nutritional compared with other approaches to preventive and therapeutic care. |
| 8. Assess the validity of nutritional literature and nutritional reports in the media. |

**Table 2.11 Bullet-pointed content for nutrition education and training (228)**

| **Principles of nutritional science** |
|---|
| 1. Diets, foods and nutrients (substrates and cofactors). |
| 2. Metabolic demand, digestion and absorption, balance and turnover, physical activity, metabolic effects of excess, obesity. |
| 3. Requirements, essentiality, bioavailability, limiting nutrients, effects of nutritional status on biochemical and organ function. |
| 4. Adaptation to low nutrient intakes, body composition (form and function). |
| 5. Assessment of diet and nutritional status. |
| 6. Physiological mechanisms that determine appetite, sociological, psychological, economic and behavioural aspects of food choice. |

Table 2.11 Bullet-pointed content for nutrition education and training (222) continued

| **Public health nutrition** |
|---|
| 1. The average British diet, including subgroup differences (eg region, gender, ethnic origin), lifestyle, risk factors and epidemiology (socio-economic factors, smoking and activity). |
| 2. Pre-conception, pregnancy, breast-feeding, infant nutrition, growth and development, ageing. |
| 3. Dietary reference values, dietary recommendations and guidelines, diet and CHD and stroke, the health targets. |
| 4. Nutritional surveillance and identification of markers of nutritional status. |
| 5. Achieving change, education and motivation (educational resources, theory and skills). |
| 6. Food supply, monitoring, cost-benefit of nutritional interventions, legislation, food labelling and policy which affects food consumption. |
| **Clinical nutrition and nutritional support** |
| 1. Assessment of clinical and functional metabolic state, effect of functional state on nutritional intake and status, effect of status on clinical outcomes. |
| 2. Anorexia and starvation, response to injury, infection and stress. |
| 3. Altered nutritional requirements in relevant disease states, unusual requirements. |
| 4. General principles of nutritional support, routes of support. |
| 5. Basis of nutrition-related disease, therapeutic diets (diabetic, renal), weight reduction. |
| 6. Drug-nutrient interactions. |

*CHD = Coronary Heart Disease*

In the early 2000s, the General Medical Council (GMC) completed a landmark review of the structure and content of the undergraduate medical curriculum as part of a new approach to medical education (229). This document contains explicit reference to the need to include education in public health and the environmental determinants of wellbeing, such as diet and lifestyle, as core elements in medical training to enable graduates to deal with these fundamental elements of clinical practice (229). This highlighted the need to explore how nutrition education could be incorporated effectively into the undergraduate learning experience. Recent revisions of "Tomorrow's Doctors" have confirmed that it is within the core responsibilities of doctors to address nutrition in patient care (230, 231). The most recent GMC standards document includes two specific competencies relating to the role of nutrition: 1) the role of nutrition in health, and 2) assessment of nutrition and weight status (230). The GMC has also endorsed more expansive recommendations by the Academy Nutrition Group of the Academy of Medical Royal Colleges, including 17 comprehensive nutrition competencies based in four areas: 1) the role of nutrition in health; 2) the influence of disease on nutrition requirements; 3) nutritional risk and status and; 4) the provision of safe and competent nutrition care in a variety of care settings (232).

The quantity of nutrition content in medical education and the time devoted to nutrition education in the curriculum continues to be an issue. In a recent survey of deans and leading clinicians responsible for teaching nutrition in all UK medical schools, half the respondents indicated that their courses in nutrition were inadequate to prepare their students to become effective doctors (233). The time allocated to nutrition, defined specifically as that covering the interaction between diet and health (as opposed to merely basic physiology or biochemistry) was low; incomplete coverage of core areas was reported in 45 percent of courses (233), a finding supported by other studies (234). The UK literature generally supports the finding from the USA that senior medical students are less certain about the

importance of nutrition in their profession than are junior medical students (169). This may be attributed to the failure of senior clinicians to highlight the importance of nutrition to their students (234).

More recently, the GMC “Shape of Training” review has recommended discontinuing the pre-registration year (Foundation Year 1) after training and granting full registration to medical graduates at the point of graduation (235). Concurrent to this recommendation is the proposal to apply the existing non-European Union (EU) graduate licensing examination to all UK/EU graduates (235). The non-EU graduate licencing examination incorporates nutrition aspects under endocrinology, metabolism and gastroenterology. Adoption of this examination provides a new opportunity for nutrition to be integrated into the licensing assessment, with the potential to promote additional learning experiences throughout undergraduate medical education (235).

## 2.18 Graduate medical nutrition education in the USA

To maintain nutrition science competency, a longitudinal curriculum in nutrition is desirable, starting in medical school and then proceeding into postgraduate study and on through to CME (236). There are four certification boards in the area of nutrition and obesity in the US: the National Board of Nutritional Support Certification (NBNSC) examination for the American Society of Parenteral and Enteral Nutrition (ASPEN); the American Board of Physician Nutrition Specialist (ABPNS) examination for the Intersociety Professional Nutrition Education Consortium (IPNEC); the Certification Board for Nutrition Specialists (CBNS) for the American College of Nutrition (ACN); and the American Board of Obesity (ABOM) examination in obesity endorsed by 14 partner organisations (237). In addition, nutrition education has been required by the Residency Review Committee for Family Practice of the Accreditation Council for the Graduate Medical Education Program since

1982 (updated in 1989, 1995 and 2000) (70, 201). The Accreditation Council for Graduate Medical Education (ACGME) developed competencies for residency training that are comparable to the “staged” learning objectives of the NAA Nutrition Curriculum Guide for training physicians, allowing for continuity with this curriculum (238).

Despite these postgraduate requirements, nutrition education for physicians in the USA is limited in scope, quality and duration (239), and it is suggested that the field of nutrition will not mature until the American Board of Medical Specialists (ABMS) recognises nutritional medicine with speciality board certification (240). As a consequence, physicians frequently lack the substantive nutrition knowledge and counselling skills necessary to successfully guide their patients (236). Two recent studies illustrate gaps in postgraduate nutrition training. In the first study, gastroenterology fellows from multiple institutions reported that their nutrition knowledge was suboptimal, a finding that was confirmed by objective evaluation (143). In the second study, which included medical interns in a university-based training programme, only 14 percent of resident physicians believed they were adequately trained to provide nutritional counselling (129).

The ABMS “Maintenance of Certification” (MOC) now requires life-long learning, self-assessment and quality improvement to meet standards for the ongoing evaluation and certification of physicians (241, 242). Included in this evaluation are standards that require the ongoing measurement of six core competencies (241, 242). These core competencies include: 1) patients care; 2) interpersonal and communication skills; 3) professionalism; 4) practice-based learning; 5) systems- based practice and 6) medical knowledge. Many subspecialty boards, such as family medicine, internal medicine and preventive medicine should integrate nutrition into these core competencies and a “call for action” of these organisations was recently published (243). The foundation nutrition curriculum, even as a

self-study curriculum in undergraduate training, will facilitate life-long learning and quality patient care required for the MOC as well as encourage residency and sub-specialty training to integrate nutrition concepts and competencies (241-244).

Similar to the NIM undergraduate nutrition education, an online modular education programme, “Nutrition Education for Practicing Physicians” (NEPP), has been developed to support nutrition competency development for residents, fellows and other practicing physicians (35). Content for the NEPP is driven by publications defining the scope and competencies required by residents and fellows such as the NAA’s “Nutrition Curriculum Guide for Training Physicians’ (184), “The American Board of Physicians Nutrition Specialists Curriculum Guide” (245) and the “Physicians Curriculum in Clinical Nutrition: Primary Care” (246). The programme aims to give doctors the critical knowledge and practical skills required to improve the nutrition care provided to patients and ultimately to improve outcomes for patients with diseases and conditions that respond to dietary interventions (35). Limited literature is available on the use of this programme for graduate training.

## 2.19 Graduate medical nutrition education in the UK

Postgraduate medical education training and accreditation in the UK is the responsibility of the Royal Colleges, each of which manages a different aspect of higher specialist training. The Royal Colleges have the power, individually or collectively, to recognise the need for professional competence in nutrition and to see that an appropriate level of competence is assessed in a suitable way (73). While nutrition as a theme cuts across all specialties and should rightfully be the province of every clinician, it is often assumed to be addressed by others and, with no one taking ownership, becomes lost in both education and clinical practice (247).

Since the late 1990s, the Academy of Royal Colleges Intercollegiate group has run a 1-week nutrition foundation course, developed by the group, for all specialities (248). The course is evidence-based, and characterises what is fundamental and of general relevance and common to all doctors, regardless of speciality (73). While the Intercollegiate group's foundation course provides a beginning to graduate education in nutrition, participants themselves have identified the need for further training in order to become competent practitioners offering suitable advice and care (73).

The GMC curriculum for GPs is competence-based. While GP registrars must demonstrate nutrition knowledge related to patient management as a component of core competence, there is no specified nutrition syllabus (249). However, given recent literature regarding medical graduates inadequate nutrition preparation (233) and insufficient time devoted to nutrition education (234), GPs may still lack nutrition knowledge.

## 2.20 New Zealand GP training

In New Zealand, the Royal New Zealand College of General Practice (RNZCGP) provides training and ongoing professional development for GPs and sets standards for general practice (250). Since 2012, the GP curriculum has included a nutrition syllabus with specified competencies, which GP registrars are expected to develop throughout training (7). Competence assessment occurs throughout the 3-year training programme as well as through clinical and written examinations on completion of the first year of training and in summative assessment at the end of the third year of training (7). The nutrition syllabus competencies are presented in Table 2.12.

**Table 2.12 Royal New Zealand College of General Practitioners nutrition syllabus competencies (7)**

| **Throughout vocational training a registrar will develop a variety of competencies and be expected to:** |
|---|
| 1. Understand the central role of diet and nutrition in causing chronic diseases, excessive weight gain, obesity, type 2 diabetes, hypertension, CVD, cancer, dental diseases and osteoporosis. |
| *2.* Be confident in advising on nutritional requirements across different age spectrums, including infants, toddlers, teenagers, menstruating women, women pre-conception, during pregnancy and breast-feeding, vegetarians and older patients with an emphasis on encouraging nutrition from "food first." |
| 3. Be confident in appropriate investigation and management of nutritional requirements in specific conditions such as:<br>– chronic obstructive pulmonary disease<br>– renal impairment<br>– irritable bowel syndrome<br>– coeliac disease<br>– food allergy and food intolerance<br>– severe eczema<br>– migraine<br>– anorexia and bulimia<br>– malnutrition in the elderly<br>– osteoporosis |
| 4. Be able to describe:<br>– a cardioprotective diet<br>– diabetic diet<br>– a cholesterol lowering diet |
| 5. Be able to discuss weight loss strategies, provide dietary and lifestyle advice, discuss use of medications appropriately and safely, and know indications for weight loss surgery. 6. Know the criteria for access to prescription foods for patients on special authority, including infant formulas, gluten-free foods and nutritional supplements. |

Table 2.12 Royal New Zealand College of General Practitioners nutrition syllabus competencies (6) continued

| **Throughout vocational training a registrar will develop a variety of competencies and be expected to:** |
| --- |
| 6. Know the criteria for access to prescription foods for patients on special authority, including infant formulas, gluten-free foods. and nutritional supplements. |

*CVD = Cardiovascular Disease*

### 2.20.1 Continuing medical education

CME refers to educational activities undertaken to maintain, develop or increase knowledge, skills and professional performance and relationships (251).

New Zealand GPs undergo re-certification to maintain their vocational registration (252). Vocational registration is achieved through meeting the requirements to become a Fellow of the RCNZGP, followed by participation in a credit-based reaccreditation process known as a Maintenance of Professional Standards (MOPS) Programme (253). This credit-based system is drawn from two primary sources: practice review activities and CME (253). This may include reading and working through approved internet activities such as the British Medical Journal accredited learning modules for doctors (254).

For the most part, GPs are able to select the topics studied to meet learning needs, which in turn drives professional development (181). Topics are provided by the RNZCGP or an accredited provider such as a GPs' public health organisation (PHO). Regional differences may exist in the programmes available, making it difficult to determine the number or nutrition-related topics offered or their uptake. Evidence exists that GPs perceive CME as discouraging them from seeking broader information on lifestyle-related care (253). GPs also report that lifestyle-related care in general practice requires life-long learning, whereas CME activities assume that this is a segregated skill that can be easily learnt and mastered in a short period of time (252).

GPs tend to choose topics they are already familiar with and avoid those for which they lack knowledge and confidence (255). This limits the usefulness of CME in topics such as nutrition. Therefore, if CME is to increase the ability of GPs to provide nutrition care, GPs would need to actively choose to enrol and participate in such activities. However, it seems

that GP uptake of nutrition-specific CME is often low in comparison with other health professionals (251); with no systematic plan to ensure that nutrition information is included in relevant CME programmes, nutrition CME is often piecemeal and usually included along with other material and easily neglected (251).

A systematic plan for nutrition CME should include topics in nutrition research and instruction on how to critically evaluate new findings (236). In addition, the internet provides huge scope for the development of e-learning modules that can form part of nutrition CME (208). The European Society for Clinical Nutrition (ESCN) Long Life Learning programme in clinical nutrition and metabolism provides an example of "blended learning" using online modules, attendance at live courses, and successful completion of an examination, which together lead to a Diploma in Clinical Nutrition and Metabolism (256).

## 2.21 Summary of literature review

> *Future doctors expect to be trained in nutrition and intuitively seem to understand the importance of nutrition in clinical practice, but something happens during training, and students become disillusioned or misguided with their understanding of the importance of nutrition in clinical practice. (257).*

As the above quotation indicates, undergraduate nutrition education represents an important opportunity for the development of foundation knowledge, attitudes and skills; such skills are useful in medical training and beyond. In the USA, it took concerted proactive lobbying within the public and private sectors for nutrition education to become mandated in medical education (173-180). The National Nutrition Monitoring and Related Research Act of 1990 provided a mandate for nutrition education (183); however, given the lack of consensus on the best way to implement the medical nutrition curriculum (203), the period after introduction of the NAA became a time to experiment with approaches to the implementation

of nutrition education within the medical curriculum (238, 258). At the same time, a major review of the medical education curriculum (179) meant that nutrition educators have had to continue to develop innovative new ways to include nutrition education within the curriculum (258).

Nutrition may now be a component of lifestyle courses related to disease prevention and health promotion as well as physician well-being (36, 37, 170, 207). In addition, recognition is given to the importance of inter-professional nutrition education for effective collaboration in the provision of nutrition care (259). However, there are still concerns about the time devoted to nutrition education and the degree to which graduating students are provided with the knowledge base, attitudes and clinical skills necessary to identify and prescribe effective nutrition interventions and that this is likely to affect attitudes to practice (35, 260). There are also concerns regarding the provision of nutrition education in postgraduate training (35, 261), and these are likely to persist until nutrition is recognised with speciality board certification (35).

In the UK, it took an event of significant importance to recognise the need to include nutrition education in undergraduate medical training. This event was the GMC landmark review of undergraduate medical education in the early 2000s, entitled “Tomorrow’s Doctors” (229). The review highlighted the need to explore how nutrition education could be effectively incorporated into the undergraduate learning experience (229). Subsequent revisions of “Tomorrow’s Doctors” have confirmed that nutrition care is within the core responsibilities of doctors and includes two specific competencies related to the role of nutrition in health and nutritional assessment (230). Recently, the GMC has endorsed the Academy Nutrition Group of the Medical Royal Colleges’ 17 nutritional competencies based on nutrition in normal health, nutrition in public health, impact of nutrition on disease, impact

of disease on nutrition and nutritional assessment and nutritional care (232, 262). Postgraduate medical education is the responsibility of individual Royal Colleges and this group runs a course that includes nutrition information relevant to all specialist training (232, 248) although it is acknowledged that more nutrition education is required (73).

GPs experience barriers in providing nutrition care to patients, which include perceived lack of time (9, 12, 152), inadequate teaching materials (10, 12), lack of nutrition education (12, 13, 152), lack of knowledge (9, 12, 13 ), inadequate remuneration (9, 10, 12) and low self-efficacy/confidence (12). Nutrition care in the primary care setting should be an important focus given the high rate of chronic disease presentation in general practice and the influence of nutrition on health outcomes relating to chronic diseases (3, 263). Despite an international consensus that nutrition is an important component of chronic disease management (6), many barriers specific to practice settings require attention if GPs are to be supported in the provision of nutrition care to patients with chronic disease.

## 2.22 Conclusion

This literature review explored the topic of nutrition education provided in undergraduate training and to practicing GPs. It appears that the nutrition education received in undergraduate training does not provide an adequate foundation on which to extend knowledge in postgraduate training (203). Both medical students and GPs report a lack of nutrition knowledge that extends into postgraduate training (13, 139-141). However, a lack of recent studies of GPs' nutrition knowledge means that earlier findings may not be relevant in the current context. Further investigation of GPs' perceived nutrition knowledge and training is required.

GPs have positive attitudes towards nutrition care that may not be matched to their levels of competence in providing nutrition care (12). Consequently, GPs may not provide the nutrition care that may be appropriate (264). Therefore, research into the competence of New Zealand GPs in providing nutrition care is required. These investigations need to consider how to develop GPs' confidence within the context of the practice setting, which includes time available in the consultation (given that other treatment and advice may be required) and how to successfully engage in inter-professional collaboration. This research is important, given the increasing prevalence of chronic disease in New Zealand.

Thirdly, the attitudes of medical students towards nutrition care can be improved through the use of a variety of methods (187, 189, 191-194), although the perceived relevance of nutrition care declines in the absence of reinforcement (265). Successful methods for enhancing students' attitudes to nutrition care involve students using their own dietary experiences to demonstrate the relationship between nutrition knowledge and attitude, and can involve practicing strategies and skills, and experiencing the obstacles that exist in changing health behaviour (36, 37, 170, 266).

Fourthly, medical students perceive that they lack nutrition education and are dissatisfied with the level of education they receive (201). The foundational nutrition knowledge provided in undergraduate training may be insufficient to develop the competency needed to deliver an adequate level of care to patients (70, 203). Further exploration of the level of knowledge is required.

Finally, although the importance of nutrition in medical education is internationally recognised (134, 229) and is included to varying extents in medical curricula, the competing interests of other subjects and the time available for education mean that the place of nutrition

in the curriculum is by no means assured. In addition, there is still no consensus as to the best timing, content and assessment of nutrition education and competence within the curriculum (203).

# Chapter 3. Nutrition beyond drugs and devices: a review of the approaches to enhance the capacity of nutrition care provision by general practitioners

## Preface

Chapter 2, Section 2.12 highlighted the reported concern over the competence of GPs to provide nutrition care. The increasing prevalence of lifestyle-related chronic disease seen in general practice (263) and the increasing expectations for GPs to provide nutrition care (53) suggest that it is imperative that strategies are implemented to ensure that GPs provide this nutrition care. Internationally, various strategies have been implemented to enhance the nutrition care provided by GPs, although interventions to enhance this care in New Zealand have been limited. Given the growing relevance with Australian researchers a combined review of the appropriateness of international literature on the overall provision of nutrition care and approaches to enhance the capacity of nutrition care was undertaken.

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## Abstract

**Aim** The prevention and management of chronic disease is a key priority for primary care services. Nutrition-related care is an integral feature of several best practice guidelines for management of chronic disease in the general practice setting.

**Methods** This paper critically reviews the international literature to enhance the nutrition knowledge, skills and overall capacity of GPs to provide nutrition care using examples from nutrition in medical education, continuing medical education, GP-centred and practice-setting approaches.

**Results** The medical nutrition education approach provides an opportunity for linear translation between desired nutrition competencies and curriculum learning objectives, while that of continuing medical education allows for tailored nutrition education to increase nutrition competencies once a learning need is identified. The GP-centred approach focuses on the determinants of nutrition care provision by GPs as strategies for enhancing nutrition care delivery whereas, the practice setting approach aims to increase the nutrition related exposure to patients through avenues independent of the GP.

**Conclusion** In the Australian and New Zealand context, the potential appropriateness of these approaches requires judicious consideration, as it is unlikely that one approach will comprehensively address this topic. Ongoing multifaceted evaluation of each approach is needed to ensure enhancement of GPs capacity to provide nutrition care by increasing nutrition knowledge and skills, and improving patient health outcomes.

## Introduction

The prevention and management of chronic disease is a key priority for primary care services (268, 269). Latest health care expenditure records indicate that Australia spends more than $61billion per year on health care, with more than $49 billion attributable to chronic disease (270). A significant proportion of this cost is attributed to primary care services. Small changes in weight, blood lipid profiles and other patient outcomes at a population level have a significant impact on the burden of chronic disease (3). Improvements to nutrition and lifestyle factors have been shown to be more effective than medication for the management of some chronic diseases (57).

In recognition that nutrition is an essential feature of chronic disease prevention and management (271, 272), nutrition-related care is an integral feature of several best practice guidelines in the general practice setting (273, 274). The presentation of patients with chronic disease is increasing significantly in Australia and New Zealand, and currently more than 52 out of 100 consultations involve this care (275). General Practitioners (GPs) are seen as one of the most credible sources of nutrition information and patients with chronic disease expect nutrition care to be provided by their GP (276, 277). There is a disparity between patient expectations and experiences regarding nutrition care provision by GPs (83, 278). It is therefore very important that GPs are equipped with sufficient knowledge and skills to provide appropriate nutrition care to patients.

General Practitioners may not feel equipped to provide nutrition care because of the lack of recognition of nutrition as an important subject in medical school (11, 91). The majority of USA physicians have specifically reported that they did not receive adequate training in nutrition for chronic illness (147). Resident physicians also have deficits in knowledge of

nutrition assessment and nutrition for obesity, endocrine and cardiovascular diseases (129). Deficits in nutrition knowledge are likely to account for medical practitioners reporting reduced confidence and self-perceived proficiency in the provision of nutrition care (9, 109, 279). This is despite strong positive attitudes towards the importance of providing nutrition care to patients with chronic disease (9, 129).

It appears that the ability and capacity of GPs to provide nutrition care is not adequate given the increasing need for this care related to rising rates of chronic disease in the community (280). It is imperative that strategies are implemented to enhance the nutrition care delivery of GPs. Various approaches have been implemented internationally to address this need such as increasing medical nutrition education (177), continuing medical education (265), GP-centred initiatives (281) and practice-centred initiatives (272). However, interventions to enhance nutrition care delivery of GPs in Australia and New Zealand have been relatively limited.

The purpose of this paper is to critically review the international literature on approaches to enhance the nutrition knowledge, skills and overall capacity of GPs to provide nutrition care. Recommendations are then provided on the potential appropriateness of these approaches in an Australian and New Zealand context.

## Medical nutrition education approach

Medical nutrition education refers to the incorporation of nutrition concepts into pre-vocational medical degrees. The rationale for this approach is that greater coverage of nutrition topics in the medical curricula will enhance the nutrition-related competencies of graduating students. This approach utilises a linear progression from learning objectives, to assessment outcomes towards graduate competencies.

The importance of nutrition education has been recognised by numerous international institutions, which have implemented initiatives to enhance the quantity and quality of nutrition education during health professional training (187, 282, 283). In the United Kingdom, efforts to raise the profile of nutrition amongst health professionals culminated in the publication of a nutrition core curriculum in 1994 (228). A similar endorsement for the inclusion of nutrition education as a component of the curriculum for most health professionals came from the American Dietetic Association three years later (284).

Significant progress towards incorporation of medical nutrition education in the USA occurred through the establishment of the Nutrition Academic Award (NAA) in 1998 in response to a congressional mandate to increase the quantity of nutrition content in USA medical curricula (201). The NAA Curriculum Committee developed a consensus document of knowledge, skills and attitude learning objectives for medical nutrition education, with an emphasis on outcomes-based educational objectives for nutrition in medical education (285). The curriculum covers twenty-three nutrition topics, each with a stage-matched set of competencies for undergraduates, residents and specialists. Despite issues of curriculum crowding, twenty one USA-based universities received funding to develop and implement aspects of the NAA curriculum within their respective medical programmes (201). This initiative encouraged innovative and creative ways to integrate nutrition into medical curricula with the aim to establish nutrition as an integral component of medical education.

The concept of nutrition in medical education implies logical alignment of learning outcomes and student assessment to desired knowledge, skills and attitudes deemed as required for competent practice as a GP. This approach assumes that the competencies acquired throughout training will assure implementation of nutrition care, when appropriate. The barriers faced by GPs to providing nutrition care are multifaceted such as a perceived lack of

time during consultations and low patient compliance to nutrition advice (12, 91). Nutrition in medical education as an approach to increase nutrition care delivery by GPs does not address these practice-based barriers. Furthermore, it is difficult to evaluate the effectiveness of medical nutrition education (286). Robust evidence from longitudinal evaluation is required to appropriately assess whether the incorporation of nutrition into medical curricula results in increased delivery of nutrition care by GPs, and improved patient-related health outcomes.

Within the Australian and New Zealand context overall, chronic disease management by GPs is described through recognised competencies (287). These competencies do not contain nutrition concepts, nor are they structured in an appropriate format for alignment with medical education curricula or performance measurement. The following is an example from the Royal Australian College of General Practitioners (RACGP) Curriculum for Chronic Disease (287). This document states that GPs should be able to:

> *Demonstrate ability to identify and implement practical and pragmatic approaches to managing chronic diseases and co-morbidities in the general practice setting that take explicit account of the uncertainties and complexities across biopsychosocial domains.*

This statement does not allow for a clear pathway in the development of competency, or assessment of performance in structured learning. Clear pathways are integral to ensure validity of performance assessment, comparable curriculum design and appropriate interpretation by practitioners (288, 289). If the approach of medical nutrition education is undertaken in order to increase capacity of nutrition care delivery by GPs, redevelopment of prescribed competencies is required.

The nutrition competencies developed by the NAA are consistent with the recommended structure of medical competency statements (288) . Each of the twenty-three topics in the

NAA Curriculum Guide is separated into discrete knowledge, skills and attitude competencies deemed as required by medical students. For example, one knowledge objective is:

> *Describe the physiological mechanisms that relate hunger, satiety, and appetite to diet and physical exercise.*

This competency statement is designed in a format that can be utilised by medical institutions to appropriately inform medical curricula. This structured process of nutrition competency development relies on consensus surrounding the appropriate role of GPs in providing nutrition care to patients, which has not yet been reached in the Australian, and New Zealand setting. Therefore, further clarification of this role is required before development of prescribed nutrition competencies can be considered.

## CME approach

In most countries, GPs are required to undertake Continuing Medical Education (CME), which refers to educational activities to maintain, develop or increase knowledge, skills and professional performance and relationships (251). Topics studied for CME are mostly elective in nature, allowing for GPs to identify activities that meet their desired learning needs. These activities drive the professional development of GPs, and build on the formal education received during university study (181). Several formats are available for CME, including live presentations, web-based programs, CDs, audio-tapes and journal based activities (265). An example of a nutrition-specific CME activity is the Royal Australian College of General Practitioners (RACGP) accredited “Clinical Nutrition” module offered by Monash University, Australia. This online course provides GPs with a basic overview of nutrition care related to multiple common disease states as well as addressing part of the nutrition care process (290).

Due to the elective nature of CME topics, participating GPs represent a captive audience in the areas chosen to study. General Practitioners tend to pursue education around topics they are already confident with, whilst avoiding areas in which their knowledge and confidence are lacking (255). This potentially limits the capacity of CME to enhance competencies in areas of learning needs.

Uptake of nutrition-specific CME is often low amongst GPs, and much higher amongst allied health professionals (265). In order for nutrition CME to increase the capacity of GPs to provide nutrition care, GPs are required to actively choose to enroll and participate in such activities. A study of New Zealand GPs indicates that GPs perceive this nature of CME as discouraging from seeking broader information for lifestyle related care (253). In New Zealand, GPs also state that lifestyle-related care in general practice requires life-long learning, whereas CME activities infer that this is a segregated skill which can be easily learnt and mastered in a short period of time (252). The above CME example represents one of the few nutrition-specific activities available to Australian GPs. In New Zealand, CME topics are also mainly elective in nature. General Practitioners choose from topics provided by the Royal New Zealand College of General Practitioners (RNZCGP) or an accredited provider. Accredited providers CME programs, for example, from a Public Health Organization may differ from region to region. This makes it difficult to determine the number of nutrition-related topics offered or their uptake.

Although this approach is yet to be evaluated specifically, it is difficult to determine how CME would have a major impact on the nutrition care delivery by GPs due to the variable uptake of these activities. Some evidence suggests that attendance at a continuing education program in nutrition results in significantly higher opinions of the importance of nutrition (285). It also appears that higher opinions of nutrition are reflected in the quality of nutrition

care provided to patients (291). At present there is no evidence that this approach improves the long-term patient health outcomes after receiving nutrition care by GPs. Further evaluation of CME strategies on patient health outcomes is required.

## GP centred approach

General Practitioners are the primary facilitator of nutrition care delivery in the general practice setting (252, 292). The rationale for a GP-focused approach is that initiatives that directly facilitate GPs to provide nutrition care will enhance the rate and effectiveness of care provided. Most of this research has been conducted by the International Heelsum Collaboration, based in the Netherlands with findings presented at triennial Heelsum workshops. The overarching aim of the Heelsum workshops is to advocate for research and advancements that assist GPs to appropriately incorporate nutrition concepts during consultations (90). A wide range of interventions have occurred through this collaboration such as determining the barriers and driving forces for GPs instigating nutrition care (12), exploring communication styles of GPs providing nutrition care (293), and developing minimal intervention strategies for GPs to utilise in nutrition care delivery (294).

Many of the interventions implemented from this collaboration have demonstrated positive outcomes. For example, the identification of driving forces for nutrition care delivery by GPs has resulted in the development of strategies that exemplify these driving factors, such as the availability of tools to implement nutrition care. Following this, resources such as the Minimal Intervention Strategy relating to overweight and obesity have also been trialled, with plans for future implementation (294).

Patients place higher consideration on nutrition as an influence of health when compared to GPs (295). These insights have allowed intervention strategies to appropriately focus on the

GP-patient relationship, including recommended communication styles. For example, in recognition that patients perceive GPs as reliable and expert sources of nutrition information, it is recommended that GPs raise nutrition awareness relevant to and appropriate for patients' understanding of nutrition, and matched to patients' personal characteristics (296).

Interventions that target the determinants of nutrition care such as GP-perceived barriers, driving forces, communication styles and resources may result in short-term improvements to delivery due to the upstream focus of this approach. It should be noted that improvements to health outcomes of patients receiving this care have not been investigated. Additionally, an underlying notion of this approach is that current university training inadequately prepares GPs to competently provide effective nutrition care to patients (3). It would appear that constant intervention is required to increase the preparedness of GPs, inferring that this approach will not ultimately address the initial problem of inadequate competencies possessed by graduating GPs.

In Australia, the Lifescripts© program is an example of a strategy to facilitate GP-provision of nutrition care by providing care in a similar manner to prescription medication (297). Although this program is evidence-based and theoretically effective, it has not received positive evaluation due to minimal uptake by GPs (298). It is suggested that in Australia, GPs perceive barriers to providing nutrition care to be more excessive than driving forces, even with this resource to assist implementation (298). This suggests that despite positive outcomes of international approaches to enhance nutrition care provision by focusing on GPs, careful consideration is required prior to the development of any strategies in the Australian and New Zealand setting to ensure that they reflect that regional-specific nature of determinants of GP-facilitated care.

## Practice setting approach

Patients encounter a variety of health care messages and stimuli through the experience of consulting a GP within the practice setting. These interactions may not incur time spent with a GP. However the legitimisation and endorsement of health messages has been shown to be effective (299). A principal example of this is the interaction with public health material in the waiting room of a GP clinic, a setting in which patients prefer to receive health education to occupy their time (300). Although this approach does not necessarily encompass nutrition care provision by GPs, these interactions augment the potential level of nutrition-related care received by patients through interactions in the practice setting. Others also suggest that waiting room time for patients could be used for completing important goals such as a Stages of Changes questionnaire or allowing patients to play with interactive nutrition information modules on a computer (301).

The general practice setting has been a focus of many efforts to promote nutrition. Within this setting, patients may interact with many different health professionals, including practice nurses and allied health professionals. Although GPs are the primary providers of nutrition care, some practice settings utilise practise nurses in the provision of nutrition care (302). This indicates that the practice nurse can play an important role in advising patients about desirable dietary practices.

Additionally, referrals to dietitians are common in settings where dietitians are government funded or subsidised by insurance companies. Referral to a dietitian occurs when GPs or practice nurses do not perceive themselves as having the time, knowledge or skills for more detailed dietary counselling with patients (303, 304), or when there is the perception that patients are unable to wait for subsidised support (305).

In Australia, patients living with a chronic disease are eligible to receive up to five partially subsidised allied health professional consultations per calendar year as part of the Chronic Disease Management (CDM) policy (306). This system initiative requires GPs to facilitate the referral pathways available to patients, which can include nutrition care provision by Accredited Practising Dietitians (APDs). In the first five years of implementation, the number of APDs working in the general practice setting increased considerably (307), indicating a growth in the number of patients receiving nutrition care by APDs. However, this growth is slight when compared to the current rate of GP-provided nutrition care. Based on the number of full-time-equivalent APDs working in private practice settings, the maximum capacity for CDM nutrition consultations is approximately 630,000 per annum (298). As a comparison, GPs currently discuss nutrition concepts in approximately 7% of consultations, which equates to over 7.9 million occurrences per year (292). A review of the CDM program did not include a review of patient health outcomes (308), and patients still indicate a preference for the provision of nutrition care by GPs (71).

The foundation of this practice setting approach is the provision of nutrition care to patients in a supplementary manner. Although this approach encompasses interventions that have resulted in an increased provision of nutrition care to patients, minimal evaluations have demonstrated improvements in patient health outcomes. Evaluations should include a comparison of nutrition care provision by health professionals to GPs, along with the effectiveness of this advice on the long term care of patient outcomes. Objective evidence is also required to determine the long-term effects of patients interacting with nutrition information in the waiting room prior to GP consultations.

Despite significant investment in the provision of chronic disease management by allied health professionals, GPs continue to constitute the primary provider of nutrition care based

on a workforce capacity perspective. This indicates that approaches that focus on GPs as the providers of nutrition care may be required in the Australian and New Zealand settings.

## Conclusion

A variety of approaches exist which attempt to enhance the capacity of GPs to provide nutrition care. Each approach focuses on a different aspect of nutrition care delivery in the general practice setting. The medical nutrition education approach provides an opportunity for linear translation between desired nutrition competencies and curriculum learning objectives. However, redevelopment of prescribed nutrition competencies for Australian and New Zealand GPs is required before the implementation of this approach. The continuing medical education approach allows for tailored nutrition education to increase nutrition competencies once a learning need is identified. In spite of this, limited continuing education opportunities are available to GPs in Australia and New Zealand for nutrition. The GP-centred approach focuses on the determinants of nutrition care provision by GPs as strategies for enhancing nutrition care delivery. Although this approach demonstrates promising outcomes, it appears that constant intervention is required, inferring that this approach will not ultimately address the initial problem of inadequate competencies possessed by graduating GPs. The practice setting approach has been successful in increasing the nutrition related exposure to patients through avenues independent of the GP. At present, patients continue to indicate a preference for the provision of nutrition care by GPs, and evidence of long-term patient health outcomes is required.

It is important that judicious consideration be given to the international approaches prior to implementation in the Australian and New Zealand context, as it is unlikely that one approach will comprehensively address this topic. The need for ongoing multifaceted

evaluation is required to ensure that approaches to enhance the capacity of GPs to provide nutrition care not only increase nutrition knowledge and skills, but ultimately result in improved patient health outcomes.

## Commentary

Since publication of the paper, an increasing focus has been given to multidisciplinary approaches to patient care in tertiary and postgraduate education (259). The future impact of this focus may be that GPs perceive their role as co-ordinating patients nutrition care needs with health professionals able to provide this care, rather than provide nutrition care themselves.

# Chapter 4. New Zealand general practitioners' views on providing nutrition care to patients with chronic disease: a focus group study

## Preface

The outcomes of Study 1 suggest that, internationally, four approaches exist to enhance the capacity of GPs to provide nutrition care. The approaches include; primary medical education, continuing education, GP-centred and practice setting, with each approach focusing on a different aspect of care to enhance capacity. Careful consideration is required when deciding on which approach is best suited to meet the needs of a given country, and it is unlikely that one approach will adequately address this topic. It is also unclear which approaches would best suit the New Zealand context and ultimately enhance the nutrition care provided by New Zealand GPs.

The views of New Zealand GPs in providing nutrition care are unknown and are important to inform the best approach to support enhanced nutrition care. Specifically, GPs views on providing nutrition care, the perceived barriers to providing this care as well as GPs views regarding continuing nutrition education, and possible roles for other health professionals in providing nutrition care, need to be explored. In New Zealand, patients access health care via general practices, co-ordinated through public health organisations and funded through district health boards (309). Primary care covers a broad range of health and preventive services, including health education, counselling, disease prevention and screening (6). This means GPs are usually patients' initial point of primary care contact, and are ideally placed to address patients' health requirements (310).

A qualitative approach using focus groups was selected for Study 2. Focus groups use a facilitator to encourage small groups of participants, who share common characteristics or experiences, to discuss, explore and share their thoughts, ideas and perceptions about a topic (311). The interaction between the facilitator and the group members themselves provides a greater amount of in-depth information than would be obtained from many other research methods such a surveys (311). This makes focus groups the most appropriate method for this study (312).

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## Abstract

**Aim** Nutrition care refers to any practice conducted by health professionals to support patients improve their dietary intake. New Zealand GPs are expected to provide nutrition care to patients for prevention and management of chronic disease. This study explores New Zealand GPs opinions regarding provision of nutrition care to patients with chronic disease.

**Methods** An interpretive descriptive approach to qualitative research was conducted using seven semi-structured focus groups with 48 GPs in Auckland. Focus groups investigated how GPs felt about providing nutrition care; perceived barriers to, and support required for this care; the development of further nutrition knowledge and skills; and possible roles for Practices Nurses. Recorded interviews were transcribed verbatim and analysed using a thematic approach.

**Results** GPs indicated routine provision of basic nutrition care to patients with chronic disease, but perceived themselves as having limited capacity to provide nutrition care due to limited consultation time and nutrition competence. GPs felt they needed further information to provide culturally, socially and economically sensitive nutrition care. GPs displayed variable opinions on the benefits of developing their nutrition knowledge and skills, and the idea of Practice Nurses providing nutrition care.

**Conclusions** Despite perceiving that nutrition care is important for patients with chronic disease and facing barriers to providing nutrition care, GPs appear reluctant to further develop their knowledge and skills and for Practice Nurses to provide this care. Strategies to

enhance GPs' nutrition-related self-efficacy, nutrition cultural competence, and attitudes towards further training care appear warranted in New Zealand.

## Introduction

The prevalence of chronic disease is increasing worldwide and contributes significantly to morbidity and mortality (6). The WHO recognises the importance of nutrition in the prevention and management of chronic disease (6). In New Zealand, poor nutrition behaviour is estimated to contribute to approximately 9,000 deaths each year (3). Individualised nutrition care has the potential to significantly improve biomarkers associated with chronic disease (314). Nutrition care has previously been defined as any practice conducted by health professionals to improve the nutrition behaviour and subsequent health of patients (9).

In New Zealand, GPs are ideally placed to provide nutrition care to patients with chronic disease as they are the initial point of patient contact with medical services, provide care to 80% of the New Zealand adult population every year, (7) and are highly regarded by patients for nutrition care (70, 73, 315). GPs can elicit improvements in patients' nutrition behaviour when provided with a structured protocol for nutrition care (72). However, GPs require sufficient knowledge, skills and attitudes relating to nutrition in order to provide effective nutrition care in routine practice (7, 69).

International literature suggests that GPs experience numerous barriers to providing nutrition care to patients. These barriers include: perceived lack of time (9, 11, 12, 152), patient non-adherence (10-12), inadequate teaching materials (11, 152), lack of nutrition education (10-12), lack of knowledge (9-11, 13), inadequate remuneration (9, 11, 152) and low confidence (11). Notably, the primary health care context within countries is likely to influence these

barriers. In New Zealand, patients pay relatively high fees per consultation (316) and there is a relatively high ratio of patients to GPs compared with other countries (65). Therefore, New Zealand GPs are likely to face some unique barriers to providing nutrition care. This warrants investigation in order to support GPs in their role.

New Zealand GPs' views regarding the provision of nutrition care and support required for optimal delivery have not been documented. One study has demonstrated that New Zealand GPs feel confident to provide some aspects of nutrition care but are less confident with others (317). However, utilising a quantitative approach, it provided limited insight into why confidence to provide nutrition care is variable. Using a qualitative approach, another study reported that New Zealand GPs feel responsible for supporting patients in weight management, yet feel disempowered regarding their ability to carry this out (318). The study design allowed for deep insight into GPs' perceptions, which can inform future strategies to support GPs in their role. Our use of a qualitative approach to investigate GPs' perceptions of the provision of nutrition care for patients with chronic disease will similarly allow for deep insight which can inform future interventions. Therefore, the aim of this study was to explore New Zealand GPs' opinions regarding providing nutrition care to patients with chronic disease.

## Methods

This study utilised a qualitative design to produce basic thematic descriptions of experience in everyday terms (319, 320). The study was approved by the University of Auckland Ethics Committee (reference number 011080). The Royal New Zealand College of General Practitioners provided written endorsement of the study.

### Participant recruitment

Potential participants were New Zealand GPs who attended a monthly CME meeting arranged by four of Auckland's PHOs during February-April 2014. The Chief Executive Officers from five of Auckland's six PHOs were contacted regarding participation in this study and four responded. Clinical Advisors (CA) from these PHOs were emailed a letter introducing the study and outlining requirements for their GP members. Following a meeting between the CAs and the researchers, a CME meeting date was set. One month before the CME meeting, the CAs emailed a flyer to GPs to explain the purpose and format of the meeting. A reminder email was sent by the CA one week before the CME meeting. At the beginning of each meeting, GPs completed a questionnaire to assess their attitudes and confidence to provide nutrition care; and the results are reported elsewhere (317). GPs then participated in focus groups to explore opinions regarding providing nutrition care to patients with chronic disease. To facilitate manageable focus groups (<10 participants), some CME meetings were split into two groups. One PHO hosted one focus group, and three PHOs hosted two focus groups each. Participants from two of seven focus groups practised in central Auckland, including Waiheke Island; participants from three focus groups practised in south Auckland; and the remaining participants practised in east and central-east Auckland

respectively. At the conclusion of the focus groups, the lead researcher (JC) presented a short nutrition update to GPs.

**Data collection and interview design**

Data collection comprised seven focus groups using open-ended questions to guide discussions. Two trained facilitators, who were not part of the research team, conducted the discussions, following an identical format for all groups set up according to published guidelines (311, 321). Table 1 outlines each interview question and how it aligns with the study aims. The interview guide was developed following a review of published literature. Piloting of questions was conducted with three individuals from the potential participant pool. Following each interview, consultation was undertaken, between the lead researcher and the pilot participant, to ensure each question was comprehensive, understandable and appropriate to the investigative aims of this study. Data collection occurred until additional interviews did not reveal new information or perceptions from participants. As a result, an eighth focus group was not conducted. Focus groups were on average 64 minutes in length and interview data were recorded using a digital recording device. Written notes of responses were also taken by the lead researcher (JC) who observed one focus group from each PHO.

**Table 4.1: List of interview questions utilised in focus groups and rationale for inclusion**

| Interview questions | Rationale |
|---|---|
| How do you feel about GPs providing nutrition care to patients? | Explore GPs' perceptions for providing nutrition care. |
| What barriers do you see to GPs including nutrition in patient care? | Identify GPs' perceived barriers for providing nutrition care. |
| What support would be required for you to provide nutrition care in your practice? | Explore GPs' perceptions of the type of support required for providing nutrition care to patients. |
| How do you perceive GPs develop and extend skills related to the provision of nutrition care? | Explore GPs' perceptions for opportunities for professional development in providing nutrition care. |
| Describe your views on the possibility of overseeing other health professionals, such as Practice Nurses, to provide nutrition care. | Explore GPs' perceptions for overseeing Practice Nurses providing nutrition care. |

**Data analysis**

After each focus group, recorded interviews were transcribed verbatim by the lead researcher (JC). Data analysis was conducted using a thematic approach. One investigator (JC) manually coded the transcripts and grouped the codes into themes on the basis of recurrent and related ideas. Two investigators (JC and LB) independently reviewed the themes and identified common or dissident viewpoints. Discussions among the investigators continued until agreement was reached on the titles of themes and sub-themes and links between them. Indicative quotes from transcripts have been used to illustrate themes identified from the data.

**Results**

A total of 48 GPs from a potential pool of 199, from the four PHOs, participated in this study. The participants' general characteristics are reported in Table 2. The facilitators engaged with all participants and achieved robust discussion throughout the focus groups.

**Table 4.2: Demographic characteristics of GPs in each focus group (n= 48)**

| Focus Group | Gender (M, F) | Medical training location (Dom, Ovs) | Self-identified ethnicity (ENZ, Asn, PP, Oth) | Age (yrs) (Mean±SD) | Experience as GP (yrs) (Mean±SD) |
|---|---|---|---|---|---|
| Group 1 (n=6) | 4, 2 | 4, 2 | 3, 3, 0, 0 | 51±24.9 | 23±11.6 |
| Group 2 (n=5) | 2, 3 | 1, 5 | 4, 1, 0, 0 | 47±13.7 | 13±10.5 |
| Group 3 (n=9) | 7, 2 | 7, 2 | 2, 2, 1, 4 | 56±20.1 | 20±11.5 |
| Group 4 (n=8) | 5, 3 | 6, 2 | 1, 2, 1, 4 | 50±14.4 | 21±12.9 |
| Group 5 (n=7) | 6, 1 | 4, 3 | 2, 3, 2, 0 | 53±14.6 | 17±11.3 |
| Group 6 (n=6) | 4, 2 | 2, 4 | 5, 0, 0, 1 | 56±16.6 | 26±13.1 |
| Group 7 (n=7) | 4, 3 | 6, 1 | 4, 1, 0, 2 | 54±16.9 | 22±12.4 |
| **Total (n=48)** | **32, 16** | **30, 18** | **21, 12, 4, 11** | **53**±8.1 | **20±11.7** |

M: Male; F: Female; Dom: Domestic; Ovs: Overseas; ENZ: European New Zealander; Asn: Asian; PP: Pacific Peoples; Oth: Other

**Provision of nutrition care**

Participants reported that providing basic nutrition care for patients with chronic disease and day to day care was routine clinical practice and that some of them enjoyed providing this care.

> *Diet and exercise are part of the consultation. It's routine. (Group 3, male 52 years, GP 25 years)*
>
> *It's almost every patient that needs nutrition advice. We should know how to treat it…It's part of what we do every day. (Group 3, male 53 years, GP 27 years)*
>
> *I like giving dietary advice, trying to keep it simple. (Group 5, female, 64 years, GP 40 years)*

Participants felt that nutrition care is best provided when relevant to the presenting person, as when providing nutrition care to a patient who smokes, despite a family history of osteoporosis. With regard to patients with newly diagnosed chronic disease, participants like adding to patients' nutrition education during successive consultations to enable motivated patients to absorb and act on the nutrition care provided.

> *When a patient is newly diagnosed, start talking about it, they will take things in, they are motivated. Bring in other things at the same time. It is easier to bring up when there is an issue. (Group 2, male 45 years, GP 5 years)*

Some participants noted that patients' nutrition queries often related to information obtained from the media. While participants intuitively knew that what was proposed may not be beneficial or appropriate for the patient, they could not always give a reason why.

> *Patients asking weird questions about nutrition through the media: diets, gluten free, dairy free or a particular supplement. They are rubbish but I cannot explain why. I do not know enough about why they are not a good thing. (Group 1 female 48 years, GP 20 years)*

Participants perceived that changing dietary behaviours is challenging for patients but necessary given New Zealand's high rates of obesity and the relationship of obesity and lifestyle behaviours to chronic disease.

*With an obesity epidemic it is fundamental. We have to do something about it. With older obese patients it's really difficult. Problems with joints mean that they cannot exercise their body. They are locked into eating habits. (Group 6, male 67 years, GP 42 years)*

*Societal norms and practices are generally not the healthy options. Significant changes are required by patients to adopt Healthy Eating Guidelines… There is a shifting attitude of what is 'normal weight'. (Group 6, female, 49 years, GP 25 years)*

While participants acknowledged the value some patients place on nutrition care, they perceived others would question GPs wanting to introduce this into the consultation.

*Doctors don't underrate nutrition. Patients do. They don't come to the doctor to hear they need to do something about their food. They want something more scientific than that. (Group 7, female 50 years, GP 12 years)*

Participants acknowledged the social and cultural determinants of patients' dietary behaviours, as well as the importance of addressing these factors when providing nutrition care.

*We need to look at socioeconomic aspects of their life. Are they able to afford to spend money on themselves or do other family members have call on their income. Family members can influence their lifestyle, and we need to investigate ethnic and religious barriers to food eaten. (Group 3, male 53 years, GP 27 years)*

*Develop rapport with patients so that they trust and are prepared to listen to you before raising issues of food and lifestyle. They won't take it from me if I just attack them.*

*What do you know about my culture or social background? (Group 4, male 52 years, GP 20 years)*

*We need to have insight into culture, i.e. how to do it in a less energy dense way that is acceptable. (Group 5, male 55 years, GP 6 years)*

Some participants recognised that considerable gains could be achieved when patients with chronic disease received generalised nutrition care, but acknowledged that individualised, specific advice is necessary in certain situations. Others felt that there was a role in them providing basic nutrition care and directing patients to further support and further information.

*Big gains can be made from general advice. Specific advice may be needed for specific medical problems. (Group 7, female 50 years, GP 12 years)*

*We can help with the guidelines, then we need to refer to a dietitian or a website. (Group 3, male, 65 years, GP 10 years)*

**Time to provide nutrition care**

Lack of time was frequently cited as the main barrier to incorporating nutrition care to patients with chronic disease. Lack of time to provide nutrition care was attributed to limited time in consultations, patients' limited nutrition knowledge, and patients' expectations for the consultation.

*It is good to talk about nutrition, but how do you fit it in when people come with an agenda for a fifteen minute consult? You may have two minutes left after you have dealt with what they came for. (Group 1, male, 46 years, GP 20 years)*

*Patients have their own agenda. They come with their own list. They don't want the GP talking about subjects not relevant to the list….. It may not be what they are there for. (Group 1, male 57 years, GP 28 years)*

*We don't have time to be dietitians, we have time to say here's the healthy food website or a dietitian. (Group 1, male, 53 years, GP 25 years)*

While many participants expressed concern at the lack of time to provide nutrition care in consultations, others disagreed and reported that this viewpoint reflected a suboptimal attitude towards nutrition care.

*Time is an avoidance strategy from some doctors as they don't want to give advice. (Group 3, male, 52 years, GP 25 years)*

Despite an overall theme of limited time, participants recognised the opportunity to promote healthy nutrition behaviours through material in waiting rooms. This was seen as a productive use of time spent waiting before consultations.

*How do we make use of patient waiting time? How do we engage with patients prior to seeing them? Are they watching the TVs in the waiting room? We need to concentrate on making productive use of [waiting] time. (Group 4, male, 70 years, GP 43 years)*

**Competence to provide nutrition care**

Participants perceived that a lack of detailed nutrition knowledge hindered GPs' willingness and capacity to provide nutrition care for patients with chronic disease. Participants were also uncertain about how to improve their competence in providing nutrition care.

> *Happy, honoured to be asked to take a role, as it belies [sic] a trust. I encourage it in ongoing relationships, but recognise limits of time and knowledge. (Group 1, male, 53 years, GP 25 years)*

> *Lack of knowledge, which stems from lack of training. You learn from what you read in the patient information sheets. (Group 2, female, 54 years old, GP 25 years)*

> *GPs' knowledge is a barrier… we don't know where to go to get advice. (Group 3, male 65 years, GP 10 years)*

Participants had variable views regarding their development of competence in providing nutrition care to patients with chronic disease. Some participants saw potential personal benefits in further developing their competence in nutrition for patients with chronic disease, while others saw limited benefits in attending professional development courses.

> *We need brief bullet points. It is not necessary to go on long courses. (Group 7, male, 53 years, GP 25 years)*

> *As health professionals we can help with guidelines.....We are not trained. Going on a course or having a CME session does not make you an expert. Basic stuff is ok, but then flick on. (Group 6, male, 51 years, GP 12 years)*

Some participants sought to address their limited nutrition knowledge by utilising resources available in the practice, such as patient education material and other health professionals.

> *In our practice, we have a visiting dietitian in our rooms. She takes rehabilitation for patients with heart disease and diabetes. It's basic stuff and by sitting in on sessions, I absorbed the information and felt my confidence increase. Now I have reasonable knowledge. (Group 7, male, 53 years, GP 25 years)*

Participants expressed a need for readily usable tools to support the provision of nutrition care for patients with chronic disease.

> *We all need an evidence-based tool and a method of conveying nutrition information that is practical for us during consultations. Short, sharp and straight. It may be*

*attached to a pathway that this patient can go and see this person for an hour. (Group 6 male, 51 years, GP 12 years)*

*It would be good for doctors to have brief intervention knowledge at our fingertips. (Group 6 female, 51 years, GP 15 years)*

Some participants expressed the desire to have easy access to and collaborate with dietitians to provide nutrition care to patients with chronic disease. Participants felt that dietitians should be publically funded or employed by PHOs, as many patients were unable to afford to consult dietitians privately. However, other participants disagreed, and felt GPs should be the main nutrition care provider.

*I would like to see dietitians employed to help. Our PHO doesn't employ dietitians. It is unable to provide and patients cannot afford to see dietitians privately. (Group 4, male, 51 years, GP 20 years)*

*It would be a waste. We should be the provider [of nutrition care]. (Group 4, female, 53 years, GP 25 years)*

**GPs' views on the potential role of PNs in providing nutrition care**

Many participants perceived that PNs could provide nutrition care to patients with chronic disease as patients perceive them to be approachable and empathetic.

*Patients appreciate it when nurses talk to them in a way that they can understand. (Group 4 male, 53 years, GP 27 years)*

*Nurses can provide nutrition care if appropriately trained and supported with time. (Group 1, male, 46 years, GP 20 years)*

Participants had variable views on the autonomy that PNs should have in providing nutrition care for patients with chronic disease. Some participants felt that PNs, like doctors, should have nutrition knowledge and autonomy within the health care team.

*Doctors should know about nutrition as should nurses and they can be as autonomous as they feel competent in. (Group 1, male 57 years, GP 28 years)*

*They are part of the team, trust them, see them as equals. They have been to courses and are trained. (Group 7, male 53 years, GP 25 years)*

Other participants were less trusting of PNs to work autonomously and perceived the need to stay informed about the content of the nutrition care provided by PNs for patients with chronic disease.

> *We need to have a general idea of what they are telling patients. It is important that they are giving evidence-based information. They require formal education (Group 6, male 66 years, GP 42 years)*

> *Quality control is important. We need to sit in on sessions to see that the process is happening or the relevant nutrition education is given. (Group 5, male 47, GP 15 years).*

## Discussion

The purpose of this study was to explore GPs' opinions regarding providing nutrition care to patients with chronic disease. Overall, participants indicated routine provision of some nutrition care to patients. This was perceived as important, but challenging because of their limited nutrition education, limited time to provide nutrition care and patients' resistance to change. Participants reported a need for further resources that facilitate nutrition care for patients with chronic disease, and better access for patients to have publically funded alternatives for nutrition care. Participants had variable views regarding the benefits of further developing their nutrition competence.

The participants had variable views regarding the provision of nutrition care to patients with chronic disease, with two contrasting approaches to nutrition care apparent. Some GPs appeared genuinely interested in taking action to support patients with chronic disease to improve their nutrition behaviours, whereas others appeared less convinced that this was possible and worthwhile given time constraints in consultations. Variability in the nutrition care provided by GPs has also been reported in Australia as a result of direct observations of standard consultations (72). In the Australian study, general questions about a patient's diet occurred as frequently as routine clinical care practices, but less emphasis was given to social, cultural and economic determinants of patients' nutrition behaviours (72). Interestingly, the GPs in the present study acknowledged the broad social, cultural and economic determinants of patients' nutrition behaviours as well as the importance of addressing these factors when providing nutrition care. The contrast in these findings could be due to differences in study design rather than specific differences in the nutrition care practices of Australian and New Zealand GPs. Further research is needed to determine if the

country-specific context influences GPs' views about nutrition care and affects patient outcomes.

The GPs in this study reported the provision of basic nutrition care to patients. Limited provision of nutrition care by GPs has previously been associated with the treatment-focused nature of the primary care setting (322). In addition, nutrition has been identified as an important, yet mostly a superficially addressed component of health care in general practice (9). The findings of this study reflect international literature regarding doctors' provision of nutrition care. The two key barriers to GPs providing nutrition care for patients with chronic disease in this study - a lack of time and limited nutrition education - accord with previous investigations of doctors' provision of nutrition care in Australia, North America, Europe, and the United Kingdom (9-13, 152). The reported negative impact of limited nutrition education on GPs' confidence is consistent with literature from Australia, North America and the United Kingdom (9, 11, 135). This consistency suggests that New Zealand GPs' experiences are similar to their international counterparts, and the conclusions drawn from these studies are likely to be similar (153, 155). Specifically, New Zealand GPs are likely to be experiencing barriers that prevent effective provision of nutrition care when appropriate. These barriers include: lack of time (9, 11, 12, 152), patient non-adherence (10-12), inadequate teaching materials (11, 152) lack of nutrition education (10-12), lack of knowledge (9-11, 13), inadequate remuneration (9, 11, 152), and low confidence (11). This means that GPs are missing opportunities to enhance patients' nutrition behaviour and health outcomes (83).

Many GPs in this study perceived that they received inadequate nutrition education during undergraduate medical training, and that the relevance of nutrition was not recognised until

after graduation. The Royal New Zealand College of General Practitioners training programme introduced a nutrition syllabus in 2012, with competencies expected to be developed throughout three years of training (7). However, the participants in the present study graduated on average 20 years ago (see Table 2) when there was no specific nutrition syllabus. In an earlier study, New Zealand GPs reported that they require further education to help address government involvement in community nutrition (323). Interestingly, in a recent study of New Zealand GPs' self-perceived competence to provide nutrition care, the GPs with the greatest experience reported the most confidence to provide nutrition care (317). Clearly, a thorough understanding of GPs' previous nutrition education as well as practice experience is required to inform any initiatives aimed at enhancing the provision of nutrition care by GPs to patients with chronic disease. General Practitioners' lack of time to address nutrition care in standard visits could be addressed by using the free annual diabetes review consultation "Get Checked" (324). In addition, interdisciplinary approaches to nutrition care appear to be more successful than individual health care professional approaches (325, 326) and given GPs' detailed knowledge of patients' histories, they need to be an integral part of any approaches. Further research is required, in the New Zealand context, on interdisciplinary approaches to nutrition care for patients with chronic disease in the general practice setting.

Lack of tools and resources were perceived by participants as contributing to their limited capacity to provide nutrition care for patients with chronic disease. A potential tool to support New Zealand GPs to provide nutrition care is the 5A's – Ask, Assess, Advise, Agree and Arrange – used by GPs in the USA and Australia as a counselling model to encourage behaviour change among overweight and obese patients (327, 328). An earlier evaluation of the tool in the USA found that GPs regularly Ask and Advise, yet seldom Assess, Assist and Arrange when counselling patients (154). Recent research endorses the use of all 5A's to

maximise opportunities for GPs to support patients to change nutrition behaviour (329). Notably, the Ministry of Health has launched a pilot weight management programme for primary care, which uses a brief opportunistic intervention to help health professionals engage with patients with weight- or diet-related health issues (330).

Participants in this study reported variable views about the role of PNs in providing nutrition care to patients with chronic disease. Some participants supported the potential for patients to receive nutrition care from PNs, yet others questioned the adequacy of PNs' nutrition knowledge and competence to provide nutrition care. While some literature (261) echoes this belief, other evidence suggests that PNs can deliver health outcomes comparable to GPs for patients with chronic disease (331). Australian PNs perceive that their favourable attitudes to providing nutrition care (332) make them ideally placed to provide this care opportunistically, in addition to being highly trusted, approachable (333), and acceptable (332). Nevertheless, PNs recognise the need for additional training and education to enhance their effectiveness in this area of patient care (332, 333). Establishing nutrition curricular recommendations and core competencies in nurses' training could help to address GPs concerns regarding PNs' knowledge and competence to provide nutrition care (261). However, data from our study suggest possible resistance to PNs providing nutrition care to patients with chronic disease autonomously because the role of PNs in New Zealand is still developing (334). Investigations of the extent to which PNs currently provide nutrition care to patients with chronic disease and the effect of this care on patient outcomes are required in New Zealand.

Some participants in this study reported the need to have increased access to dietitians while others had variable views about the role of dietitians in providing nutrition care. Dietitians are

health professionals with expertise in nutrition care and may be more effective providing nutrition care than doctors (335). In New Zealand, there is support for increased numbers of dietitians in primary care to provide early nutrition intervention and beneficial patient outcomes in patients with chronic disease (8). If more dietitians are employed in primary care, there is potential to increase GPs' nutrition knowledge and practical application of specific nutrition advice (138). In addition to the support dietitians can offer GPs, evidence exists that lifestyle modification is greater if GPs and dietitians work together with individuals and families in their communities (325, 326, 336). There is a need to evaluate the feasibility and effect of dietitians working in primary care in collaboration with GPs to provide nutrition care to patients.

The present study has some limitations. Participation in the focus groups was based on self-selection. Views of the focus group participants may not represent other GPs' experience and perceptions of providing nutrition care to patients with chronic disease. The analysis also focused on manifest rather than latent meanings of the interview findings. The participant GPs were older and include fewer females than the national workforce (337). In addition, PNs were not involved in this study. Nevertheless, our findings indicate a need for further investigation of GPs' nutrition knowledge, confidence to provide nutrition care to patients with chronic disease and support for its delivery to improve patient outcomes.

In conclusion, the GPs in the present study reported providing basic nutrition care to patients with chronic disease, but experienced barriers consistent with international findings, including limited nutrition education and limited consultation time. GPs reported variable views about their own role in providing nutrition care, and the perceived role of PNs, suggesting that interventions to enhance the nutrition care for patients with chronic disease

provided to patients may need to be multifaceted in order to address a range of influencing factors. New approaches may be required for supporting GPs to provide nutrition care, which recognise variability in knowledge, perceived role and overall engagement in providing nutrition care to enhance the health of patients.

# Chapter 5. Nutrition guidelines in undergraduate curricula: a six country comparison

## Preface

The key findings from Study 2 were that GPs consider that they have insufficient time and lack an adequate nutrition education for providing nutrition care. These perceived barriers appear to prevent GPs from providing nutrition care and are consistent with those reported in the international literature (9-13, 152). Ultimately, this suggests that New Zealand GPs are missing an opportunity to positively influence patients' dietary behaviours and may not be providing nutrition care at optimal rates.

To investigate New Zealand GPs' perceived lack of nutrition education and low confidence in providing nutrition care, it was deemed important to determine whether nutrition education is included in undergraduate medical training and what requirements exist for this education. In New Zealand medical training, nutrition education takes place in the undergraduate setting. As undergraduate nutrition education is the main form of nutrition education GPs receive, the content and its placement in curricula are important in building competence in providing nutrition care. Furthermore, it was also deemed important to compare the current requirements for undergraduate nutrition education in New Zealand with those of other countries that have similar educational settings in order to gauge the appropriateness of these requirements, and inform any future changes in New Zealand.

Study 3 is a review of the undergraduate nutrition education requirements in New Zealand compared with those of five other countries. Prerequisites for those countries selected for comparison included having comparable tertiary education systems, similar continuing

medical education programmes, English language delivery, and broadly comparable healthcare needs of the population.

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## Abstract

**Aim** To assess nutrition curriculum guidelines for undergraduate medical education in the USA, Canada, the UK, Republic of Ireland, Australia and New Zealand to highlight potential opportunities for shared learning on advancement of nutrition in medical education.

**Method** A comprehensive list of professional bodies, councils, organisations and other groups relevant to education or nutrition was compiled for each country after a review of relevant white and grey literature. All documents that were published from 2000 onwards, and provided guidance on nutrition education within undergraduate medical education for one of the identified countries were included in the review. Each curriculum guideline was evaluated for (i) the organisation's or group's role in undergraduate medical education; (ii) extent of nutrition related recommendations; and (iii) mandatory implementation.

**Results** In the countries reviewed, a total of six nutrition-related curriculum guidelines were identified. All countries, aside from the Republic of Ireland, currently have externally visible curriculum guidelines to inform medical schools in undergraduate nutrition education, yet there is little evidence of mandatory enforcement. Curriculum guidelines predominantly focus on basic nutrition principles, nutrition assessment, role of nutrition in health, interdisciplinary teamwork and provision of nutrition counselling. Notable differences exist regarding the scope and detail of curriculum guidelines for the reviewed countries.

**Conclusions:** There are promising developments in nutrition curriculum guidelines for medical schools within the reviewed countries. Differences in the scope and detail of nutrition curriculum guidelines may influence the nutrition education provided to medical students, and the subsequent nutrition care provided by doctors in these countries. Consideration is required as to how to monitor and evaluate nutrition competence of doctors

in relation to routine healthcare practices, as well as the impact of their competency levels on patients' nutrition behaviour and health outcomes.

## Introduction

Undergraduate medical education aims to provide a foundation for the practice of junior doctors and for further training in any branch of medicine (339). Medical education curricula are continually reviewed to incorporate improvements in pedagogies and assessment, advancements in medical science, and future demands of the medical workforce. Medical schools may be informed by curriculum guidelines, but generally have relative autonomy to determine learning activities, assessments and end point competencies (339). Undergraduate curriculum guidelines are typically developed by professional associations or interest groups to have a specialised focus on an area of medicine or health (for example palliative care (340), psychology (341), and provide an indication of the competence of graduating medical students in a given area.

Advancements in undergraduate curriculum guidelines have occurred internationally in the field of nutrition, following reiteration that it is within the responsibility of doctors to address nutrition-related issues concerning patients and the public (231). Nutrition curriculum guidelines stem from the recognised importance of nutrition in optimal health (2), and widespread reports of insufficient nutrition education during medical training (35, 227, 342). The expectation on doctors to provide nutrition care is increasing due to the rising prevalence of nutrition-related disease (2) and patients' preference to receive nutrition care from doctors rather than other health professionals (72). In order to provide effective nutrition care, doctors need knowledge of basic sciences related to nutrition; skills in nutritional assessment and counselling; and attitudes that are conducive to providing nutrition care when appropriate (69). In recognition of the role of nutrition in optimal health (2), a range of nutrition

curriculum guidelines have been developed in the past two decades and generally focus on issues of clinical nutrition, under-nutrition and over-nutrition across all age groups (173, 262, 343). Collectively, these guidelines represent opportunities for shared learning among comparable countries to progress the advancement of nutrition in undergraduate medical education.

Shared learning in medical education is facilitated through comparable tertiary education systems, CME, language of delivery and healthcare needs of populations. The USA, Canada, UK, Republic of Ireland, Australia and New Zealand are comparable in these key areas, and may therefore be expected to have similar nutrition curriculum guidelines. Of note, an 'International Summit' on medical nutrition education within these six countries will be hosted by the Need for Nutrition Education/Innovation Programme (NNEdPro) in Cambridge UK, in 2015 (344). The purpose of the summit is to: (i) share information on the current state of medical nutrition education in each country; (ii) identify shared needs in medical nutrition education; (iii) showcase examples of transferrable models of nutrition education; and (iv) identify opportunities for joint strategies in medical nutrition education. As a forerunner to the summit, an investigation of similarities and differences among existing guidelines for these countries may inform the future development of national or international guidelines in medical nutrition education, along with strategies to support doctors in the provision of nutrition care to patients. Therefore, the aim of this review was to assess, compare and contrast existing nutrition curriculum guidelines for undergraduate medical education in the USA, Canada, UK, Republic of Ireland, Australia and New Zealand to highlight potential opportunities for shared learning on advancement of nutrition in medical education.

## Methods

This review utilised a systematic approach to identify undergraduate nutrition curriculum guidelines from the USA, Canada, UK, Ireland, Australia and New Zealand. A comprehensive list of professional bodies, councils, organisations and other groups relevant to education or nutrition was compiled for each country after a review of relevant literature. The literature included peer reviewed journal articles (white literature) and reports from professional organisation websites (grey literature). Databases used included Medline® and PubMed using the search terms "nutrition curriculum" and "undergraduate medical nutrition education" and "curriculum policy". All documents that were published from 2000 onwards, and provided guidance on nutrition education within undergraduate medical education for one of the identified countries were included in the review. Each curriculum guideline was evaluated for (i) the organisation's or group's role in undergraduate medical education; (ii) extent of nutrition related recommendations; and (iii) mandatory implementation. Countries were grouped according to commonalities in geographical location, medical education accreditation and reciprocity between nations. Information on nutrition curriculum guidelines were extracted independently by two reviewers (JC and LB) and disagreements were resolved through consultative and iterative discussion amongst authors.

## Results

Curriculum guidelines from nine committees were found. Three curriculum guidelines were not assessed because updated versions have been published since 2000. Table 5.1 presents six curriculum guidelines developed to inform medical schools regarding undergraduate nutrition education.

**Table 5.1 Curriculum guidelines that aim to inform medical schools regarding nutrition education in, the USA, Canada, the United Kingdom, Republic of Ireland, Australia, New Zealand**

| Country | Year of Publication | Organization/ Group | Organization/Group Role | Title | Recommendation | Mandatory enforcement |
|---|---|---|---|---|---|---|
| USA & Canada | 2007 | Association of American Medical Colleges | Provide guidance on all curriculum content areas of undergraduate medical education | *Tomorrow's Doctors, Tomorrow's Cures(345)* | Six competencies required by graduating medical students on 1) physiology of diet and hunger; 2) basic principles of nutrition; 3) weight management; 4) body weight assessment; 5) socio-cultural factors influencing dietary intake; and 6) overeating and portion sizes. | No, but endorsed by accrediting body, LCME |
| | 2002 | Curriculum Committee of the Nutrition Academic Awards Program | Nutrition special interest group promoting nutrition within medical education | *Nutrition Curriculum Guide for Training Physicians: Practice Behavior Skills and Attitudes Across the Curriculum(343)* | A total of 23 nutrition content areas grouped as practice behaviour skills, nutrition basics, lifespan, cardiovascular system, metabolic/endocrine systems, other organ systems, and other areas. Each content area includes 'staged' learning objectives for knowledge, attitudes and practice behaviour skills for medical students, residents and clinical faculty. | No |

Table 5.1 Curriculum guidelines that aim to inform medical schools regarding nutrition education in, the USA, Canada, the United Kingdom, Republic of Ireland, Australia, New Zealand continued

| Country | Year of Publication | Organization/ Group | Organization/Group Role | Title | Recommendation | Mandatory enforcement |
|---|---|---|---|---|---|---|
| UK | 2013 | Academy of Medical Royal Colleges Academy Nutrition Group | Nutrition special interest group formed within the Academy of Medical Royal Colleges | *UK Undergraduate Curriculum in Nutrition(262)* | A total of 17 competencies required by graduating medical students based on four areas 1) role of nutrition in health; 2) influence of disease on nutrition requirements; 3) nutritional risk and status; 4) provision of safe and competent nutrition care in a variety of health care settings. | No, but endorsed by accrediting body, GMC |
| | 2009 | GMC (accreditation body for UK medical schools) | Provide guidance on all curriculum content areas of undergraduate medical education | *Tomorrows Doctors Outcomes and Standards for Undergraduate Medical Education(230)* | Two competencies required by graduating medical students on 1) the role of nutrition in health; and 2) assessment of nutrition and weight status. | Yes, through accreditation of medical schools |
| Australia and New Zealand | 2013 | Deakin University Strategic Teaching and Learning Grant steering committee | Nutrition special interest group promoting nutrition within medical education | *Nutrition Knowledge and Competency Framework for Medical Graduates* (Draft for Consultation)*(21)* | Nine competencies required by graduating medical students on 1) basic principles of nutrition; 2) role of nutrition in health; 3) evidence-based nutrition approaches; 4) sociocultural factors influencing dietary intake; 5) nutrition risk assessment; 6) critical analysis of nutrition evidence; 7) basic nutrition care ; 8) ethical nutrition care; and 9) team-based nutrition care. | No |

Table 5.1 Curriculum guidelines that aim to inform medical schools regarding nutrition education in, the USA, Canada, the United Kingdom, Republic of Ireland, Australia, New Zealand continued

| Country | Year of Publication | Organization/ Group | Organization/Group Role | Title | Recommendation | Mandatory enforcement |
|---|---|---|---|---|---|---|
| | 2012 | Medical Deans Australia and New Zealand | Medical education special interest group promoting national standardised assessment | *Medical Graduate Competency Framework Stage 2 Final Report(346)* | 1 competency required by medical students on body weight assessment. | No |

*Abbreviations: LCME, Liaison Committee on Medical Education; General Medical Council.*

## USA and Canada

Standards for medical education in both the USA and Canada are set by the Liaison Committee on Medical Education (LCME). Medical schools must be accredited by the LCME, and are informed by a series of curriculum guidelines developed and published by the Association of American Medical Colleges (AAMC) under the generic heading “Tomorrow’s Doctors, Tomorrow’s Cures” (345). Nutrition concepts are a key focus of one set of guidelines for the prevention and treatment of overweight and obesity, including six nutrition knowledge and assessment competencies (345).

In addition to the AAMC guidelines, other guidelines regarding medical nutrition education exist in the USA. The importance of enhancing medical nutrition education was first identified at a national level in 1985 (134), reinforced in 1990 (183), and supported by the American Medical Student Association in 1996 (173). These milestones culminated in the formation of the Nutrition Academic Awards (NAA) from 1998-2005. The aim of the NAA was to improve nutrition education for medical students (184), and included the development of a nutrition curriculum guide (343). The curriculum guide includes twenty three content areas with learning objectives for knowledge, attitudes and practice behaviour skills across medical specialties. Each objective is “staged” for medical students, residents and clinical faculty respectively. Concurrent to these events, expert nutrition interest groups reviewed and updated the US Medical Licencing Examination (USMLE) between 1997 and 2006 to increase the quantity and appropriateness of items included in the nutrition subscore for USMLE Step 1, 2 and 3 examinations (282).

Two recent initiatives illustrate how the inclusion of nutrition in medical education continues to develop in the USA. In 2012, the National Heart, Lung and Blood Institute convened a group of interdisciplinary nutrition education experts to develop proactive approaches to

nutrition education for health professionals (342). In addition, in 2013 the New York Academy of Sciences convened a workshop to discuss reforming nutrition science curricula throughout medical training, including 13 presentations by leading experts in medical nutrition education (347).

## UK and Republic of Ireland

Standards for medical education in the United Kingdom are set by the GMC. The GMC determines standards for knowledge, skills and behaviours that graduating medical students are required to demonstrate. Medical schools are accredited by the GMC, and are informed by the curriculum guidelines "Tomorrow's Doctors': Outcomes and Standards for Undergraduate Medical Education." (230). The most recent edition (2009) includes two specific competencies relating to the role of nutrition in health and nutritional assessment. The GMC has also endorsed more expansive recommendations by the Academy Nutrition Group under the Academy of Medical Royal Colleges (UK and Ireland), which includes seventeen comprehensive nutrition competencies based on nutrition in normal health, nutrition in public health, impact of nutrition on disease, impact of disease on nutrition, nutritional assessment and nutrition care (262).

Standards for medical education in the Republic of Ireland are set by The Medical Council. The Medical Council utilise the World Federation for Medical Education's (WFME) Standards in Basic Medical Education (348). These standards do not specify requirements for nutrition education, and no other undergraduate nutrition guidelines have been identified.

## Australia and New Zealand

Standards for medical education in Australia and New Zealand are set by the Australian Medical Council (AMC). Australian and New Zealand medical schools are accredited by the

AMC, and are informed by AMC curriculum guidelines (19). Notably, the ninety curriculum guidelines of the AMC do not include specific nutrition competencies, although they do stipulate broad competencies involving common and important conditions, population health and clinical and professional skills (19). The Medical Deans Australia and New Zealand completed a competencies project in 2014 to inform all medical schools in undergraduate education (346). Nutrition is briefly mentioned within one attribute and related learning outcome for the management of common health conditions, as well as within the procedural skills recommended for assessing nutrition-related clinical conditions - specifically, measuring height, weight, and body mass index of adults and children. The proposed assessment items (e.g. Objective Structured Clinical Examinations, (OSCEs) do not specifically mention nutrition-related issues commonly seen in practice e.g. malnutrition, lifestyle-related chronic disease and obesity, highlighting opportunity for further incorporation of nutrition-related issues (e.g. as cases and stations in OSCEs).

Recently, a curriculum framework to inform Australian medical schools in nutrition education was developed. The framework outlines four nutrition knowledge goals and five nutrition skill goals for medical students, as well as associated learning outcomes. The framework is aligned with the competencies developed by the Medical Deans Australia and New Zealand (21), and signifies ongoing work in this area.

## Discussion

This paper assessed nutrition curriculum guidelines for undergraduate medical education in the USA, Canada, the UK, Republic of Ireland, Australia and New Zealand to highlight potential opportunities for shared learning on advancement of nutrition in medical education. Overall, promising developments in nutrition guidelines for medical schools have taken place within the countries reviewed. Most countries currently have curriculum guidelines to inform

medical schools in nutrition education, which generally focus on basic nutrition principles, nutrition assessment, the role of nutrition in health, interdisciplinary teamwork in nutrition and provision of nutrition counselling.

There are notable differences among countries regarding the recommendations for nutrition education. For example, the curriculum guidelines in the USA have evolved to be prescriptive and detailed, whereas the standards of the WFME used in the Republic of Ireland do not specify any nutrition-related recommendations for medical education. The detailed and extensive USA curriculums are a strength, allowing for specified competency assessment. In contrast, lack of specified competencies in the WFME standards diminishes the importance placed on medical nutrition and its application to patient care (96).

There are also notable differences in the expression of curriculum guidelines among countries. For example, the Australia and New Zealand nutrition curriculum framework specifies that all medical graduates should be able to identify nutritional risk, deficits and excesses (349), which is likely to encompass many components, including nutrition screening, anthropometric assessment and dietary intake assessment. This broad approach is a strength of the Australia and New Zealand draft nutrition curriculum framework (349). In contrast, the UK and USA curriculum guidelines articulate some specific skills in body weight assessment, which may preclude consideration of other assessment components essential to providing competent and safe nutrition care to patients (231, 262, 343). Lack of clarity in recommendations and implicit assumptions of skills may lead to confusion in translating curriculum guidelines into curriculum content. This could be addressed by standardised assessment of competencies. Currently, the number of specific nutrition competencies assessed using OSCEs is limited by the use of standardised patients. However, the development of online assessment methods with interactive exercises, gaming

environments and virtual patient encounters to provide reproducible standardised results are becoming available and could be used in the six countries (259).

At present, the only mandated nutrition-related curriculum guidelines for the reviewed countries are from the GMCs in the UK, which occurs through the accreditation of medical schools (350). The GMC have also endorsed, but not mandated, the nutrition recommendations of the Academy of Medical Royal Colleges (262). Similarly, in the USA, the LCME have endorsed, but not mandated, the nutrition recommendations of the Association of the American Medical Colleges (345). Lack of mandatory enforcement means that guidelines may not be incorporated in a consistent manner at medical schools within a country, limiting assumptions about the nutrition competence of doctors based on the doctors' country of origin. Lack of mandatory enforcement also illustrates a likely initial challenge to achieving a common nutrition curriculum across all reviewed countries. Agreement by all six countries would be required for the development of a generic nutrition curriculum that would enable each country to incorporate its own cultural identity; this would be followed by curriculum accreditation by the respective medical education regulatory organisations.

The USA is the only country among the six countries reviewed that mandates a national examination for medical licence. This examination includes nutrition-related items. In the UK, the GMC "Shape of Training" review has recommended discontinuing the pre-registration year (Foundation Year 1) after training and granting full registration at the point of graduation (235). Currently, there is a growing lobby to apply the existing non-European Union (EU) graduate licensing examination to all UK/EU graduates, which incorporates nutrition aspects under endocrinology, metabolism and gastroenterology. This poses a new opportunity for nutrition to be integrated into the licensing assessment, and may subsequently

promote additional learning experiences throughout undergraduate medical education in these countries (235).

Consideration is required as to the means by which medical schools measure the nutrition competence of students. While some components of the nutrition guidelines are discrete and easily measured, such as knowledge of energy content of macronutrients, others require ongoing development, such as nutrition counselling skills. Effective nutrition counselling by doctors is ideally measured through improvements in patients' dietary intake (315), and consequent improvements in health outcomes; both of which are challenging to measure as one assessment item. It is therefore important that medical graduates continue to develop their nutrition competence in postgraduate training and in practice.

The importance of interprofessional health education has been recognised at a global level (6, 259). Nutrition curriculum guidelines from the USA, Australia and New Zealand include specific goals in developing competence within interprofessional teams (72, 347). A weakness in the UK curriculum guidelines is that similar goals are not included, suggesting that doctors from this country may require additional support to effectively work in interprofessional teams to appropriately address nutrition in patient care. There are ongoing activities in the promotion of nutrition competence within the evolving curricula of health care professionals (340), which represent a time of opportunity for nutrition education within medical curricula (259) and would need to be addressed if a common nutrition curricula is to be adopted.

Multinational workforces have the potential to influence the nutrition competencies of doctors within a given country. For example, in New Zealand, over 52% of registered doctors obtained their primary medical qualification overseas, with high migration from the UK (23% of registered doctors), South Africa (5% of registered doctors), India (3% of registered

doctors), and Sri Lanka (1% of registered doctors) (351). For doctors who come from the countries reviewed in this paper a “Competent Authority” pathway exists, where doctors are presumed to have equivalent knowledge and skills and are not required to sit an examination (351). However, many doctors migrate from other countries where there are clear differences in education, language and health needs (351). This indicates the need for a broad approach to the review of medical nutrition education and further supports the use of standardised assessment as a means of ensuring competence in nutrition.

Historically, the six countries reviewed in this paper share a common language and many food customs. For example, early migrants from the United Kingdom to the USA, Canada, Australia and New Zealand followed their traditional food customs that reflected their historical association with the rural environment and may have included meat, bread and dairy products (352). Today, the foods eaten in each country, reflects the impact of successive waves of migrants from throughout the world to each country (352). While doctors from the six countries reviewed could be able to identify and have general nutrition knowledge of food choices from the other five countries, differences may exist in food choices and nutrition knowledge received in undergraduate medical education for migrant doctors from other countries.

Consideration is required as to whether enhanced nutrition education at undergraduate level will impact on the complex biopsychosocial and political issues related to poor nutrition and obesity. For example, while the nutrition curriculum guidelines in the USA are detailed and prescriptive, the USA also experiences one of the highest rates of poor nutrition behaviour and obesity in the world and the projected targets for the reduction in the numbers of overweight and obese people are unlikely to be met (88). It may be that an increased focus on public health and nutrition advocacy within the curriculum is also required. Successful public

health campaigns led by doctors have centred on smoking cessation (353), and with bariatric surgery in carefully selected subjects (354).

In conclusion, there are promising developments in nutrition guidelines for medical schools in the USA, Canada, UK, Republic of Ireland, Australia and New Zealand. Differences in the scope and approach of nutrition-related curriculum guidelines may influence the nutrition education provided to medical students, and they may also affect the subsequent care provided by doctors in these countries. Notably, the reviewed curriculum guidelines focus on undergraduate education, and it is recognised that medical students will further enhance clinical practice competencies in nutrition during postgraduate training, depending on the specialty they enter. Consideration is required as to how best to monitor and evaluate nutrition competence of doctors, and how nutrition competence influences patients' nutrition behaviour and health outcomes. Given the comparable tertiary education systems, continuing medical education programmes, language of delivery and healthcare needs of populations in the reviewed countries, a joint international strategic approach to medical nutrition education would promote uniform content and may minimise duplication of effort and resources in this area and warrants further consideration.

# Chapter 6. New Zealand medical students have positive attitudes and moderate confidence in providing nutrition care to patients: a cross sectional survey

## Preface

The findings from Study 3 suggest that undergraduate training is an appropriate time to undertake nutrition education. All countries except the Republic of Ireland have curriculum guidelines that recommend that undergraduate nutrition education be provided in medical schools, yet there is little evidence of mandatory enforcement. The guidelines predominantly focus on basic nutrition principles, nutrition assessment, the role of nutrition in health, interdisciplinary teamwork and the provision of nutrition counselling. However, differences exist regarding the scope and detail of curriculum guidelines in these countries which may affect the nutrition care provided by doctors.

Recently, the Australian Medical Council (19), the organisation that sets standards for medical education in Australia and New Zealand, completed a Nutrition Knowledge and Competencies Framework. This framework outlines four nutrition knowledge goals and five nutrition competency goals for medical students, as well as associated learning outcomes that align with the competencies developed by the Medical Deans Australia and New Zealand (19). While the Nutrition Knowledge and Competencies Framework signifies ongoing work in this area, until the framework is formally adopted there are no mandated nutrition education requirements in New Zealand medical training. This makes it unclear what, if any, nutrition education New Zealand medical students receive during training. Therefore, it was deemed important to investigate how New Zealand medical graduates perceive their competence in providing nutrition care and to establish if the current nutrition education

received by students is adequate. Furthermore, there is limited literature available on medical students' attitudes to and skills in providing nutrition care and whether self-perceived attitudes and skills are influenced by the perceived quantity and/or quality of nutrition education received during training. Internationally, perceived adequacy of nutrition training (quantity and quality) is reported to be positively correlated with self-reported nutrition proficiency (16); it is important to investigate this issue in the New Zealand context.

Since 2000, nutrition education has been considered important at the Auckland School of Medicine and has slowly been integrated into medical education. In 2008, a clinical nutritionist assumed responsibility for the delivery of nutrition education in the medical programme. At present, the Auckland School of Medicine undergraduate training uses a curriculum with a case-based framework, and nutrition education does not have a dedicated domain. Nutrition is taught predominantly within the pre-clinical curriculum (years 2 and 3), and a small component is included during the clinical years (years 4, 5 and 6). Auckland School of Medicine is one of two medical schools in New Zealand, and produces more than 50 percent of medical graduates. Therefore, investigating the attitudes to and confidence in providing nutrition care among Auckland School of Medicine graduates is an appropriate way to further investigate these issues in New Zealand.

At Auckland School of Medicine, nutrition knowledge is formally evaluated in written examinations or progress tests in which students demonstrate competence for progression through medical training. Given the limited literature in New Zealand related to medical students' nutrition education, and limited methods available for assessing competence, the most appropriate way to determine students' nutrition competence acquired from nutrition training and practice was through an assessment of the students on completion of all formal undergraduate training. Mihalynuk et al's., (16) nutrition proficiency tool, with construct

validity, was chosen because the questionnaire was based on USA core nutrition areas previously identified (118). The proficiency tool was developed to assess confidence in nutrition care, derived from training or practice, as an alternative to costly, time-intensive objective structure clinical examinations (OSCEs) (16). The tool uses self-reported proficiency in nutrition care (16) as proxy measures are often as valid as more extensive and expensive tests in similar areas (355). Students' attitudes to nutrition care were measured using a tool developed by McGaghie et al., (356) with proven reliability. Therefore, the following study investigated self-perceived attitudes to, and confidence in, providing nutrition care among students about to graduate from medical school. The perceived quantity and quality of nutrition education received during undergraduate training was also evaluated.

Data published in: Crowley J, Ball L, Han D, Arroll B, Leveritt M, Wall C. New Zealand medical students have positive attitudes and moderate confidence to counsel in providing nutrition care to patients; a cross sectional survey. *J Biomed Educ.* 2015:127-33[(357)].

## Abstract

**Aim** Throughout the world, medical students and doctors report inadequate nutrition education and subsequently lack knowledge, attitude and skills to include nutrition in patient care. This study described New Zealand's students' attitudes to, and self-perceived skills in providing nutrition care in practice as well as perceived quantity and quality of nutrition education received in training.

**Methods** 183 medical students from New Zealand's largest medical school (response rate 52%) completed a 65-item questionnaire, partially validated, using 5-point Likert scales.

**Results** Students believed incorporating nutrition care into practice is important, yet were less confident patients improve nutrition behaviours after receiving this care. Students were confident in skills related to nutrition in health and disease, but less confident in skills related to general food knowledge. Greater quantity and quality of nutrition education received was associated with greater self-perceived skills in providing nutrition care to patients, but not with attitudes towards incorporating nutrition care into practice.

**Conclusions** This cohort of New Zealand medical students place similarly high importance on nutrition care as students and doctors from other countries. Further investigations beyond graduation are required to inform whether additional nutrition education is warranted for these doctors.

## Introduction

The incidence of chronic disease in New Zealand is growing (263). The role of nutrition in the prevention and management of chronic disease is well recognised (2, 358). It is a priority target of the New Zealand Health Strategy to improve the dietary behaviour of individuals (263). Primary health care has been identified as an ideal setting to provide nutrition care to patients with chronic disease (263, 359). In this setting, nutrition care refers to any practice conducted by a health professional that aims to improve the nutrition behaviour and subsequent health of patients (72).

Approximately thirty percent of New Zealand medical students express a strong interest in becoming GPs when leaving medical school (360). GPs General Practitioners have the potential to make a significant contribution to the prevention and management of chronic disease in New Zealand by providing nutrition care for three reasons. First, GPs are often the initial contact point for health care of individuals with chronic disease (310). Second, over three quarters (78%) of the adult New Zealand population consult a GP at least once each year (263). Third, GPs are one of the most trusted providers of nutrition care (71-73, 251).

There is evidence that GPs can provide effective nutrition care that results in improvements in patients' nutrition behaviour (315, 361, 362). However, the competence of GPs in providing nutrition care has previously been questioned (128), and it is reported that GPs receive insufficient nutrition education during medical training (128, 203, 251). As a result, GPs perceive that they are inadequately prepared to provide nutrition care to patients and report low self-efficacy in this area (11, 76, 87, 136). It is unclear whether the findings reported in international literature extend to the New Zealand primary care context (267). In New Zealand's largest medical school, undergraduate training is taught using a systems-based curriculum. Nutrition education does not have a dedicated domain and is taught within

the pre-clinical systems curriculum (years 2 and 3) and in clinical years (years 4, 5 and 6). Students receive approximately twenty hours of nutrition teaching, similar to the United States national average of 19.6 hours (203). The teaching is predominantly didactic, taught by a dietitian in collaboration with other medical educators and includes one three hour nutrition laboratory.

Competence refers to an individual's ability to perform a task, and includes three components; *knowledge* of a task, *skill* to perform a task, and *attitude* that enables task performance (119). The investigation of self-perceived skills and attitudes in medical students is an accepted indicator of competence when objectives are clearly specified (16, 30). As prospective GPs, medical students in the final stages of their university training are an ideal group to investigate skills and attitudes towards incorporating nutrition care into practice. It is presently unclear whether self-perceived skills and attitudes are mediated by the perceived quantity and/or quality of nutrition education received during medical training. Investigating this relationship will assist in understanding if additional nutrition education is required during medical training, and will inform strategies to support future GPs to increase competence in nutrition care.

This study described New Zealand medical students' (i) attitudes towards incorporating nutrition care into practice, (ii) self-perceived skills in providing nutrition care, and (iii) perceived quantity and quality of nutrition education received during medical training.

## Methods

This study utilised a cross-sectional design and was approved by the relevant institutional human research ethics committee (reference number 7785).

Potential participants were students enrolled in two consecutive cohorts from the largest of one of two New Zealand medical schools. The students had finished their coursework and placements and were eligible to graduate (n=351). In 2012, there were one hundred and sixty two graduate students and in 2013, one hundred and eighty nine graduate students. There were no differences between the two cohorts for nutrition content and number of hours taught. Data collection occurred each year on a single day when students attended university to complete administrative tasks prior to graduation. To avoid bias, a person not involved with the study administered the process. Information relating to the study was provided to all medical students through the online student information system two months and one month prior to data collection.

A survey was developed from previously used surveys of medical students' attitudes to nutrition care (356) and GP registrars confidence in providing nutrition care (16) and included three sections (Table 1). McGaghie et al's., (356) survey has proven reliability and Mihalynuk et al's., (16) survey exhibits construct validity. Where necessary, wording was modified for relevance to the New Zealand context (such as using kilojoules instead of calories). Each item was measured using a 5-point Likert scale, where 1 indicated negative attitude or low confidence, and 5 indicated positive attitude or high confidence. The survey was tested with a group of five final year medical students for clarity of understanding, three months prior to final examinations.

**Table 6.1 Description of each section of the questionnaire.**

| Section | Description of Questions |
|---|---|
| Attitudes towards incorporating nutrition care into practice[a] | 33 questions exploring the perceived importance of nutrition care, implementation of nutrition care, doctor-patient relationship in nutrition and efficacy of doctors in providing nutrition care. |
| Self-perceived skills in providing nutrition care[b] | 30 questions exploring confidence in skills relevant to nutrition care. |
| Nutrition education | 2 questions exploring perceived quantity and quality of nutrition education received during medical training. |

[a]*Adapted from McGaghie et al.,*[(356)].
[b]*Adapted from Mihalynuk et al.,*[(16)].

Data analysis was conducted using SPSS version 22. Representativeness of the sample for gender and age was investigated using a Chi-Squared Goodness of Fit test and a single sample t-test. Descriptive statistics were calculated for each survey item. The relationship between students' perceived quantity and quality of nutrition education received during medical training, their attitudes towards incorporating nutrition care into practice and self-perceived skills in providing nutrition care were investigated using Pearson's Chi-Squared tests. In order to comply with the assumptions underpinning chi-square tests, categories were collapsed to ensure that <20% of cells remained below minimum counts. Statistical significance was set at $p \leq 0.05$.

## Results

A total of 183 out of 351 eligible students completed the questionnaire, resulting in a response rate of 52%. Seventeen surveys were excluded because of incomplete data. The majority of participating students (n=108, 59%) were female, and the average age of the sample was 24.8 (SD=2.5) years. There were no significant differences between the participating and non-participating students with regards to age (average population age=25.1 years; p=0.277 or gender (population 55% female; p=0.211).

Table 6.2 displays students' attitudes towards incorporating nutrition care into practice. Nearly all students reported that patient motivation, advocating for healthy lifestyle behaviours and support from other health professionals were important when providing nutrition care. In contrast, students reported variable attitudes about the likelihood of patients changing nutrition behaviour after receiving nutrition care from their doctor.

Table 6.3 displays students' self-perceived skills in providing nutrition care. Students were confident in skills related to the role of nutrition in health and disease; for example calculating Body Mass Index and waist-hip ratio; explaining the significance of modest

weight loss for patients with type 2 diabetes and explaining the influence of alcohol consumption on health. Students were less confident in skills associated with the nutrition composition of foods and general food knowledge; for example assessing total kilojoules and saturated fat per portion of food; explaining how to identify anti-oxidant rich produce; and indicating when to use single vitamins or multivitamins.

The majority of students (60%) perceived the quantity of nutrition education received during medical training was good or very good; and even more (83%) perceived the quality of nutrition education received during medical training was good or very good. The perceived quantity and quality of nutrition education received during medical training had limited association with students' attitudes towards incorporating nutrition care into practice (Table 6.2). However, students who reported higher confidence in providing nutrition care were also more likely to perceive the quality and quantity of nutrition education received during medical training to be good or very good (Table 6.3).

**Table 6.2 Students' attitudes towards incorporating nutrition care into practice, ranked in order of agreement (n=183)**.

| Items | Agree<br>n (%) | Unsure<br>n (%) | Disagree<br>n (%) |
|---|---|---|---|
| Patient motivation is essential to achieving dietary change. | 174 (95) | 5 (3) | 4 (2) |
| It is important that I evaluate a patient's alcohol intake as part of their overall nutritional status. | 165 (90) | 16 (9) | 2 (1) |
| A change toward a healthier lifestyle is important at any stage of life. | 166 (91) | 17 (9) | 0 (0) |
| Doctors require the support of health professionals such as nurses and dietitians to reinforce patient nutrition education.[a] | 159 (87) | 21 (11) | 3 (2) |
| It is important that I advocate diet and physical activity to promote weight control.[a] | 156 (85) | 26 (14) | 1 (1) |
| There is a role for practice nurses to provide nutrition education to patients when referred by the doctor. | 155 (85) | 20 (11) | 8 (4) |
| Doctors can have an effect on a patient's dietary behaviour if they take the time to discuss the problem. | 152 (84) | 31 (17) | 0 (0) |
| Patients requiring detailed nutrition counselling require referral to a dietitian.[b] | 153 (84) | 26 (14) | 4 (2) |
| Specific advice about how to make dietary changes could help some patients improve their dietary habits. | 148 (81) | 33 (18) | 2 (1) |
| All doctors regardless of specialty, should counsel high-risk patients about dietary change. | 144 (79) | 32 (17) | 7 (4) |
| Patients need ongoing counselling following my initial instruction to maintain behaviour changes. | 140 (76) | 42 (23) | 1 (1) |

Table 6.2 Students' attitudes towards incorporating nutrition care into practice, ranked in order of agreement (n=183) continued

| | | | |
|---|---|---|---|
| It is important that I assist paediatric patients to establish healthy eating patterns early to prevent risk of chronic diseases. | 124 (68) | 53 (29) | 6 (3) |
| I have an obligation to improve the health of my patients including discussing nutrition with them. | 132 (72) | 48 (26) | 3 (2) |
| It is important that I refer patients with diet-related problems to registered dietitians and other qualified nutrition staff. | 132 (72) | 43 (23) | 8 (4) |
| Patients need specific instructions about how to change their eating behaviour.[a] | 123 (67) | 54 (30) | 6 (3) |
| It is important that I address the importance of diet whenever I care for a patient. | 124 (68) | 50 (27) | 9 (5) |
| Nutrition counselling should be part of routine care by all doctors, regardless of speciality. | 121 (66) | 48 (26) | 14 (6) |
| It is important that I encourage patients to ask diet-related questions and refer them for assistance when needed. | 119 (65) | 56 (30) | 8 (5) |
| It is important that wherever possible, I recommend diet changes before initiating drug therapy. | 114 (62) | 58 (32) | 11 (6) |
| It is important that I assess each patient's stage of change before initiating dietary intervention. | 106 (60) | 61 (32) | 16 (8) |
| My patient education efforts will be effective in increasing patients' compliance with nutritional recommendations.[a] | 102 (56) | 68 (37) | 13 (7) |
| It is important that I advocate a low-fat diet for weight control.[a, b] | 99 (54) | 68 (37) | 16 (9) |
| Most doctors are not adequately trained to discuss nutrition with patients.[a,b] | 97 (53) | 68 (37) | 18 (10) |
| It is important that I perform at least some nutritional assessment with every patient. | 77 (42) | 72 (39) | 34 (19) |
| Nutrition assessment should be included in any routine appointment, just like any diagnosis and treatment. | 73 (40) | 78 (43) | 32 (17) |

Table 6.2 Students' attitudes towards incorporating nutrition care into practice, ranked in order of agreement (n=183) continued

| | | | |
|---|---|---|---|
| Patients will rarely change their behaviour if they do not have active symptoms of disease. | 74 (40) | 80 (44) | 29 (16) |
| Patients are not motivated to make changes unless they are sick. | 58 (33) | 73 (40) | 52 (28) |
| Patients will change their eating patterns only if faced with a significant health problem (eg heart attack). | 54 (30) | 72 (39) | 57 (31) |
| After receiving nutrition counselling, patients with poor eating patterns will make moderate changes in their eating behaviour. | 48 (26) | 110 (60) | 25 (14) |
| It is important that I assess each patient's intake of vitamin, mineral and dietary supplements. | 42 (23) | 89 (49) | 52 (28) |
| Nutrition counselling is not effective use of my professional time. | 36 (20) | 61 (33) | 86 (47) |
| After receiving nutrition counselling, patients with poor eating habits will make major changes in their eating behaviour. | 30 (16) | 92 (50) | 61 (34) |
| Most patients will try to change their lifestyle if I advise them to do so. | 24 (13) | 87 (48) | 72 (39) |

[a]*Positively associated with students' self-perceived quality of nutrition education received during their medical degree ($p<0.05$).*
[b]*Positively associated with students' self-perceived quantity of nutrition education received during their medical degree ($p<0.05$).*

**Table 6.3 Students' confidence in providing nutrition care to patients, ranked in order of agreement (n=183)**.

| Items | Confident<br>n (%) | Uncertain<br>n (%) | Not confident<br>n (%) |
|---|---|---|---|
| Calculating Body Mass Index (BMI) and waist-hip ratio based on gender. | 149 (81) | 25 (14) | 8 (5) |
| Explaining the overall benefits of aerobic exercise on health and well-being.[a] | 140 (77) | 33 (18) | 10 (5) |
| Explaining the significance of modest weight loss for patients with type two diabetes.[a] | 136 (75) | 38 (21) | 9 (5) |
| Defining moderate alcohol consumption and its role in health and disease. | 129 (70) | 49 (27) | 5 (3) |
| Interpreting growth charts and pertinent trends for a child with failure to thrive.[a] | 132 (72) | 43 (24) | 8 (4) |
| Explaining the maternal and infant benefits and challenges anticipated with breast feeding.[a,b] | 124 (67) | 43 (23) | 16 (9) |
| Explaining the role of dietary cholesterol and saturated fats in elevating blood lipids.[a,b] | 120 (66) | 51 (28) | 12 (6) |
| Recommending dietary patterns for patients with type 2 diabetes. | 113 (62) | 56 (31) | 14 (8) |
| Explaining the role of water and hydration in health based on activity level and age. | 106 (58) | 59 (32) | 19 (10) |
| Recognising the warning signs and symptoms of patients with eating disorders. | 98 (54) | 64 (35) | 21 (11) |
| Explaining avoidance of cross contamination when preparing and storing foods.[a,b] | 94 (51) | 65 (36) | 24 (13) |
| Recognising nutritional risk in elderly patients.[a] | 88 (48) | 79 (43) | 16 (9) |
| Explaining common nutrient deficiencies of adolescent women.[b] | 78 (43) | 77 (42) | 28 (15) |
| Giving advice on breast feeding or formula feeding for an infant with colic. | 76 (42) | 72 (39) | 35 (19) |
| Giving nutrition strategies for individuals losing weight due to chronic cachexia.[a] | 73 (40) | 70 (38) | 40 (22) |
| Implementing strategies for osteoporosis prevention, including nutrition and lifestyle advice.[a,b] | 70 (38) | 81 (44) | 32 (18) |
| Addressing nutrition concerns of patients with gastrointestinal intolerances, maldigestion or | 71 (39) | 71 (39) | 41 (22) |

Table 6.3 Students' confidence in providing nutrition care to patients, ranked in order of agreement (n=183) continued

| Items | Confident n (%) | Uncertain n (%) | Not confident n (%) |
|---|---|---|---|
| malabsorption.[a,b] | | | |
| Giving examples of serving sizes of meat or dairy from the Ministry of Health serving guide.[a,b] | 68 (37) | 79 (43) | 36 (20) |
| Explaining the indications and contraindications for enteral and parenteral nutrition.[b] | 66 (36) | 84 (46) | 33 (18) |
| Explaining potentially harmful interactions of medications with herbal or botanical supplements.[a] | 64 (35) | 77 (42) | 42 (23) |
| Explaining the reported health risks of high protein/high fat diets such as the Atkins diet.[a,b] | 61 (33) | 81 (44) | 41 (23) |
| Assessing total kilojoules and saturated fat per portion of food by using the nutrition label.[a,b] | 58 (32) | 71 (39) | 54 (29) |
| Indicating the use of single vitamins (ie A, C, E) or multivitamin supplements.[b] | 55 (30) | 79 (43) | 49 (27) |
| Explaining the role of omega-3 and omega-6 fatty acids in heart health. | 51 (28) | 78 (42) | 54 (30) |
| Giving an explanation of the benefits of probiotics. | 50 (27) | 76 (42) | 57 (31) |
| Explaining the kilojoules per gram of protein, carbohydrate and fat and their basic metabolic roles. | 49 (27) | 68 (37) | 66 (36) |
| Explaining the role of genetics, diet and pharmacology in weight loss regimes.[a,b] | 47 (26) | 89 (48) | 47 (26) |
| Explaining how to identify antioxidant-rich produce while grocery shopping.[a,b] | 44 (24) | 81 (44) | 58 (32) |
| Explaining the scientifically confirmed benefits of St John Wort and Echinacea.[a,b] | 37 (20) | 73 (40) | 73 (40) |
| Explaining the role of food constituents in health.[b] | 32 (18) | 81 (44) | 70 (38) |

[a]*Positively associated with students' self-perceived quality of nutrition education received during their medical degree ($p<0.05$).*
[b]*Positively associated with students' self-perceived quantity of nutrition education received during their medical degree ($p<0.05$).*

## Discussion

This is the first study to investigate the nutrition-related competence of New Zealand medical students by measuring their attitudes towards incorporating nutrition care into practice and self-perceived skills in providing nutrition care to patients. The results indicated that students felt incorporating nutrition care into practice is important for doctors. However, they were less sure about the capacity of patients to improve their nutrition behaviour after receiving nutrition care by doctors. Students felt more confident discussing the role of nutrition in health and disease than explaining the nutrient composition of foods to patients.

International literature has demonstrated that nutrition care is perceived to be important by medical students, doctors and medical educators (9, 16, 109, 129). The results of the present study indicate that similar perceptions exist amongst New Zealand medical students. Despite these positive views, previous studies suggest that students' attitudes towards nutrition care decline after graduation (31-33). Although attitudes towards nutrition care are positive in students about to graduate, it may still be important to reinforce the significance of nutrition care during the early stages of their career (265, 267).

Although students in the present study reported that nutrition care is important, they were less confident that patients would improve their nutrition behaviour after receiving nutrition care from doctors. This suggests that the nutrition-related self-efficacy of this group of students may be low. Given that self-efficacy is a barrier to incorporating nutrition care into practice (15, 33, 153), it is plausible that the students in the present study, despite thinking nutrition care is important, will not provide this care at every appropriate opportunity. It may also be that students were less confident that patients would improve their nutrition behaviour reflecting the reality of their practical experiences that changing dietary behaviour is very difficult and many patients are resistant to change. It may also be that nutrition care may not

be modelled by senior doctors as part of medical practice. Further investigation for reasons why students feel less confident patients will improve nutrition behaviour after receiving nutrition care from doctors is required. This may include developing strategies to improve the nutrition-related self-efficacy of these students given that nutrition care provided by doctors can positively impact patients' nutrition behaviour (315).

Medical educators have highly variable views on the most important and relevant nutrition-related competencies for students to develop during medical training (9, 259). Students in the present study were aligned with findings from previous studies; whereby they felt confident in skills related to describing the role of nutrition in health and disease (58). However, they did not feel confident in skills related to nutrition composition of foods and general food knowledge. Given that these students also perceive that nutrition care should involve the support of other health professionals, such as nurses and dietitians, the specific nutrition-related skills required by doctors may not be universal. This suggests the ideal role of doctors in providing nutrition care may be to engage with patients regarding their nutrition care needs, and ensure access to supporting health professionals when required (259). Notably, broader health care reforms are focusing on this type of patient-centred approach to care (363).

It has been reported in many international studies that students receive inadequate nutrition education in medical training (133, 203). Early reports indicated that over 85% of medical students were not satisfied with some aspect of their nutrition education (95) and dissatisfaction still exists among the majority of students (203). In contrast, most students in this New Zealand sample perceived the quality and quantity of nutrition education to be good or very good. One reason why the results of the present study may have differed from international studies is because students are taught by a nutrition expert (dietitian), which has

been recognised as critical to the success of nutrition education programmes and is lacking in many international medical schools (259). Clearly, further research is required to identify the specific components of nutrition education required to meet the learning needs of New Zealand medical students.

The present study indicated that students' self-perceived skills in providing nutrition care were positively associated with the nutrition education received during medical training. However, there was a limited relationship between perceptions of quantity and quality of nutrition education and students' attitudes towards nutrition care. This suggests that the quantity and quality of medical education is likely to influence the nutrition-related skill development of students. This is consistent with findings reported in international literature (70, 203). However, the somewhat rudimentary measure of nutrition education quantity and quality used in this study prevents definitive conclusions in the New Zealand context.

The present study has noteworthy strengths and limitations. Previous studies have utilised various methods to investigate the attitudes and self-perceived skills of medical students in providing nutrition care. The use of two previously validated tools to guide the development of the questionnaire in the current study enhances the confidence in findings, which can be used to inform future studies in New Zealand. However, with a response rate of 52 percent of the potential participant pool, it is possible that students interested in nutrition were more likely to complete the questionnaire and this may have overestimated the attitudes and self-perceived skills reported in this study. Furthermore, this study relates to only one of the two medical schools in New Zealand, and generalisability of the results should be cautioned. There is no consensus method for assessing the quantity and quality of medical nutrition education and this remains a challenge for the future. Finally, further research is required to

determine whether attitudes and self-perceived skills in nutrition care influences students' future provision of nutrition care in practice and ultimately the health of their patients.

## Conclusion

In conclusion, New Zealand medical students feel that incorporating nutrition care into practice is important for doctors. However, they believed the capacity of patients to improve their nutrition behaviour after receiving nutrition care by doctors is somewhat limited. Students perceived the quantity and quality of nutrition education received during medical training was good. Further investigation of students' attitudes and self-perceived skills in providing nutrition care after graduation will inform whether additional nutrition education is warranted for these doctors. Considering that New Zealand GPs are well placed to provide nutrition care to patients with chronic disease, they may require support dealing with the barriers to providing this care to patients.

## Commentary

Since publication of this paper, recent literature reports that the average time devoted to medical nutrition education has further decreased to an average of 19.0 hours (197).

# Chapter 7. Doctors' attitudes and confidence towards providing nutrition care in practice: comparison of New Zealand medical students, GP registrars and GPs

## Preface

The findings of Study 4 suggest that New Zealand medical students feel that incorporating nutrition care into practice is important, although they are less convinced that patients would change behaviour after receiving nutrition care. These findings are supported by the international literature on the attitudes of medical students, doctors and medical educators (9, 16, 109, 129). Students felt more confident discussing the role of nutrition in chronic disease with patients than engaging in in-depth discussion on the nutrient composition of foods. The findings that students lack confidence in providing nutrition care is similar to the findings reported in international literature (15, 33, 153), and indicate that appropriate nutrition care may not be provided as often as is necessary once the students become qualified (155).

Medical education is a lifelong journey; it is currently unclear whether students' perceptions towards nutrition care change after graduation and beyond. This is important because it is GPs who provide care and therefore influence patients' health outcomes. This makes it important to investigate nutrition education in the postgraduate environment. Specifically, GPs' attitudes to and confidence in providing nutrition care need to be examined to clarify if additional education and/or professional development is required in order to support competent nutrition care.

The tool used in Study 4 was deemed appropriate for use in this study to facilitate comparisons between graduating students, GP registrars and GPs. The following study is a

comparison of students', GP registrars' and GPs' attitudes to and self-perceived confidence in providing nutrition care.

Data published in: Crowley J, Ball L, Han D, McGill A-T, Arroll B, Leveritt M, Wall C. Doctors' attitudes and confidence towards providing nutrition care in practice: Comparison of New Zealand medical students, GP registrars and GPs. *J Prim Health Care.* 2015 (In press)[317].

## Abstract

**Aim** This study describes and compares New Zealand medical students', GP registrars' and GPs' attitudes towards incorporating nutrition care into practice, and self-perceived skills in providing nutrition care.

**Methods** 183 New Zealand medical students, 51 GP registrars and 57 GPs completed a 60 item questionnaire investigating attitudes towards incorporating nutrition care into practice and self-perceived skills in providing nutrition care. Items were scored using a 5-point Likert scale. Factor analysis was conducted to group questionnaire items and a generalised linear model compared differences between medical students, GP registrar and GPs.

**Results** All groups believed incorporating nutrition care into practice is important. GPs displayed more positive attitudes than students towards incorporating nutrition in routine care ($p<0.0001$) and performing nutrition recommendations ($p<0.0001$). GP registrars were more positive than students towards performing nutrition recommendations ($p=0.004$) specified practices ($p=0.037$) and eliciting behaviour change ($p=0.024$). All groups displayed moderate confidence towards providing nutrition care. GPs were more confident than students in areas relating to wellness and disease ($p<0.0001$), macronutrients ($p=0.030$), micronutrients ($p=0.010$), and women, infants and children ($p<0.0001$).

**Conclusion** New Zealand medical students, GP registrars and GPs have positive attitudes and moderate confidence towards incorporating nutrition care into practice. It's possible that GPs' experience providing nutrition care contributes to greater confidence. Strategies to facilitate students developing confidence in providing nutrition care are warranted.

## Introduction

The increasing prevalence of lifestyle-related chronic disease in New Zealand represents an escalating component of health care expenditure (4, 263). Poor nutrition behaviour is a risk factor for chronic disease, and improvements in individuals' nutrition behaviour can improve risk factors and outcomes associated with lifestyle-related chronic diseases (2). In this context, nutrition care refers to any practice conducted by a health professional that aims to improve patients' nutrition behaviours and subsequent health (9).

Internationally, GPs are viewed as reliable and trusted sources of information on nutrition and patients with chronic disease expect to receive nutrition care from GPs (278, 364). However, GPs face challenges in providing nutrition care, including perceived inadequate nutrition training and low self-efficacy (147), which may be due to insufficient nutrition education, knowledge, skills, or confidence (303). The attitudes and confidence of students to provide nutrition care has been suggested to decline after graduation (129). However, it is unclear whether this extends to the New Zealand context. In New Zealand, accreditation standards for medical schools specify that graduates must have the ability to apply nutrition knowledge in practice (346). For GPs, the nutrition syllabus of the Royal New Zealand College of General Practitioners (RNZCGP) training programme includes competencies that GP registrars are expected to develop throughout three years of training (7). The RNZCGP competencies relevant to providing nutrition care are presented in Table 7.1.

**Table 7.1 Nutrition care competencies expected of New Zealand General Practitioners (7)**

| **At the completion of vocational training, a registrar is expected to:** |
|---|
| 1. Understand the central role of diet and nutrition in causing chronic diseases, excessive weight gain, obesity, type 2 diabetes, hypertension, cardiovascular diseases, cancer, dental diseases and osteoporosis. |
| 2. Be confident in advising on nutritional requirements across different age spectrums, including infants, toddlers, teenagers, menstruating women, women pre-conception, during pregnancy and breast feeding, vegetarians and older patients with an emphasis on encouraging nutrition from 'food first'. |
| 3. Be confident in appropriate investigation and management of nutritional requirements in specific conditions such as: chronic obstructive pulmonary disease, renal impairment, irritable bowel syndrome, coeliac disease, food allergy and food intolerance, severe eczema, migraine, anorexia and bulimia, malnutrition in the elderly, osteoporosis. |
| 4. Be able to describe a: cardio protective diet, diabetic diet, cholesterol lowering diet. |
| 5. Be able to discuss weight loss strategies, dietary and lifestyle advice, use medications appropriately and safely, and know indications for weight loss surgery. |
| 6. Know the criteria for access to prescription foods for patients on special authority, including infant formulas, gluten free foods and nutritional supplements. |

The aim of this study was to compare New Zealand medical students', GP registrars' and GPs' attitudes towards incorporating nutrition care into practice, and self-perceived confidence in providing nutrition care.

## Methods

This study utilised a cross-sectional design. A paper-based questionnaire was developed from previous investigations of medical students and GP registrars (16, 356). Section A contained 30 questions with proven reliability from a Nutrition in Patient Care Survey which investigated attitudes to nutrition care (356), is supported by theory focused on attitudes and their influence on behaviour (365, 366). Question topics included: 1) nutrition assessment, 2) nutrition in routine care, 3) nutrition recommendations, 4) specified practices, 5) behaviour change and 6) patient motivation. Section B contained 30 questions from a survey (16) with construct validity, which investigated confidence in skills relevant to nutrition care (16) based on a USA list of priority nutrition topics (200). Question topics included: 1) nutrition in wellness and disease; 2) macronutrients; 3) micronutrients 4) women infants and children; 5) nutrition in disease management. Each item was measured using a 5-point Likert scale, where for attitudes, 1=strongly disagree, 2=disagree, 3=uncertain, 4=agree, and 5=strongly agree; and for confidence, 1=not confident, 2=somewhat confident, 3=neutral, 4=confident, and 5=very confident.

Participant medical students were from Auckland Medical School and had finished coursework and placements and were eligible to graduate in 2012 and 2013 (n=351). Participant GP registrars were first-year registrars attending a training day in Auckland in February, 2014 (n=54). Participant GPs were recruited when they attended CME meeting on the topic of nutrition at one of four urban PHOs in Auckland. All groups received emailed notification of the study approximately one month and one week prior to data collection,

administered by a person not involved in the study. Data collection occurred for medical students when the groups returned to university to complete administration tasks; for the GP registrars prior to a nutrition session and for GPs at the beginning of the CME. A larger sample of medical students than GP registrars and GPs was appropriate due to the larger potential participant pool and because approximately 30 percent of medical students progress to become GPs (360).

Data analysis was conducted using SAS version 9.3 (SAS Institute Inc., Cary, NC, USA). Representativeness of participant groups for age and gender were investigated using Chi square Goodness of Fit analyses. Descriptive statistics for the Likert scale were calculated for each survey item, collapsed down to three groups. Factor analysis was conducted to group related items, allowed meaningful comparison between the three groups of participants. For each group of participants, items within each factor were classified as a binary outcome: agreed (participants reporting 4 or 5) and disagreed (reporting 1 or 2). Data recorded as uncertain 3, were not used in this analysis. The score was given by +1 if their response was agreed and a score of -1 for a disagreed response. The scores were summed and a Generalised Linear Model test performed to determine differences between the three groups. Statistical significance was set at $p \leq 0.05$.

## Results

A total of 183 medical students, 51 GP registrars and 57 GPs completed the questionnaire, resulting in response rates of 52%, 94% and 29% respectively. Eleven medical students' surveys and 1 GP survey were removed from the study because of incomplete data. The participant demographic data is presented in Table 7.

**Table 7.2: Demographic characteristics of participants (n=291)**

| Group | Gender | Age in years (mean ± SD) | Comparison with potential participant pool |
|---|---|---|---|
| Students | M: 75 (41%)<br>F: 108 (59%) | 24.9 ± 2.4 | Representative for age and gender (p>0.05) |
| GP Registrars | M: 18 (35%)<br>F: 33 (65%) | 32.9 ± 6.5 | Representative for age and gender (p>0.05) |
| GPs | M: 34 (60%)<br>F: 23 (40%) | 52.0 ± 8.3 | Representative for gender (p>0.05). Study sample older than national workforce (p=0.001) |

Participants' attitudes towards incorporating nutrition care into practice are displayed in Table 7.3. Overall, all groups displayed positive attitudes towards incorporating nutrition care into practice. GPs were particularly positive towards incorporating nutrition in routine care ($p<0.0001$) and performing nutrition recommendations ($p<0.0001$) when compared with students. General practice registrars were particularly positive towards performing nutrition

recommendations (p=0.004) specified practices (p=0.037) and eliciting improvements in behaviour change (p=0.024) when compared with students.

**Table 7.3 GPs, GP registrars and students' attitude towards incorporating nutrition care into practice (n=291)**.

| Items | Group | Mean (SD) | Range | Estimate (95% CI) | P |
|---|---|---|---|---|---|
| **Nutrition Assessment (3 items)** | | | | | |
| Nutrition assessment should be included in any routine appointment, just like any diagnosis and treatment. | GPs | 1.789 (1.081) | 0 - 3 | 0.320 (-0.017-0.656) | 0.063 |
| Encourage patients to ask diet-related questions and refer for additional assistance when needed. | GP registrars | 1.353 (0.934) | 0 - 3 | -0.117 (-0.469-0.235) | 0.513 |
| Perform at least some nutritional assessment with every patient. | Students | 1.470 (1.190) | 0 - 3 | 0 | |
| **Nutrition in routine care (6 items)** | | | | | |
| Address the importance of diet whenever I care for a patient. | GPs | 5.228 (1.239) | 0 - 6 | 0.764 (0.323-1.204) | **<0.0001** |
| Obligation to improve the health of my patients including discussing nutrition with them. | GP registrars | 4.902 (1.315) | 1 - 6 | 0.437 (-0.023-0.898) | 0.062 |
| Nutrition counselling should be part of routine care by all doctors regardless of specialty. | | | | | |
| All doctors regardless of specialty should counsel high-risk patients. | Students | 4.464 (1.582) | 0 - 6 | 0 | |
| Patients need ongoing counselling following my initial instruction to maintain behaviour changes. | | | | | |

Table 7.3 GPs, GP registrars and students' attitude towards incorporating nutrition care into practice (n=291) continued

| Items | Group | Mean (SD) | Range | Estimate (95% CI) | P |
|---|---|---|---|---|---|
| Advocate diet and activity to promote weight control. | | | | | |
| **Nutrition recommendations (4 items)** | GPs | 3.281 (0.881) | 0 - 4 | 0.592 (0.255-0.929) | **<0.0001** |
| Assist paediatric patients to establish healthy eating patterns early to prevent risk of chronic diseases. | | | | | |
| Recommend wherever possible diet changes before initiating drug therapy. | GP registrars | 3.216 (0.923) | 1 - 4 | 0.527 (0.175-0.879) | 0.004 |
| My patient education efforts will be effective in increasing patient's compliance with nutritional recommendations. | | | | | |
| Doctors can have an effect on patient's dietary behaviour if they take the time to discuss the problem. | Students | 2.689 (1.243) | 0 - 4 | 0 | |
| **Specified practices (6 items)** | GPs | 4.018 (1.275) | 0 - 6 | 0.324 (-0.076-0.723) | 0.112 |
| Refer patients with diet-related problems to registered dietitians or other qualified nutrition staff. | | | | | |
| Specific advice about how to make dietary changes could help some patients improve their dietary habits. | GP registrars | 4.137 (1.342) | 1 - 6 | 0.443 (0.026-0.860) | 0.037 |
| Most patients will change their lifestyle if I advise them to. | | | | | |
| Advocate a low-fat diet for weight control. | Students | 3.694 (1.356) | 0 - 6 | 0 | |
| Assess each patient's stage of change before initiating drug therapy. | | | | | |

Table 7.3 GPs, GP registrars and students' attitude towards incorporating nutrition care into practice (n=291) continued

| Items | Group | Mean (SD) | Range | Estimate (95% CI) | P |
|---|---|---|---|---|---|
| Evaluate each patient's alcohol intake as part of their overall nutrition status. | | | | | |
| **Behaviour change (7 items)** | | | | | |
| After receiving nutrition counselling patients with poor eating habits will make moderate changes to their eating behaviour. | GPs | 3.912 (1.184) | 0 - 6 | 0.202 (-0.202-0.606) | 0.327 |
| Patients need specific instructions about how to change their eating behaviour. | GP registrars | 4.196 (1.200) | 2 - 7 | 0.486 (0.064-0.908) | 0.024 |
| Most doctors are not adequately trained to discuss nutrition with patients. | | | | | |
| A change towards a healthier lifestyle in important at any stage of life. | | | | | |
| Patient motivation is essential for achieving dietary change. | Students | 3.710 (1.440) | 0 - 7 | 0 | |
| Assess each patient's intake of vitamins, minerals and dietary supplements. | | | | | |
| After receiving nutrition counselling patients with poor eating habits will make major changes in their eating behaviours. | | | | | |
| **Patient motivation (4 items)** | | | | | |
| Patients will rarely change their behaviour, if they do not have active symptoms of disease. | GPs | 1.070 (1.252) | 0 - 4 | -0.143 (-0.532-0.246) | 0.470 |
| Patients will change their eating patterns only if faced with significant health problems (eg heart attack). | GP registrars | 1.588 (1.359) | 0 - 4 | 0.375 (-0.031-0.781) | 0.070 |
| | Students | 1.213 | 0 - 4 | 0 | |

Table 7.3 GPs, GP registrars and students' attitude towards incorporating nutrition care into practice (n=291) continued

| Items | Group | Mean (SD) | Range | Estimate (95% CI) | P |
|---|---|---|---|---|---|
| Patients are not motivated to make changes unless they are sick. | | (1.302) | | | |
| Nutrition counselling is not effective use of my professional time. | | | | | |

All groups displayed very positive attitudes (>90% agreed) for some areas of nutrition care For example, nearly all participants believed that patient motivation is essential to achieving dietary change and that it is important to evaluate alcohol intake as part of patients' overall nutritional status. All groups were less positive (<40% agreed) about specific tasks related to nutrition care, such as performing some nutrition assessment with each patient and patients' willingness to change lifestyle behaviours.

Participants' confidence towards incorporating nutrition care into practice is displayed in Table 7.4. Overall, all groups displayed moderate confidence towards providing nutrition care. GPs were significantly more confident than students in nutrition in wellness and disease ($p<0.0001$), macronutrients ($p=0.030$), micronutrients ($p=0.010$), and women, infants and children ($p<0.0001$). There were no differences between GP registrars and students for any factor ($p>0.05$).

**Table 7.4 GPs, GP registrars and students' confidence towards incorporating nutrition care into practice (n=291)**.

| Items | Group | Mean (SD) | Range | Estimate (95% CI) | P value |
|---|---|---|---|---|---|
| **Wellness and disease (5 items)** | | | | | |
| Overall benefits of aerobic exercise on health and well-being. | GPs | 3.491 (0.735) | 1 - 4 | 0.896 (0.552-1.240) | **<0.0001** |
| Strategies for osteoporosis prevention, including nutrition and lifestyle. | | | | | |
| Significance of modest weight loss for patients with type two diabetes. | GP registrars | 2.863 (1.149) | 0 - 4 | 0.267 (-0.092-0.626) | 0.144 |
| Definition of moderate alcohol consumption and its role in health and disease. | | | | | |
| Role of water and hydration in health and fluid needs on activity level and age. | Students | 2.596 (1.254) | 0 - 4 | 0 | |
| **Macronutrients (5 items)** | | | | | |
| Role of dietary cholesterol and saturated fats in elevating blood lipids. | GPs | 2.614 (1.278) | 0 - 5 | 0.488 (0.049-0.928) | **0.030** |
| Assessing total kilojoules and saturated fat per portion of food by using the food label. | GP registrars | 2.275 (1.297) | 0 - 5 | 0.149 (-0.310-0.607) | 0.524 |
| Kilojoules per gram of protein, carbohydrate and fat and their basic metabolic roles. | | | | | |
| Avoidance of cross contamination when preparing and storing foods. | Students | 2.126 (1.569) | 0 - 5 | 0 | |
| Examples of serving size of meat or dairy from the Ministry of Health | | | | | |

Table 7.4 GPs, GP registrars and students' confidence towards incorporating nutrition care into practice (n=291) continued

| Items | Group | Mean (SD) | Range | Estimate (95% CI) | P value |
|---|---|---|---|---|---|
| serving guide. | | | | | |
| **Micronutrients (9 items)** | | | | | |
| Indications for the use of single vitamins (ie B, C, E) or multivitamin supplements. | GPs | 3.491 (2.399) | 0 - 8 | 0.950 (0.230-1.670) | **0.010** |
| Scientifically confirmed benefits of St John Wort and Echinacea. | GP registrars | 2.569 (2.193) | 0 - 7 | 0.028 (-0.724-0.779) | 0.942 |
| Role of omega-3 and omega-6 fatty acids in heart health. | | | | | |
| Generalised mechanism for the probiotic use of yoghurt and acidophillis. | | | | | |
| Means of identifying antioxidant–rich food while grocery shopping. | | | | | |
| Role of food constituents in health (phytonutrients, dietary fibre, soy etc). | | | | | |
| Nutrition concerns of patients with GI intolerances, maldigestion or absorption. | Students | 2.541 (2.471) | 0 - 9 | 0 | |
| Reported risks of high protein diets such as Aikens diet. | | | | | |
| Potentially harmful interactions of medications with herbal of botanical supplements. | | | | | |
| **Women infants and children (6 items)** | | | | | |
| Maternal and infant benefits and challenges anticipated with breast | GPs | 4.404 (1.474) | 0 - 6 | 1.092 (0.578-1.606) | **<0.0001** |

Table 7.4 GPs, GP registrars and students' confidence towards incorporating nutrition care into practice (n=291) continued

| Items | Group | Mean (SD) | Range | Estimate (95% CI) | P value |
|---|---|---|---|---|---|
| feeding.<br>Interpretation of growth chart tables and pertinent trends for a child with failure to thrive. | GP registrars | 3.608 (1.372) | 1 - 6 | 0.296 (-0.241-0.833) | 0.278 |
| Advice on feeding an infant with colic, breast versus soy formulas.<br>Common nutrient deficiencies of adolescent women.<br>Calculating the body mass index (BMI) and wait-hip ratio base on gender.<br>Role of genetics, diet and pharmacology in weight loss regimes. | Students | 3.311 (1.874) | 0 - 6 | 0 | |
| **Disease management (5 items)**<br>Recommended dietary patterns for patients with non-insulin dependent diabetes. | GPs | 2.877 (1.415) | 0 - 5 | 0.484 (-0.015-0.982) | 0.057 |
| Recognising warning signs and symptoms of patients with eating disorders. | GP registrars | 2.314 (1.516) | 0 - 5 | -0.080 (-0.600-0.441) | 0.763 |
| Recognition of nutritional risk in elderly patients.<br>Nutrition strategies for persons losing weigh due to chronic cachexia.<br>Indications and contraindications for enteral and parenteral nutrition. | Students | 2.393 (1.778) | 0 - 5 | 0 | |

All groups reported to be confident (>70% agreed) for some areas of nutrition care, such as performing basic nutrition-related skills including calculating body mass index and explaining the influence of alcohol consumption on health. All groups were less confident (<40% agreed) in nutrition skills such as listing the kilojoules per gram of protein, carbohydrate and fat and their basic metabolic roles and describing the role of food constituents in health.

**Discussion**

This study contributes new information on the attitudes and confidence of medical students, GP registrars and GPs in providing nutrition care to patients. All groups displayed positive attitudes and moderate confidence towards incorporating nutrition care into practice. General practitioners displayed more positive attitudes than students for some areas of nutrition care, whereas GP registrars displayed more positive attitudes than students in other areas. While GPs reported greater confidence than students in most areas of nutrition care, there were no differences between the GP registrars and students.

The perception that nutrition care is important is supported by international literature that has studied attitudes to provide nutrition care for students, doctors and educators (9, 16, 129). Previous literature from the USA, suggesting students' attitudes towards nutrition care decline after graduation (129) was not supported in the present study where, overall, GPs placed greatest importance on nutrition care. Similar to international studies, the participants in this study felt more confident discussing the role of nutrition in health and disease than explaining the nutrient composition of foods to patients (16, 129).

General practitioners reported greatest confidence to provide nutrition care, which may be related to their greater experience in this area. However, the increasing focus on multidisciplinary approaches to patient care in tertiary and postgraduate education (259) may

have impacted on GP registrars' perceived role in this area. Further information on New Zealand GPs' nutrition care practices and the influence of these practices on patients' health care outcomes is needed.

There are limitations to this study. Despite differences in response rates, medical students and GP registrars were representative for age and gender, while GPs were older and there were fewer females than the national workforce (65). Many GPs would have trained prior to the inclusion of nutrition syllabus within the GP curriculum, which may have influenced their nutrition knowledge. It's possible that GPs who attended the CME meetings were already interested in nutrition, and this may have resulted in more favourable responses. Furthermore, this study relates to one large urban area in New Zealand and there is a need for caution in generalising the results. Finally, ideally a prospective cohort study design would have enabled an investigation of changes in attitudes and confidence in a single group rather than three disparate groups.

In conclusion, New Zealand medical students, GP registrars and GPs have positive attitudes towards incorporating nutrition care into practice. Lack of confidence by all participants in some areas of nutrition care suggests that strategies to enhance GPs self-efficacy in these areas of nutrition care are required.

# Chapter 8. Impact of an undergraduate course on medical students' self-perceived nutrition intake and self-efficacy to improve their own health behaviours and counselling practices

## Preface

The findings of Study 5 confirm that New Zealand graduating medical students, GP registrars and GPs have positive attitudes towards incorporating nutrition care into practice, and this finding is supported by the international literature (9, 16, 87, 356). GPs have greater confidence than students (Study 5) in providing nutrition care, which suggests that experience and relevance may assist with the further development and increased confidence in providing this care. Medical students, GP registrars and GPs reported a lack of confidence in some areas of nutrition care, suggesting that lack of self-efficacy continues beyond undergraduate training and into practice (Study 4 and Study 5). Medical students, GP registrars and GPs are more confident in explaining the role of nutrition in health and disease than in providing in-depth explanations of the composition of foods (Study 4 and Study 5), suggesting that they lack basic nutrition knowledge; this finding is supported by the results from the focus group study (Study 2).

Given the increasing expectation that New Zealand GPs should provide nutrition care, it is essential that nutrition education in GP registrar training and undergraduate training provides the knowledge, attitudes and skills to enable this important aspect of patient care to be appropriately addressed. A comparison of the results of students' attitudes and skills to providing nutrition care (Study 4) with those of GP registrars and GPs (Study 5) confirms that there are areas of nutrition care in which doctors lack knowledge and self-efficacy. These

findings suggest that the best time to commence nutrition education is during undergraduate training.

The previous five studies have provided data that support investigating whether students' attitudes and self-perceived skills can be improved during training. The current trends in health care in the areas of disease prevention and health promotion are towards providing medical education that focuses on a healing-oriented approach (37); such an approach includes lifestyle courses in core curricula. These courses teach students the effect that their own lifestyle behaviours can have on health outcomes, allowing them to better assist patients in developing and maintaining healthy lifestyle behaviours (36, 38, 170).

A second-year course at the Auckland School of Medicine, "The Digestive System", was adapted to explore the effect of nutrition education in medical training; this course is the place in the curriculum where most of the nutrition education is provided. It was important to assess the effects of this course against one that did not contain nutrition content, in order to confirm the effects of this intervention. Biomedical science students in the same year taking a course that did not contain nutrition content, "The Physiology of Human Organ Systems", served as a control group. Self-reported questionnaires, regarded as reliable indicators of actual dietary change (367), were completed by medical students and control students at the beginning and end of the semester.

Study 6 explores the impact of an undergraduate course containing the majority of the nutrition content in the medical training programme on students' self-perceived nutrition intake and self-efficacy in improving their nutrition behaviours and counselling practices.

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## Abstract

**Aim** Assess the impact of a medical undergraduate course containing nutrition content on medical students' self-perceived nutrition intake and self-efficacy to improve their health behaviours and counselling practices.

**Methods** A total of 239 medical students enrolled in a 12-week nutrition-related course at Auckland School of Medicine were invited to complete an anonymous questionnaire before and after the course. The questionnaire was adapted from a previous evaluation of a preventive medicine and nutrition course at Harvard Medical School.

**Results** Sixty-one medical students completed both pre-and post-course questionnaires (25.5%). At baseline, medical students described their eating habits to be more healthy than non-medical students ($p$=0.0261). Post-course, medical students reported a higher frequency of wholegrain food intake ($p$=0.0229). Medical students also reported being less comfortable making nutrition recommendations to family and friends post-course ($p$=0.008). Most medical students (63.9%) perceived increased awareness of their own dietary choices, and some (15.3%) reported an increased likelihood to counsel patients on lifestyle behaviour post-course.

**Conclusions** Students can increase awareness of their own nutrition behaviour after undertaking a course that includes nutrition in the initial phase of their medical degree. Further investigation of how medical students' confidence to provide nutrition advice evolves throughout their training and in future practice is required.

## Introduction

The prevalence of chronic disease is increasing and is influenced by lifestyle risk factors, including poor nutrition (263). Doctors are increasingly involved in the management of chronic disease and counsel patients about their lifestyle behaviours to improve their health outcomes (267). Nutrition care is a component of chronic disease management and refers to any practice conducted by a health professional that attempts to improve the nutrition behaviour and subsequent health outcomes of an individual (369). Individuals living with chronic disease prefer to receive nutrition care from doctors rather than other health professionals and hold this care in high regard (72, 75).

Historically, medical schools have included limited or no curriculum relating to nutrition and exercise, which has led students to report that they are under-prepared to counsel patients about nutrition and exercise (173, 370). In addition, medical students have been shown to be pessimistic about their ability to learn these skills (166, 371). Medical students' perceptions of the importance of prevention in medicine are related to their own health habits (372). In addition, doctors with healthy personal habits or a desire to improve their own health are more likely to counsel or screen patients regarding preventive health (148, 373, 374). Medical students' counselling practices are improved after health promotion interventions throughout medical school that focus on students' personal health practices (375).

The movement of health care delivery towards disease prevention and health promotion should encourage medical education to focus on lifestyle courses in the core curriculum (37). In these courses, students learn about the influence of their own lifestyle behaviours on health outcomes, the aim of which is to facilitate students to help their patients develop or maintain healthy lifestyle behaviours. The experiences included in lifestyle behaviours courses, such as on healthy eating patterns and physical activity, benefit the students' academic performance,

emotional regulation, and future functioning as doctors (38, 206, 207). Importantly, students report an enhanced understanding of the principles of behaviour change and improved ability to perform behavioural change counselling (36).

The inclusion of nutrition in medical education has not been systematically evaluated in New Zealand. Given the link between medical students' health behaviours and counselling practices, it is important to explore curriculum strategies that have the potential to result in improved health behaviours of medical students. Therefore, the following study assessed the impact of an undergraduate medical course which contained nutrition content to determine its impact on medical students' self-perceived nutrition intake and self-efficacy to improve their health behaviours and counselling practices.

## Methods

This study was an investigation of medical students' nutrition behaviour and self-efficacy to provide nutrition counselling after completing a course with nutrition content as part of their curriculum. The 12-week course, 'The Digestive System' was delivered in Semester 1, 2012 at Auckland School of Medicine. This course covered the structure and function of the gastrointestinal system in health and disease, as well as the digestion and absorption of food components, their metabolic roles and action. Approximately one third of the course was devoted to nutrition content, including 13 hours of contact time and one assessed nutrition practical activity. In the practical activity, students performed dietary recalls on peers and completed a nutritional assessment of their own dietary intake using dietary analysis computer software (FoodWorks, Xyris software, Queensland, Australia). The course did not cover nutrition counselling or behaviour change counselling. However, students concurrently took a course in professional skills which covered behaviour change.

Information relating to the study was provided to 239 enrolled students at the beginning of the semester and all students were invited to participate in the study. Participating students provided informed consent and completed the anonymous, hard-copy questionnaire at the beginning and end of the course in their own time. Student identification numbers were used to link pre- and post- course questionnaires. Demographic data on the overall potential participant sample was obtained from the medical school records. A volunteer convenience sample of undergraduate biomedical science students at the same year-level and enrolled in courses without specific nutrition content, were invited to act as a control group. The control students completed the same questionnaires at the beginning and end of the same semester. Ethical approval was granted by The University of Auckland Human Participants Ethics Committee (Ref. 7786).

The questionnaire sections, rationale, area of inquiry and response type are shown in Table 1.

A self-reported questionnaire was used, as self-reported questionnaires are regarded to be a reliable indicator of actual dietary change (367). The questionnaire was adapted from a previous evaluation of a nutrition course at Harvard Medical School (168). After modifying the questionnaire to be relevant to the New Zealand context, the questionnaire was assessed for face validity by piloting it on four researchers and two university students not involved in the study. The questionnaire assessed students' demographics, dietary patterns including frequency of food intake, exercise patterns and other health behaviours, as well as their confidence in counselling patients and family members about diet and exercise. The end of semester questionnaire repeated the baseline questionnaire items, with two questions added for medical students to assess the perceived influence of the course on their nutrition and exercise behaviours.

**Table 8.1: Survey sections, rationale for investigation and response modes**.

| Survey Section | Rationale for Investigation | Area of inquiry | Response Mode |
|---|---|---|---|
| Self-perception of diet | Provide an indication of perceived personal diet habits in relation to others and over time | Perceived healthiness of overall diet | 5-pt Likert |
| | | Comparison to other individuals | 5-pt Likert |
| | | Perceived change since the start of degree | 5-pt Likert |
| | | Perceived change since start of course[a] | 5-pt Likert |
| Current diet restrictions | Provide an indication of current dietary behaviour | Moderation of fat intake | 4-pt Likert |
| | | Moderation of saturated fat intake | 4-pt Likert |
| | | Moderation of refined carbohydrate intake | 4-pt Likert |
| | | Moderation of salt intake | 4-pt Likert |
| | | Energy content of current diet | 4-pt Likert |
| Confidence to provide dietary recommendations | Assess whether undertaking the course modified students' confidence to provide dietary recommendations | Confidence to provide nutrition recommendations[b] | 4-pt Likert |
| | | Confidence to assess nutrition content of diets[b] | 4-pt Likert |
| | | Confidence in helping patients change their diet[b] | 4-pt Likert |
| Frequency of Food Intake | Assess whether undertaking the course modified students' intake of common foods | Frequency of intake of fruits and vegetables; Whole milk dairy foods; Low fat milk products; Whole eggs; Margarine; Wholegrain foods; Pasta, rice or noodles; Baked products; Beef, pork or lamb as a main dish, Processed meats; Fish, seafood; Deep | 5-pt Likert |

Table 8.1: Survey sections, rationale for investigation and response modes continued

| Survey Section | Rationale for Investigation | Area of inquiry | Response Mode |
|---|---|---|---|
| | | fried foods; Added salt | |
| Dietary supplements | Assess whether undertaking the course modified students' supplement usage | Multivitamin consumption | Dichotomous |
| | | Other supplement consumption | |
| Physical activity | Provide an indication of perceived personal exercise habits in relation to others and over time | Perceived physical activity level | 5-pt Likert |
| | | Comparison to other individuals | 5-pt Likert |
| | | Perceived change since the start of degree | 5-pt Likert |
| | | Perceived change since start of course[a] | 5-pt Likert |
| | | Outdoor walking pace[c] | 5-pt Likert |
| | | Flights of stairs climbed daily[c] | 5-pt Likert |
| Confidence to provide physical activity recommendations | Assess whether undertaking the course modified students' confidence to provide physical activity recommendations | Confidence to provide physical activity recommendations[b] | 5-pt Likert |
| | | Confidence to assess physical activity level of patients[b] | 5-pt Likert |
| | | Confidence in helping patients change physical activity patterns[b] | 5-pt Likert |
| Perceptions of course[d] | Investigates perceived impact of the course on dietary choices, physical activity habits and | Perceived impact on dietary choices | Dichotomous |
| | | Perceived impact on improving dietary choices | Dichotomous |

Table 8.1: Survey sections, rationale for investigation and response modes continued

| Survey Section | Rationale for Investigation | Area of inquiry | Response Mode |
|---|---|---|---|
| | lifestyle behaviour | Perceived impact on exercise choices | Dichotomous |
| | | Other changes in health behaviour or lifestyle | 5-pt Likert |
| | | Confidence to discuss lifestyle behaviours with friends, family and patients | 5-pt Likert |
| General demographics | Allows indication of representativeness of the sample by a comparison with others in group | Year of birth | Multiple Choice |
| | | Gender | Dichotomous |
| | | Ethnicity[e] | Multiple Choice |

[a]*Medical and non-medical students post questionnaire only*
[b]*Medical students pre and post-questionnaire only*
[c]*Medical and non-medical students pre questionnaire only*
[d]*Medical students post-questionnaire only*
[e]*Responses were developed according to the New Zealand Census ethnicity categories*

Almost all the questions on dietary patterns and frequency of food intake and exercise patterns offered a five-point Likert scale, such as “much more”, “somewhat more”, “the same”, “somewhat less” or “much less”. The questions on current diet restrictions offered a four point Likert scale: “always”, “usually”, “sometimes”, “never”. Questions on confidence related to making dietary and physical activity recommendations to family and friends and also included a four-point Likert scale where the students chose from “very comfortable” “somewhat comfortable”, “somewhat uncomfortable” and “very uncomfortable”.

The SAS Version 9.2 (SAS Institute Inc., Cary, North Carolina, USA) was used for all analyses and a $p < 0.05$ was considered significant. During analysis, it was found that some response categories were not selected, so the categories were collapsed down from either five to three or four to two. McNemar’s test was conducted when comparing two response categories, and Chi-square tests were conducted when comparing three or more response categories.

## Results

Seventy-two medical students completed the questionnaire at the beginning of the course. Eleven of these students failed to complete the questionnaire at the end of the semester, and their data was removed from the final analysis. This gave a response rate of 25.5 percent. The demographic characteristics of the participants are described in Table 8.2. There were no differences between the participating and non-participating students in terms of age, gender and ethnicity. However, the participating medical students were an average of 2 years older than the participating non-medical students ($p$=0.004).

**Table 8.2 Demographic characteristics participating students**

| Demographics | Medical students (n=61) | Controls (n=44) |
|---|---|---|
| **Age**[a] (years) (mean ±SD) | 23±5 | 21 ±3 |
| **Gender** | | |
| Male | 23 (37.7%) | 19 (43.2%) |
| Female | 38 (62.3%) | 25 (56.8%) |
| **Ethnicity** | | |
| Pakeha/European | 32 (35.6%) | 23 (52.3%) |
| Asian | 21 (25%) | 12 (27.3%) |
| Maori | 4 (11.4 %) | 1 (2.3%) |
| Pacific Peoples | 2 (11.1%) | 0 (0.0%) |
| Other Minorities | 2 (16.7%) | 8 (18.1%) |

[a]*Participating medical students were an average of two years older than the participating non-medical students (P=0.004)*

Table 8.3 provides a summary of significant findings on questionnaire responses in comparisons between medical and non-medical students and in each group before and after the course. At baseline, the medical students described their eating habits to be more healthy than non-medical students ($p$=0.0261) and reported a higher level of physical activity to the control students ($p$=0.0139). After the course, medical students reported a higher frequency of wholegrain food intake ($p$=0.0229) and lower levels of physical activity compared to the control students ($p$=0.0342). Interestingly, there was no difference in the reported physical activity levels of medical students before and after the course.

**Table 8.3: Significant differences in responses identified in questionnaires**

| Comparison approach | p value |
|---|---|
| ***Comparison between medical students and non-medical students before the course*** | |
| Medical students described their eating habits to be more healthy than non-medical students. | 0.0261 |
| Medical students reported higher levels of physical activity than non-medical students | 0.0139 |
| ***Comparison between medical students and non-medical students after the course*** | |
| Medical students reported a higher frequency of wholegrain food intake than non-medical students. | 0.0229 |
| Medical students reported lower levels of physical activity than non-medical students. | 0.0342 |
| ***Comparison of medical students before and after the course*** | |
| Medical students reported a reduction in confidence in providing nutrition-related counselling to family and friends after completing the course | 0.008 |
| Medical students reported a reduction in processed meat consumption after completing the course | 0.046 |
| ***Comparison of non-medical students before and after the course*** | |
| Non-medical students reported a reduction in vegetable consumption after completing the course | 0.046 |

The medical students provided similar descriptions of their dietary and health-related behaviours between the beginning and the end of the course. Two key findings between baseline and post-course questionnaires were a decrease in the number of medical students who felt ‘very comfortable’ or ‘somewhat comfortable’ knowing enough about nutrition to be comfortable making recommendations to family or friends ($p$=0.008) and a decrease in the number of medical students who ate processed meat ‘less than once per week’ or ‘once per week’ ($p$=0.046).

The control students provided similar descriptions of their dietary and health-related behaviours between the beginning and end of the course. However, at the end of the course

they reported a lower frequency of vegetable consumption compared to the beginning of the course ($p$=0.046).

Most medical students (63.9%, n=39) perceived that the course had made them more aware of their own dietary choices, and approximately half (54.1%; n=33) perceived the course had led to improvements in their dietary choices. Most medical students (83.6%; n=51) perceived that the course had not led them to improve their own exercise choices or to make any other changes in their health behaviour or lifestyle. Only approximately one quarter of medical students (23.8%; n=14) perceived the course had made them more likely to discuss lifestyle behaviours with family and friends, while some medical students (15.3%; n= 9) perceived the course had made them more likely to counsel patients about lifestyle behaviours.

## Discussion

This study assessed the impact of an undergraduate medical course which contained nutrition content on medical students' self-perceived nutrition intake and self-efficacy to improve their health behaviours and counselling practices. Overall, the course resulted in very few significant changes in nutrition and exercise behaviours of medical students, but increased their awareness of dietary choices.

This study found that the course had a significant impact on medical students' awareness of their own dietary choices, but did not necessarily translate into improvements in their own dietary choices. A previous study on medical students in the USA found an increase in awareness of dietary choices, as well as improvements in dietary choices (168). The study reported more students with greater awareness of their dietary choices (87% compared to 64%) and a higher proportion of students reporting improved dietary choices (72% compared to 54%). However, this course was specifically designed to address diet and exercise patterns in medical students and included approximately twice the contact hours compared to the current study. In order to maximise the impact of nutrition courses on medical students' awareness and behaviour, future courses may need to involve more contact time than in the present study. Doctors with healthy personal behaviours are more likely to counsel patients about preventive health, including nutrition and exercise (148, 373, 374). This premise suggests that the medical students in the current study who reported an increased awareness of dietary choices may be more likely to counsel patients about nutrition in the future. Interestingly, other medical schools in Australia and the USA have introduced nutrition and lifestyle courses into their core curriculum, in an attempt to enhance the health of students and improve practices in the future (38, 170). However, these initiatives are relatively recent, and the long-term impact on graduates' counselling practices has not been assessed.

Despite an increase in awareness of their dietary choices and perception of improved dietary choices, medical students in the present study felt less comfortable advising family and friends about diet and exercise after completing the course. This finding is in contrast with Conroy et al., (168) who reported a significant increase in students' confidence to provide this advice. A possible reason for the students not feeling as comfortable advising family and friends may be related to developing a deeper understanding of the complexity of lifestyle behaviour change. Low self-efficacy has been shown to be one of the barriers to provision of nutrition advice in medical practice (11, 12, 129). Therefore, it is of concern that students in the current study felt less comfortable providing nutrition advice after completing the course. However, the decrease in confidence in the present study may be related to the course content which focused on physiological aspects of nutrition, as opposed to behavioural counselling included in the course described by Conroy et al., (168).

The preparation of medical students for counselling patients in nutrition is challenging and previous initiatives have mandated prescribed time dedicated to nutrition in medical curricula (35, 134). Detailed comparison of the present study and the outcomes from Conroy et al., (168) show that two different nutrition courses can produce contrasting outcomes. It is evident that mandating nutrition content within a medical curriculum has the potential to produce a range of outcomes that may not always be desirable. Therefore, the nutrition components that are included in curricula need to be carefully planned and evaluated, in order to achieve best possible preparation of students for future nutrition counselling.

The changes in nutrition behaviour in the current study were generally not as marked as those reported in other studies (167, 168). Previous initiatives in medical nutrition education are highly variable in intent, delivery and depth of content (35, 58). Notably, the current course was primarily didactic in nature, and incorporated a small interactive practical component.

The approach of recent initiatives appear to have transitioned away from didactic education to focus on behaviour change counselling, preventive health and lifestyle modification. Clearly, future delivery of the current course may benefit from incorporating these concepts into its content and delivery.

Adapting nutrition content within medical curricula to best meet the needs of students, as well as policy-based initiatives, is challenging. Students often report dissatisfaction with nutrition education received during their medical training, principally that insufficient time is devoted to teaching nutrition (58). As a result, students may be confident in their ability to address basic nutrition concepts but then lack confidence in their ability to address specific nutritional requirements for different population groups in relation to the role of nutrition in the treatment of disease, and in their ability to identify credible nutrition information (58). Enhancing the nutrition education in medical curricula is difficult, due to the competition for time in the curriculum and resistance to adding new courses (134). Possible approaches include horizontal and vertical integration of nutrition concepts, although there is no clear consensus on the best way to implement the topics and objectives that a medical nutrition curriculum should cover (35, 187).

The current study has some notable strengths and limitations. The strengths of the study are that this is the first study in New Zealand to evaluate whether exposing medical students to nutrition education can improve their own nutrition behaviour and subsequent self-efficacy to provide nutrition counselling. However, a limitation of this study is that the changes observed may not reflect an overall change in the cohort of medical students, due to a relatively small sample size. The response rate in the current study was lower than previous evaluations of nutrition-related courses (168) which may be due to the voluntary nature of questionnaires, importance placed on contributing to evaluations, or the high workload of students. While it

is desirable to measure behaviours of students after receiving nutrition education, further evaluation is required to investigate their nutrition counselling practices and the subsequent impact on patients' health outcomes in the future.

In conclusion, students can increase awareness of their own personal nutrition behaviour after undertaking a course that includes nutrition content in the initial stages of their medical degree. However, only subtle changes in actual behaviour were suggested in this study. Further investigation of how medical students' confidence to provide nutrition advice evolves throughout their training and in future practice is required. In addition, ongoing attention on the optimal approach to incorporate nutrition education into medical education is also required.

# Chapter 9: Conclusions

## 9.1 Preface

This research has provided insight into the self-perceived competence of GPs, medical students, and GP registrars and GPs in providing nutrition care. Given that New Zealand medical education is not yet competency based, these factors were investigated through a number of methods. GPs' opinions and practices regarding providing nutrition care to patients with chronic disease were investigated through focus groups. Medical students', GP registrars' and GPs' attitudes to, confidence, and self-perceived skills in providing nutrition care were assessed. Furthermore, a study was performed to determine the impact of a training course containing most of the New Zealand medical training curricula's nutrition education on medical students' self-perceived nutrition intake and self-efficacy in improving their health behaviours.

## 9.2 Summary of research on medical students, GP registrars and GPs

The main findings of each research study are outlined in Table 9.1.

**Table 9.1: Overview of the aims of the thesis and the main findings of each research study.**

| Study | Research Aim(s) | Main Findings |
|---|---|---|
| Study 1 | Critically review the international literature on the approaches taken to improving the nutrition knowledge and skills and overall capacity of GPs to provide nutrition care, and their appropriateness in the New Zealand context. | Each approach focuses on different aspects of nutrition care delivery.<br>1. Medical nutrition education provides opportunity for linear translation between desired objectives and curriculum learning objectives.<br>2. CME allows for tailored nutrition education to increase nutrition competencies for identified learning needs.<br>3. The GP-centred approach focuses on determinants of nutrition care provision by GPs for improving nutrition care delivery.<br>4. The practice-setting approach increases nutrition-related exposure to patients through avenues independent of the GP. |
| Study 2 | Explore GPs' opinions regarding providing nutrition care to patients with chronic disease. | 1. GPs routinely provide some nutrition care to patients.<br>2. GPs' provision of nutrition care is limited by consultation time and competence.<br>3. GPs require additional preparation in cultural diversity to reflect cultural, social and economic components of patient-centred care.<br>4. GPs opinions varied on perceived benefits in developing regularly required nutrition knowledge.<br>5. GPs gave qualified support for PNs providing nutrition care. |
| Study 3 | Assess, compare and contrast existing nutrition curriculum | 1. All countries except the Republic of Ireland have curriculum guidelines to inform medical schools in nutrition education. |

Table 9.1: Overview of the aims of the thesis and the main findings of each research study continued

| Study | Research Aim(s) | Main Findings |
|---|---|---|
| | guidelines for undergraduate medical education in the USA, Canada, UK, Republic of Ireland, Australia and New Zealand. | 2. Differences in scope and detail of nutrition curriculum guidelines may influence the nutrition education provided to medical students and the subsequent nutrition care provided by doctors in these countries.<br>3. Consideration is required as to how to monitor and evaluate the nutrition competence of doctors in relation to routine healthcare practices and the impact of competency levels on patient nutrition behaviour and health outcomes. |
| Study 4 | Describe Auckland School of Medicine students' attitudes to, and self-perceived skills in, providing nutrition care in practice, as well as perceived quantity and quality of nutrition education received in training. | 1. Students believed that incorporating nutrition care into practice is important, yet they were less confident that patients would improve nutrition behaviours after receiving this care.<br>2. Students confident in skills related to nutrition in health and disease, and less confident in their skills related to in-depth knowledge of food composition.<br>3. Students perceived the quantity and quality of nutrition education received to be good.<br>4. Investigations beyond training may be required to determine whether additional nutrition education is required. |
| Study 5 | Describe and compare medical students', GP registrars' and GPs' attitudes toward incorporating nutrition care into practice, and their self- | 1. Medical students, GP registrars and GPs have positive attitudes and moderate confidence towards incorporating nutrition care into practice.<br>2. GPs' experience in providing nutrition care appears to contribute greater confidence to their provision of such care. |

Table 9.1: Overview of the aims of the thesis and the main findings of each research study continued

| Study | Research Aim(s) | Main Findings |
|---|---|---|
| | perceived skills in providing nutrition care. | 3. Strategies to facilitate medical student, GP registrars and GPs developing greater confidence in providing nutrition care are warranted. |
| Study 6 | Assess the impact of a medical undergraduate course containing nutrition content on medical students' self-perceived nutrition intake, and their self-efficacy in improving health behaviours and counselling practices. | 1. Students' awareness of their own nutrition behaviour and dietary choices improve after completion of a nutrition course early in their degree.<br>2. Post-course, students were less comfortable advising family and friends about diet.<br>3. Investigation of how students' confidence in providing nutrition care evolves throughout training is required. |

*GP = general practitioner; PN = practice nurse*

In Study 1, international literature was critically reviewed for approaches designed to improve the nutrition knowledge, skills and overall capacity of GPs in providing nutrition care. Each approach focused on a different aspect of nutrition care delivery in the general practice setting: medical education; CME; GP-centred approaches; and practice-setting approaches. The medical nutrition education approach provides an opportunity for linear translation between nutrition competencies and curriculum learning objectives; however, this approach may require the redevelopment of New Zealand GPs' nutrition competencies if it is to be implemented. The CME approach allows for nutrition education to be tailored once a learning need is identified. In New Zealand, this approach is hindered by the limited availability of CME opportunities in nutrition and a lack of defined competency criteria. The GP-centred approach focuses on the determinants of nutrition care provision, such as GP-perceived barriers and communication styles. This approach would require constant intervention, which suggests that it might not ultimately address the initial problem of inadequate competencies possessed by graduating GPs.

In the New Zealand context, it is unlikely that one approach will comprehensively address this topic. Therefore, judicious consideration should be given to the international approaches before any are implemented in New Zealand. There is also a need to develop multifaceted evaluation tools to ensure that approaches to improving GPs provision of nutrition care not only increase knowledge and skills but also result in improved patient outcomes.

Study 2 explored New Zealand GPs' opinions and practices regarding the provision of nutrition care to patients with chronic disease. Participant GPs in Study 2 identified the barriers they face in providing nutrition care, which include lack of nutrition knowledge, low nutrition-related self-efficacy, and limited ethnic-specific nutrition competence. GPs

displayed variable opinions on the benefits of further developing their nutrition knowledge and skills, and variable views regarding PNs providing nutrition care. The perceptions of participants in Study 2 reflected the wider literature on this topic, namely the importance of nutrition care, barriers to providing nutrition care and lack of self-efficacy in providing nutrition care (Chapter 4). Given the importance of nutrition care with New Zealand's increasing prevalence of chronic disease and its impact on GP workload, deficits in self-efficacy in nutrition care in undergraduate and postgraduate training warrant further investigation. Participants' identification of ethnic specific nutrition advice as a barrier to providing nutrition care is valid (Study 2 and Crowley et al [under review]) because in recent years, New Zealand's population has become more ethnically diverse (376). This suggests that there is a need for appropriate ethnic-specific nutrition resources to be available. However, participants' lack of self-efficacy in nutrition care and attitudes towards further training in nutrition (Study 2) do not align with the nutrition care competencies expected of GPs in the RNZCGP nutrition curriculum (7). This suggests that the RNZCGP needs to investigate GP registrars' previous nutrition education, as well as practical experience, to ensure that they possess the foundation knowledge on which to build the competencies required in the GP registrar training programme.

In Study 3, existing nutrition curriculum guidelines for undergraduate medical education in the USA, Canada, UK, Republic of Ireland, Australia and New Zealand were assessed; these countries have comparable tertiary education systems, CME programmes, language of delivery and similar population healthcare needs. The aim of this study was to determine if the current New Zealand undergraduate training requirements are appropriate. This review found that all countries except the Republic of Ireland have curriculum guidelines to inform medical schools in undergraduate nutrition education. The curriculum guidelines

predominantly focus on basic nutrition principles, nutrition assessment, the role of nutrition in health, interdisciplinary teamwork and the provision of nutrition counselling. Notable differences exist regarding the scope and detail of the curriculum guidelines, which may influence the nutrition education provided to medical students and the subsequent nutrition care provided by doctors in the countries reviewed. There was little evidence of mandatory enforcement, which means that guidelines may not be incorporated in a consistent manner at all schools within a country; this limits the assumptions that can be drawn about the nutrition competence of doctors based on their country of origin. Consideration is required as to how to monitor and evaluate nutrition competence in doctors in relation to routine health care practices, as well as the impact of competency levels on patients' nutrition behaviour.

In Study 4, medical students at the time of graduation were assessed for their attitude to, and confidence in, providing nutrition care (in lieu of measures of competence). Participant medical students acknowledged the importance of incorporating nutrition care into practice. They reported more confidence explaining nutrition in health and disease than in-depth knowledge of food composition, which supports the literature on this topic. Additionally, medical students were unsure about the ability of patients to improve nutrition behaviours after receiving nutrition care, suggesting a lack of self-efficacy, which was also reported in Study 2. These findings contrast with medical students perceptions that the quantity of nutrition education in undergraduate training was good and suggests that medical students would benefit from role modelling from their instructors as well as more practical experience in providing nutrition care to patients to improve their self-efficacy.

Study 5 extended the findings from Study 4 by using the same survey tool to describe and compare the attitudes of New Zealand medical students, GP registrars and GPs towards

incorporating nutrition care into practice, and to compare their self-perceived skills in providing nutrition care. All participants displayed positive attitudes towards incorporating nutrition care into practice, which extends the finding of Study 4. However, Study 5 revealed that not only do GPs place greater importance on incorporating some aspects of nutrition care into practice than students or GP registrars, but that their experience in providing nutrition care appears to contribute to their greater confidence in this role (used in lieu of measures of competence). All participant groups lacked confidence that patients would improve their nutrition behaviour after receiving nutrition care, suggesting medical students, GP registrars and GPs lack self-efficacy in nutrition care. These findings are in agreement with those of Study 2 and Study 4, and support the wider literature on this topic (Chapter 2). Therefore, despite recognising the importance of nutrition in patient care, participant students, GP registrars and GPs lack self-efficacy: consequently, they may not provide nutrition care as often or as appropriately as would be ideal. This finding is also supported by the wider literature (Chapter 2).

At this point in the research, the importance of nutrition education in undergraduate training and the lack of nutrition knowledge among GPs and have been established. To demonstrate the importance of including nutrition education early in medical training, an intervention was conducted which assessed the impact of a second-year undergraduate course containing nutrition content on medical students' self-perceived nutrition intake and self-efficacy in improving their health behaviours and counselling practices (Study 6). To confirm the impact of the course, medical science students taking a course at the same year level which lacked nutrition content, served as a control group. Post-course, participant medical students reported an increased awareness of their dietary choices and improved dietary behaviour (knowledge and attitude), yet were less confident making nutrition recommendations to

family and friends and counselling patients. This finding illustrates medical students' altered views on the complexity of lifestyle change and the possible need to develop a curriculum that would improve students' nutrition counselling skills - skills that have the potential to result in improved health behaviours and patient outcomes. Therefore, medical students not only need to see their instructors and senior doctors modelling nutrition care as an integral part of patient care, they require practice in these skills as well.

## 9.3 Implications of the Research

The findings of the six research studies and those of the literature review provide a collective and integrated body of research. The findings within this thesis have important implications for the knowledge, attitudes and skills required by graduating medical students to achieve competency in providing nutrition care for patients with chronic disease. These implications have been considered and outlined in accordance with the research framework (of competency including knowledge, attitudes and skills) used in this thesis (Chapter 1, Section 1.2).

### 9.3.1 Implications for medical students, GP registrars and GPs

The summary of the research implications from this thesis are presented in Table 9.2.

**Table 9.2: Summary of research implications for each group within the theoretical framework.**

| Group | Research framework | Research finding | Implications |
|---|---|---|---|
| GPs | Knowledge | 1. Gaps in nutrition knowledge from medical training continue to affect self-efficacy in the provision of nutrition care.<br>2. Limited support for further training inhibits professional development in nutrition care. | 1. Nutrition knowledge may not increase.<br>2. May choose not to provide nutrition care as often as is appropriate. |
| | Attitudes | 1. Have positive attitudes to providing nutrition care.<br>2. Have greater confidence than GP registrars and medical students in providing nutrition care. | 1. Experience may contribute the confidence needed to provide nutrition care. |
| | Skills | 1. Lack self-efficacy in aspects of nutrition care. | 1 Will not provide this care as often as is appropriate. |
| GP registrars | Knowledge | 1. Gaps in nutrition knowledge continue to affect self-efficacy in the provision of nutrition care. | 1. Nutrition knowledge will not increase.<br>2. May choose not to provide nutrition care as often is appropriate. |
| | Attitudes | 1. Have positive attitudes to providing nutrition care. | 1. Likely to retain positive attitudes to providing nutrition care. |
| | Skills | 1. Less confident than experienced GPs at providing nutrition care. | 1. Confidence to provide nutrition care may increase with experience. |

Table 9.2: Summary of research implications for each group within the theoretical framework continued

| Group | Research framework | Research finding | Implications |
|---|---|---|---|
| Students | Knowledge | 1. Gaps in nutrition knowledge exist. | 1. Gaps in nutrition knowledge affect ability to provide future nutrition care. |
| | Attitudes | 1. Have positive attitudes to providing nutrition care. | 1. Positive attitudes to providing nutrition care. |
| | Skills | 1. Lack confidence in skills in providing nutrition care. | 1. Students may not provide this care as often as appropriate once they are practicing. |

New Zealand GPs experience multifaceted barriers to providing nutrition care (lack of time, lack of nutrition education, lack of self-efficacy and lack of resources as found in Study 2, Study 5). Despite GPs positive attitudes to nutrition care, unless these barriers are removed, GPs' nutrition knowledge and self-efficacy in nutrition care will not improve. These factors are important because they are known to affect the decision to provide this care (83), and unless improved, nutrition care may not be provided as often as is appropriate (264). Lack of nutrition care from GPs could impact on patients' nutrition behaviour and future outcomes. Similar to GPs, GP registrars and medical students have positive attitudes to providing nutrition care, but lack nutrition knowledge and may lack self-efficacy. As with GPs and GP registrars, students may choose not to provide this care in situations where its provision would be ideal (264).

Unless students are well prepared with knowledge and experience in clinical practice in all medical disciplines, they will not gain the confidence required to provide appropriate nutrition care and are unlikely to consider nutrition options when caring for patients in their future medical careers.

## 9.4 Recommendations for GPs

At present, it is not known if the barriers to providing nutrition care (lack of time, lack of nutrition education, lack of resources and patients' reluctance to change) are more pervasive than the enablers (patient trust in GPs and the expectation of GPs to provide nutrition care). Reducing the barriers experienced by GPs to providing nutrition care would improve the quantity and quality of nutrition care provided.

GPs need to be supported if they are to provide nutrition care. To address the barrier of lack of time to provide nutrition care in standard consultations, for patients living with diabetes, there is the potential for GPs to use the free annual review consultation (known as "Get Checked") to address their nutrition care (324). When GPs focus on nutrition care in a consultation, it demonstrates to patients the importance of this aspect of care in chronic disease management. Additionally, in The Netherlands a tool for nutrition management embedded in patient managements systems provides a record of the consultations and a reference for GPs in future consultations (110).

Another means to support GPs in providing nutrition care is the development of a strategic tool for risk-management identification and/or stratification of patients; this could allow for the identification of patients who would benefit from targeted nutrition interventions when they visit their GP (377). Such a tool could similarly be used to support the systematic targeting of specific population groups. This could supplement the tool currently being trialled in New Zealand for weight management in primary care, (330).

It is imperative that the RNZCGP investigate GPs' lack of nutrition knowledge identified in this research (Study 2). GPs' lack of nutrition knowledge may be related to the number of years since graduation, the fact they did not receive significant nutrition education when training, or that nutrition as a component of patient care was not role modelled or mentored with GP registrars. Whatever the reason, it is of concern that experienced GPs in New Zealand do not feel that they have sufficient nutrition knowledge to be confident in providing nutrition care, especially when nutrition care is a crucial component of chronic disease management. Therefore it is recommended that the RNZCGPs investigate and address GPs nutrition knowledge deficits to enable them to have the expected competencies identified in the GP registrar training programme.

In recent years, there has been growing recognition of the need for health professionals to be better trained in nutrition so that they may contribute to improved population health (378). As with medical nutrition education, it is suggested that competencies should be a key aspect of any educational and training model used for health professionals (261). In the New Zealand context, if nutrition education becomes part of health professionals' education, this would address GPs' concerns regarding PNs' lack of nutrition knowledge and competence in the provision of nutrition care. An example of PNs providing nutrition care in general practice would be a situation in which PNs provide nutrition information when screening large numbers of patients for chronic disease (8).

Patients are more likely to modify their lifestyle's when GPs and dietitians work together with individuals and their families in their communities (325, 326). In New Zealand, there is support for increased numbers of dietitians in primary care (8). Employing dietitians in primary care could provide early nutrition intervention to help reduce the anticipated increase

in GP workload related to the increased prevalence of chronic disease. There is evidence that dietetic input at a primary care level has substantive positive economic benefits (8), and dietitians may serve as role models to GPs in providing nutrition care. However, among the participants in the focus groups (Study 2), there were some GPs for whom nutrition care was not a priority. In addition, a model of service delivery for dietitians in primary care could be challenging to implement. The key recommendations for GPs are presented in Table 9.3.

**Table 9.3: Recommendations to support GPs provide nutrition care**

| Group | Support for GPs | Rationale |
|---|---|---|
| Ministry of Health | 1. Recommend GPs address nutrition care at patients with diabetes "Get Checked" consultation. | To educate patients with diabetes regarding the importance of nutrition care in management of diabetes. |
| RNZCGP | 2. Develop tool for risk management identification of patients. | To identify patients who could benefit from targeted nutrition care interventions during consultations. |
| RNZCGP | 3. Conduct a nationally representative sample of focus groups using PHOs. | To determine GPs' attitude to providing nutrition care nationally. |
| RNZCGP | 4. Develop tool to assess GPs knowledge attitudes and skills to provide nutrition care. | To determine if GPs experience nutrition knowledge, attitudes and skills deficits. |
| RNZCGP | 5. Based on the findings of 3 and 4, review GP registrar nutrition education. | To enable GPs to provide nutrition care to patients when appropriate. |
| PHOs, NZ Dietetic Association | 6. Establish PHO networks for GPs and dietitians. | To facilitate interprofessional collaboration between PHO dietitians and GPs (where dietitians are employed). |

## 9.5 Recommendations for medical education

The inclusion of nutrition education early in undergraduate training is beneficial for students' nutrition knowledge and future modelling of positive nutrition behaviours. Ideally, an increased time allocation for teaching nutrition within the curriculum would be desirable. However, it may be difficult to accommodate more nutrition education into an already overcrowded medical curriculum. Therefore, alternative and innovative methods of increasing nutrition education in medical training are required. Table 9.4

In Australia, the development of the web-based competency tool kit (WNCIT) for entry-level medical courses provides medical schools with tools and resources to enable staff to effectively embed nutrition into the medical curriculum (379). The toolkit includes the learning outcomes derived from the four knowledge and five skill-based nutrition competencies included in the AMC Competency Framework (379), medical students require to identify and appropriately address nutritional risk in their patients. These nutritional competencies and learning outcomes have been refined and expanded to include topic content relevant to each of the four knowledge and five skill-based competencies and have been trailed in four key medical schools (379). This activity could be completed by the Curriculum Committee at Auckland School to align their medical curriculum to the competency framework. It may be possible for New Zealand's medical schools to work together on this activity.

Alignment of the medical curriculum to the competency framework by the Curriculum Committee would allow medical educators to identify gaps where nutrition content could be embedded in the new case-based curriculum Auckland Medical School is now moving

towards. Thus, medical educators will meet the recommended AMC guidelines. At one Australian medical school, it is a priority that learning outcomes within their medical course meet the AMC Graduate Outcomes (379).

The Assessment Board Committee of medical programmes could increase the nutrition content included in OSCEs that examine clinical skills. This would reinforce the importance of clinical nutrition skills in the integrated case-based curriculum and reinforce the importance of nutrition as a component of patient care in medical education for medical students and medical educators.

The Curriculum Committee should initiate a cohort study of all medial students at the beginning of each year, for four years using the NUTCOMP assessment tool (380, 381). This cohort study would through self-perceived competence identify gaps in medical students' knowledge and skills. The results of this cohort study could form part of the evaluation of medical educators' attempts to embed gaps in nutrition knowledge and skills across the case-based medical curriculum.

In the USA, "The Nutrition in Medicine Program" (NIM) has been successfully used by many medical schools across the country to implement nutrition into medical education curricula (35). NIM, an online modular programme, covers more than 30 nutrition topics that focus on knowledge and clinical skills appropriate for the topic (35). For example, the dietary assessment module teaches students how to conduct a brief nutrition assessment (2 minutes) by asking targeted questions. Patients who consume low fat diets can be at risk of low antioxidant intake. In such instances, students are directed to focus on vitamin E, vitamin C and carotenoid intake. To proceed through the module, students select from a range of

questions to ask the patient. Upon the student selecting the correct answer, the response may produce red flags on the screen for each nutrient in question, alerting the student to the patient's low antioxidant intake. The module provides the opportunity for students to reinforce this learning with information on key concepts, assessment and feedback activities and practical cases (382). The use of NIM modules could be considered as a means of reinforcing nutrition skills development in the New Zealand context, although modifications would be needed. The key recommendations for medical education are presented in Table 9.4.

**Table 9.4: Key recommendations for medical students**

| Group at Auckland School of Medicine | Recommendation | Rationale |
|---|---|---|
| Curriculum Committee | 1. Review nutrition content using WNCIT[1] | It is the best available tool to determine nutrition content in the undergraduate curriculum |
| Medical nutrition educators | 2. Integrate/embed identified gaps into case-based curriculum, across other content areas. | To meet the recommended AMC guidelines [(19)]. |
| Assessment Board Committee | 3. Increase nutrition skills content in OSCEs and exams to cover nutrition knowledge. | Assessment drives learning [(383)]. |
| Curriculum Committee | 4. NUTCOMP[2] cohort study for four years using every student at the beginning of the year. | Identify gaps in knowledge and skills through self-perceived competence. |
| Medical nutrition educators | 5. Support medical education with a model for teaching activities translated for New Zealand based on NIM. | Facilitates medical nutrition education and reinforces learning. |

[1]WNCIT [(379)]
[2]NUTCOMP [(380)]

## 9.6 Recommendations for further studies

As a result of the research conducted as part of this thesis, six recommendations for further research have been made. Each recommendation, and a rationale, is described below.

1**.** *Assess the nutrition knowledge, attitudes and skills of student health professionals.*
Recently, a validated tool has been developed to test health care professionals' self-perceived competence to counsel in nutrition (380). The NUTCOMP tool overcomes the limitations of the tools used in this research, such as a lack of systematic validation and associated limitations, such as assumptions about ideal nutrition care practice, including only one domain of competence and not being focused on nutrition as it relates to the prevention and management of chronic disease (380). This tool could be used to assess New Zealand health professionals to help determine the need for nutrition education in their training. In turn, this will inform the design of strategies for implementation in health professional education that ultimately will lead to interdisciplinary approaches to the provision of nutrition care, as recommended in the international literature (259). The effectiveness of these strategies could be evaluated using RCTs.

2. *Develop strategies to improve medical students' nutrition-related self-efficacy and counselling skills.*
It is important to investigate the New Zealand context for appropriate ways for students to improve their self-efficacy in providing nutrition care. Study 5 demonstrated that medical students lack self-efficacy in the provision of nutrition care, which may be related to insufficient experience in nutrition counselling. It is essential to understand how to improve

students' self-efficacy in providing nutrition care in order to facilitate the development of competency. Within this research, different patient populations should be investigated to determine whether the practices required for student self-efficacy are consistent with, or dependent on the characteristics of the patients. This would be beneficial for the development of approaches appropriate for different population groups to be used by students.

3. *Investigate nutrition competencies in the RNZCGP training programme.*

Study 2 and Study 5 identified that GPs have nutrition knowledge deficits and lack self-efficacy in providing nutrition care. The current nutrition syllabus in the RNZCGP training programme specifies the competencies that should be taught over the 3 years of medical training. However, this programme may not be facilitating the learning experiences necessary for developing nutrition competencies. Therefore, clarification any deficits in GPs' nutrition knowledge is required to enable the RNZCGP to facilitate nutrition learning experiences that better align with the nutrition competencies in their training programme. Within this research, different populations of GPs should be investigated to determine if nutrition knowledge deficits apply to all GPs or vary according to time (and experience) since completing training, the country of training or other GP characteristics. This would supplement current understanding of GPs knowledge deficits by identifying groups requiring additional support to achieve nutrition competency.

4. *Investigate GP inter-professional collaboration in the provision of nutrition care.*

Study 4 suggested that a lack of time is a barrier in terms of GPs providing nutrition care. While nutrition care is recognised as an important and integral component of chronic disease management, it is generally only superficially addressed in general practice (9). Clarifying how GPs understand and practice inter-professional collaboration as an approach to providing

nutrition care will enable GPs to explore their approach in this area, which could contribute to improved eating behaviours and health outcomes. Within this research, different GP populations should be investigated to determine if feasibility is dependent on the characteristics of the GPs. This would be beneficial because it will identify those GPs who may require additional support for effective interprofessional collaboration.

5. *Measure the utility of different existing nutrition tools for practice*

Currently, an evidence-based tool is being developed for the Ministry of Health for use in New Zealand, and is due to be trialled nationally in 2015 (330). Other evidence-based tools were identified in Study 2. These resources would need to be adapted for use in the New Zealand context by an expert in nutrition with relevant knowledge of the nutrition practices and requirements of specific ethnic groups, especially given the diversification of New Zealand. Research would then be required to determine which tools will be effective in improving patient food behaviours and health outcomes. The type of evidence-based tool used may depend on the community resources available and GP characteristics.

6. *Investigate methods of providing relevant and appealing nutrition CME.*

The field of nutrition evidence continues to evolve. It is imperative that GPs keep abreast of developments in order to maintain their competency in nutrition care. Clarifying the type of CME programme that would engage GPs and which would inform them of developments would aid ongoing competency. An interactive online nutrition education course for which GPs received RNZCGP MOPS credits could be developed, trialled and evaluated. If successful, an online nutrition course could be introduced within the RNZCGP CME programme. This would benefit current understanding of GPs' CME needs by providing a tool to address nutrition CME.

# Appendices

# Appendix 1. Chapter 6: Ethics approval

Research Integrity Unit

Private Bag 92019
Auckland, New Zealand

Telephone: 64 9 373 7599
Extension: 87830 / 83761
Facsimile: 64 9 373 7432

30-Jul-2012

**MEMORANDUM TO:**

Dr Clare Wall
Nutrition

**Re: Application for Ethics Approval (Our Ref. 7785)**

The Committee considered your request for change for your project titled **Exiting student self-assessment in nutrition competency and efficacy in patient nutrition counselling** on 30-Jul-2012.

The Committee approved the following amendments:

The expiry date for this approval is 11-Jan-2015.

If the project changes significantly you are required to resubmit a new application to the Committee for further consideration.

In order that an up-to-date record can be maintained, it would be appreciated if you could notify the Committee once your project is completed.

The Chair and the members of the Committee would be happy to discuss general matters relating to ethics approvals if you wish to do so. Contact should be made through the UAHPEC secretary at humanethics@auckland.ac.nz in the first instance.

All communication with the UAHPEC regarding this application should include this reference number: **7785**.

*(This is a computer generated letter. No signature required.)*

Secretary
University of Auckland Human Participants Ethics Committee

c.c. Head of Department / School, Nutrition
Ms Jennifer Crowley
Prof Lynnette Ferguson

**Graduating Medical Student Nutrition Survey**

This questionnaire assesses your approach to and perceived nutrition proficiency in patient counselling skills. It takes about 15 minutes to complete.
You will receive a summary of the questionnaire responses.

**Anonymity and confidentiality**

Please do not write your name on this questionnaire. Circle the number that best indicates your response.
We plan to write up this study for publication. No individual student will be identified in any publication or report.

This project has been APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 26/01/2012 FOR (3) YEARS Reference number 7785.

**Section A**

**Physician Approach**

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Always agree** |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 1 | Nutrition counselling should be part of routine care by all doctors, regardless of speciality. | | | | | |
| 2 | It is important that I address the importance of diet whenever I care for a patient. | | | | | |
| 3 | Patient motivation is essential to achieving dietary change. | | | | | |
| 4 | Doctors can have an effect on a patient's dietary behaviour if they take the time to discuss the problem. | | | | | |
| 5 | All doctors regardless of specialty, should counsel high-risk patients about dietary change. | | | | | |
| 6 | It is important that I perform at least some nutritional assessment with every patient. | | | | | |
| 7 | A change toward a healthier lifestyle is important at any stage of life. | | | | | |
| 8 | Patients will change their eating patterns only if faced with a significant health problem (eg heart attack). | | | | | |
| 9 | It is important that I assess each patient's stage of change before initiating dietary intervention. | | | | | |
| 10 | Most patients will try to change their lifestyle if I advise them to do so. | | | | | |
| 11 | I have an obligation to improve the health of my patients | | | | | |

| | | Strongly disagree | Disagree | Neutral | Agree | Always agree |
|---|---|---|---|---|---|---|
| | including discussing nutrition with them. | | | | | |
| 12 | It is important that wherever possible recommend diet changes before initiating drug therapy. | | | | | |
| 13 | Most doctors are not adequately trained to discuss nutrition with patients. | | | | | |
| 14 | It is important that I advocate a low-fat diet for weight control. | | | | | |
| 15 | Patients will rarely change their behaviour if they do not have active symptoms of disease. | | | | | |
| 16 | After receiving nutrition counselling, patients with poor eating habits will make major changes in their eating behaviour. | | | | | |
| 17 | It is important that I assist paediatric patients to establish healthy eating patterns early to prevent risk of chronic diseases. | | | | | |
| 18 | Nutrition assessment should be included in any routine appointment, just like any diagnosis and treatment. | | | | | |
| 19 | It is important that I encourage patients to ask diet-related questions and refer them for additional assistance when warranted. | | | | | |
| 20 | Specific advice about how to make dietary changes could help some patients improve their dietary habits. | | | | | |
| 21 | My patient education efforts will be effective in increasing patients' compliance with nutritional recommendations. | | | | | |
| 22 | Nutrition counselling is not effective use of my professional time | | | | | |
| 23 | It is important that I assess each patient's intake of vitamin, mineral and dietary supplements. | | | | | |
| 24 | Patients need specific instructions about how to change their eating behaviour. | | | | | |
| 25 | After receiving nutrition counselling, patients with poor eating patterns will make moderate changes in their eating behaviour. | | | | | |
| 26 | It is important that I evaluate patient's alcohol intake as part of their overall nutritional status. | | | | | |
| 27 | Patients need ongoing counselling following my initial instruction to maintain behaviour changes consistent with a healthier diet. | | | | | |
| 28 | It is important that I advocate diet and activity balance to promote weight control. | | | | | |
| 29 | Patients are not motivated to make changes unless they are sick. | | | | | |
| 30 | It is important that I assess paediatric patients to establish healthy eating habits early to prevent risk for chronic diseases. | | | | | |

**Patient Counselling**

How confident do you feel on performing the following skills?

| | | Not confident | Somewhat unconfident | Neutral | Confident | Very confident |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 1 | Implementing strategies for osteoporosis prevention, including nutrition and lifestyle. | | | | | |
| 2 | Assessing total kilojoules and saturated fat per portion of food by using the food label. | | | | | |
| 3 | Explaining the significance of modest weight loss for patients with type two diabetes. | | | | | |
| 4 | Explaining the kilojoules per gram of protein, carbohydrate and fat and their basic metabolic roles. | | | | | |
| 5 | Giving an explanation of the probiotic use of yoghurt and acidophillus. | | | | | |
| 6 | Giving a means of identifying antioxidant-rich produce while grocery shopping. | | | | | |
| 7 | Explaining the overall benefits of aerobic exercise on health and well-being. | | | | | |
| 8 | Explaining the role of water and hydration in health and fluids needs on activity level and age. | | | | | |
| 9 | Calculating of body mass index (BMI) and waist-hip ratio based on gender. | | | | | |
| 10 | Explaining the scientifically confirmed benefits of St John Wort and Echinacea. | | | | | |
| 11 | Indicating the use of single vitamins (ie B, C, E) or multivitamin supplements. | | | | | |
| 12 | Explaining the role of omega-3 and omega-6 fatty acids in heart health. | | | | | |
| 13 | Addressing nutrition concerns of patients with GI intolerances, maldigestion or malabsorption. | | | | | |
| 14 | Explaining the reported health risks of high protein/high fat diets such as the Aitkins diet. | | | | | |
| 15 | Explaining the maternal and infant benefits and challenges anticipated with breast feeding. | | | | | |
| 16 | Explaining avoidance of cross contamination when preparing and storing foods. | | | | | |
| 17 | Explaining common nutrient deficiencies of adolescent women. | | | | | |
| 18 | Explaining the role of genetics, diet and pharmacology (Xenecal, Duromine) in weight loss regimes. | | | | | |

| | | Not confident | Somewhat unconfident | Neutral | Confident | Very confident |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 19 | Giving advice on breast feeding or formula feeding an infant with colic. | | | | | |
| 20 | Giving examples of serving size of meat or dairy from the Ministry of Health serving guide. | | | | | |
| 21 | Explaining the role of food constituents in health (phytonutrients, dietary fibre, soy etc). | | | | | |
| 22 | Explaining potentially harmful interactions of medications with herbal or botanical supplements. | | | | | |
| 23 | Defining moderate alcohol consumption and its role in health and disease. | | | | | |
| 24 | Giving nutrition strategies for persons losing weight due to chronic cachexia. | | | | | |
| 25 | Recognising warning signs and symptoms of patients with eating disorders. | | | | | |
| 26 | Interpreting growth chart tables and pertinent trends for a child with failure to thrive. | | | | | |
| 27 | Explaining the indications and contraindications for enteral and parenteral nutrition. | | | | | |
| 28 | Explaining the role of dietary cholesterol and saturated fats in elevating blood lipids. | | | | | |
| 29 | Recommending dietary patterns for patients with non-insulin dependent diabetes. | | | | | |
| 30 | Recognising nutritional risk in elderly patients. | | | | | |

**Nutrition Education**

| | | **Very poor** | **Poor** | **Good** | **Very good** | **Excellent** |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | How would you rate the quantity of nutrition education in your undergraduate medical degree? | | | | | |
| 2 | How would you rate the quality of nutrition education in your undergraduate medical degree? | | | | | |

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Always agree** |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 3 | There is a role for practice nurses to provide nutrition education to patients when referred by the doctor. | | | | | |
| 4 | Patients requiring detailed nutrition counselling require referral to a dietitian/nutritionist. | | | | | |
| 5 | Doctors require the support of health professionals such as nurses and dietitians to reinforce patient nutrition education. | | | | | |

**Section B**

**Demographic information**

1a. What is your age? _____ years

b. What is your gender? Male/ Female

2. List the Clinical Training Centres that you have been based in this year.

_____
_____
_____
_____
_____

**Thank you for your time and effort.**

# Appendix 2. Chapter 7: Ethics approval

**Office of the Vice-Chancellor**

Research Integrity Unit

The University of Auckland
Private Bag 92019
Auckland, New Zealand

Level 10, 49 Symonds Street
Telephone: 64 9 373 7599
Extension: 87830 / 83761
Facsimile: 64 9 373 7432

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

The University of Auckland
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Auckland 1142
New Zealand

Research Office
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## UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE

19-Oct-2012

**MEMORANDUM TO:**

Dr Clare Wall
Nutrition

**Re: Application for Ethics Approval (Our Ref. 8493)**

The Committee considered your application for ethics approval for your project entitled **GP trainee self assessment of nutrition competency in patient counselling**.

Ethics approval was given for a period of three years.

The expiry date for this approval is 19-Oct-2015.

If the project changes significantly, you are required to submit a new application to UAHPEC for further consideration.

In order that an up-to-date record can be maintained, you are requested to notify UAHPEC once your project is completed.

The Chair and the members of UAHPEC would be happy to discuss general matters relating to ethics approvals if you wish to do so. Contact should be made through the UAHPEC Ethics Administrators at humanethics@auckland.ac.nz in the first instance.

All communication with the UAHPEC regarding this application should include this reference number: **8493**.

*(This is a computer generated letter. No signature required.)*

**GP registrar Nutrition survey**

This questionnaire assesses your approach to and perceived nutrition proficiency in patient counselling skills. It takes about 15 minutes to complete.
You will receive a summary of the questionnaire responses.

**Anonymity and confidentiality**

Please do not write your name on this questionnaire. Circle the number that best indicates your response. We plan to write up this study for publication. No individual student will be identified in any publication or report.

This project has been approved by THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 19/10/2012 FOR (3) YEARS. Reference number 8493.

**Section A**

**Physician Approach**

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Always agree** |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 1 | Nutrition counselling should be part of routine care by all doctors, regardless of speciality. | | | | | |
| 2 | It is important that I address the importance of diet whenever I care for a patient. | | | | | |
| 3 | Patient motivation is essential to achieving dietary change. | | | | | |
| 4 | Doctors can have an effect on a patient's dietary behaviour if they take the time to discuss the problem. | | | | | |
| 5 | All doctors regardless of specialty, should counsel high-risk patients about dietary change. | | | | | |
| 6 | It is important that I perform at least some nutritional assessment with every patient. | | | | | |
| 7 | A change toward a healthier lifestyle is important at any stage of life. | | | | | |
| 8 | Patients will change their eating patterns only if faced with a significant health problem (eg heart attack). | | | | | |
| 9 | It is important that I assess each patient's stage of change before initiating dietary intervention. | | | | | |
| 10 | Most patients will try to change their lifestyle if I advise them to do so. | | | | | |
| 11 | I have an obligation to improve the health of my patients including discussing nutrition with them. | | | | | |
| 12 | It is important that wherever possible recommend diet changes | | | | | |

| | | Strongly disagree | Disagree | Neutral | Agree | Always agree |
|---|---|---|---|---|---|---|
| | before initiating drug therapy. | | | | | |
| 13 | Most doctors are not adequately trained to discuss nutrition with patients. | | | | | |
| 14 | It is important that I advocate a low-fat diet for weight control. | | | | | |
| 15 | Patients will rarely change their behaviour if they do not have active symptoms of disease. | | | | | |
| 16 | After receiving nutrition counselling, patients with poor eating habits will make major changes in their eating behaviour. | | | | | |
| 17 | It is important that I assist paediatric patients to establish healthy eating patterns early to prevent risk of chronic diseases. | | | | | |
| 18 | Nutrition assessment should be included in any routine appointment, just like any diagnosis and treatment. | | | | | |
| 19 | It is important that I encourage patients to ask diet-related questions and refer them for additional assistance when warranted. | | | | | |
| 20 | Specific advice about how to make dietary changes could help some patients improve their dietary habits. | | | | | |
| 21 | My patient education efforts will be effective in increasing patients' compliance with nutritional recommendations. | | | | | |
| 22 | Nutrition counselling is not effective use of my professional time | | | | | |
| 23 | It is important that I assess each patient's intake of vitamin, mineral and dietary supplements. | | | | | |
| 24 | Patients need specific instructions about how to change their eating behaviour. | | | | | |
| 25 | After receiving nutrition counselling, patients with poor eating patterns will make moderate changes in their eating behaviour. | | | | | |
| 26 | It is important that I evaluate patient's alcohol intake as part of their overall nutritional status. | | | | | |
| 27 | Patients need ongoing counselling following my initial instruction to maintain behaviour changes consistent with a healthier diet. | | | | | |
| 28 | It is important that I advocate diet and activity balance to promote weight control. | | | | | |
| 29 | Patients are not motivated to make changes unless they are sick. | | | | | |
| 30 | It is important that I assess paediatric patients to establish healthy eating habits early to prevent risk for chronic diseases. | | | | | |

**Patient Counselling**

How confident do you feel on performing the following skills?

| | | Not confident | Somewhat unconfident | Neutral | Confident | Very confident |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 1 | Implementing strategies for osteoporosis prevention, including nutrition and lifestyle. | | | | | |
| 2 | Assessing total kilojoules and saturated fat per portion of food by using the food label. | | | | | |
| 3 | Explaining the significance of modest weight loss for patients with type two diabetes. | | | | | |
| 4 | Explaining the kilojoules per gram of protein, carbohydrate and fat and their basic metabolic roles. | | | | | |
| 5 | Giving an explanation of the probiotic use of yoghurt and acidophillus. | | | | | |
| 6 | Giving a means of identifying antioxidant-rich produce while grocery shopping. | | | | | |
| 7 | Explaining the overall benefits of aerobic exercise on health and well-being. | | | | | |
| 8 | Explaining the role of water and hydration in health and fluids needs on activity level and age. | | | | | |
| 9 | Calculating of body mass index (BMI) and waist-hip ratio based on gender. | | | | | |
| 10 | Explaining the scientifically confirmed benefits of St John Wort and Echinacea. | | | | | |
| 11 | Indicating the use of single vitamins (ie B, C, E) or multivitamin supplements. | | | | | |
| 12 | Explaining the role of omega-3 and omega-6 fatty acids in heart health. | | | | | |
| 13 | Addressing nutrition concerns of patients with GI intolerances, maldigestion or malabsorption. | | | | | |
| 14 | Explaining the reported health risks of high protein/high fat diets such as the Aitkins diet. | | | | | |
| 15 | Explaining the maternal and infant benefits and challenges anticipated with breast feeding. | | | | | |
| 16 | Explaining avoidance of cross contamination when preparing and storing foods. | | | | | |
| 17 | Explaining common nutrient deficiencies of adolescent women. | | | | | |
| 18 | Explaining the role of genetics, diet and pharmacology (Xenecal, Duromine) in weight loss regimes. | | | | | |

| | | Not confident | Somewhat unconfident | Neutral | Confident | Very confident |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 19 | Giving advice on breast feeding or formula feeding an infant with colic. | | | | | |
| 20 | Giving examples of serving size of meat or dairy from the Ministry of Health serving guide. | | | | | |
| 21 | Explaining the role of food constituents in health (phytonutrients, dietary fibre, soy etc). | | | | | |
| 22 | Explaining potentially harmful interactions of medications with herbal or botanical supplements. | | | | | |
| 23 | Defining moderate alcohol consumption and its role in health and disease. | | | | | |
| 24 | Giving nutrition strategies for persons losing weight due to chronic cachexia. | | | | | |
| 25 | Recognising warning signs and symptoms of patients with eating disorders. | | | | | |
| 26 | Interpreting growth chart tables and pertinent trends for a child with failure to thrive. | | | | | |
| 27 | Explaining the indications and contraindications for enteral and parenteral nutrition. | | | | | |
| 28 | Explaining the role of dietary cholesterol and saturated fats in elevating blood lipids. | | | | | |
| 29 | Recommending dietary patterns for patients with non-insulin dependent diabetes. | | | | | |
| 30 | Recognising nutritional risk in elderly patients. | | | | | |

**Nutrition Education**

| | | **Very poor** | **Poor** | **Good** | **Very good** | **Excellent** |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | How would you rate the quantity of nutrition education in your undergraduate medical degree? | | | | | |
| 2 | How would you rate the quality of nutrition education in your undergraduate medical degree? | | | | | |

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Always agree** |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 3 | There is a role for practice nurses to provide nutrition education to patients when referred by the doctor. | | | | | |
| 4 | Patients requiring detailed nutrition counselling require referral to a dietitian/nutritionist. | | | | | |
| 5 | Doctors require the support of health professionals such as nurses and dietitians to reinforce patient nutrition education. | | | | | |

**Section B**

**Demographic information**

1a. What is your age? _____ years

b. What is your gender? Male/ Female

2. List the Clinical Training Centres that you have been based in this year.

_____
_____
_____
_____
_____

**Thank you for your time and effort.**

## Ethics approval GPs

**Office of the Vice-Chancellor**
Finance, Ethics and Compliance
UoA logo
The University of Auckland
Private Bag 92019
Auckland, New Zealand
Level 10, 49 Symonds Street
Telephone: 64 9 373 7599
Extension: 87830 / 83761
Facsimile: 64 9 373 7432

**UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE (UAHPEC)**
29-Jan-2014
**MEMORANDUM TO:**
Dr Clare Wall
Nutrition
**Re: Application for Ethics Approval (Our Ref. 011080): Approved**
The Committee considered your application for ethics approval for your project entitled **GP self-assessment of nutrition competency in patient counselling**.
We are pleased to inform you that ethics approval is granted for a period of three years. The expiry date for this approval is 29-Jan-2017.

If the project changes significantly, you are required to submit a new application to UAHPEC for further consideration. If you have obtained funding other than from UniServices, send a copy of this approval letter to the Research Office, at ro-awards@auckland.ac.nz. For UniServices contracts, send a copy of the approval letter to the Contract Manager, UniServices.

In order that an up-to-date record can be maintained, you are requested to notify UAHPEC once your project is completed. The Chair and the members of UAHPEC would be happy to discuss general matters relating to ethics approvals. If you wish to do so, please contact the UAHPEC Ethics Administrators at ethics@auckland.ac.nz in the first instance.

Please quote reference number: **011080** on all communication with the UAHPEC regarding this application.

*(This is a computer generated letter. No signature required.)*
UAHPEC Administrators
University of Auckland Human Participants Ethics Committee
c.c. Head of Department / School, Nutrition
Ms Jennifer Crowley

**GP Nutrition Survey**

This questionnaire assesses your approach to and perceived nutrition proficiency in patient counselling skills. It takes about 15 minutes to complete.
You will receive a summary of the questionnaire responses.

**Anonymity and confidentiality**

Please do not write your name on this questionnaire. Circle the number that best indicates your response. We plan to write up this study for publication. No individual student will be identified in any publication or report.

This project has been approved by THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 29/01/2014 FOR (3) YEARS. Reference number 011018.

**Section A**

**Physician Approach**

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Always agree** |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 1 | Nutrition counselling should be part of routine care by all doctors, regardless of speciality. | | | | | |
| 2 | It is important that I address the importance of diet whenever I care for a patient. | | | | | |
| 3 | Patient motivation is essential to achieving dietary change. | | | | | |
| 4 | Doctors can have an effect on a patient's dietary behaviour if they take the time to discuss the problem. | | | | | |
| 5 | All doctors regardless of specialty, should counsel high-risk patients about dietary change. | | | | | |
| 6 | It is important that I perform at least some nutritional assessment with every patient. | | | | | |
| 7 | A change toward a healthier lifestyle is important at any stage of life. | | | | | |
| 8 | Patients will change their eating patterns only if faced with a significant health problem (eg heart attack). | | | | | |
| 9 | It is important that I assess each patient's stage of change before initiating dietary intervention. | | | | | |
| 10 | Most patients will try to change their lifestyle if I advise them to do so. | | | | | |

| | | Strongly disagree | Disagree | Neutral | Agree | Always agree |
|---|---|---|---|---|---|---|
| 11 | I have an obligation to improve the health of my patients including discussing nutrition with them. | | | | | |
| 12 | It is important that wherever possible recommend diet changes before initiating drug therapy. | | | | | |
| 13 | Most doctors are not adequately trained to discuss nutrition with patients. | | | | | |
| 14 | It is important that I advocate a low-fat diet for weight control. | | | | | |
| 15 | Patients will rarely change their behaviour if they do not have active symptoms of disease. | | | | | |
| 16 | After receiving nutrition counselling, patients with poor eating habits will make major changes in their eating behaviour. | | | | | |
| 17 | It is important that I assist paediatric patients to establish healthy eating patterns early to prevent risk of chronic diseases. | | | | | |
| 18 | Nutrition assessment should be included in any routine appointment, just like any diagnosis and treatment. | | | | | |
| 19 | It is important that I encourage patients to ask diet-related questions and refer them for additional assistance when warranted. | | | | | |
| 20 | Specific advice about how to make dietary changes could help some patients improve their dietary habits. | | | | | |
| 21 | My patient education efforts will be effective in increasing patients' compliance with nutritional recommendations. | | | | | |
| 22 | Nutrition counselling is not effective use of my professional time | | | | | |
| 23 | It is important that I assess each patient's intake of vitamin, mineral and dietary supplements. | | | | | |
| 24 | Patients need specific instructions about how to change their eating behaviour. | | | | | |
| 25 | After receiving nutrition counselling, patients with poor eating patterns will make moderate changes in their eating behaviour. | | | | | |
| 26 | It is important that I evaluate patient's alcohol intake as part of their overall nutritional status. | | | | | |
| 27 | Patients need ongoing counselling following my initial instruction to maintain behaviour changes consistent with a healthier diet. | | | | | |
| 28 | It is important that I advocate diet and activity balance to promote weight control. | | | | | |
| 29 | Patients are not motivated to make changes unless they are sick. | | | | | |
| 30 | It is important that I assess paediatric patients to establish healthy eating habits early to prevent risk for chronic diseases. | | | | | |

**Patient Counselling**

How confident do you feel on performing the following skills?

| | | Not confident | Somewhat unconfident | Neutral | Confident | Very confident |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | Implementing strategies for osteoporosis prevention, including nutrition and lifestyle. | | | | | |
| 2 | Assessing total kilojoules and saturated fat per portion of food by using the food label. | | | | | |
| 3 | Explaining the significance of modest weight loss for patients with type two diabetes. | | | | | |
| 4 | Explaining the kilojoules per gram of protein, carbohydrate and fat and their basic metabolic roles. | | | | | |
| 5 | Giving an explanation of the probiotic use of yoghurt and acidophillus. | | | | | |
| 6 | Giving a means of identifying antioxidant-rich produce while grocery shopping. | | | | | |
| 7 | Explaining the overall benefits of aerobic exercise on health and well-being. | | | | | |
| 8 | Explaining the role of water and hydration in health and fluids needs on activity level and age. | | | | | |
| 9 | Calculating of body mass index (BMI) and waist-hip ratio based on gender. | | | | | |
| 10 | Explaining the scientifically confirmed benefits of St John Wort and Echinacea. | | | | | |
| 11 | Indicating the use of single vitamins (ie B, C, E) or multivitamin supplements. | | | | | |
| 12 | Explaining the role of omega-3 and omega-6 fatty acids in heart health. | | | | | |
| 13 | Addressing nutrition concerns of patients with GI intolerances, maldigestion or malabsorption. | | | | | |
| 14 | Explaining the reported health risks of high protein/high fat diets such as the Aitkins diet. | | | | | |
| 15 | Explaining the maternal and infant benefits and challenges anticipated with breast feeding. | | | | | |
| 16 | Explaining avoidance of cross contamination when preparing and storing foods. | | | | | |
| 17 | Explaining common nutrient deficiencies of adolescent women. | | | | | |
| 18 | Explaining the role of genetics, diet and pharmacology (Xenecal, Duromine) in weight loss regimes. | | | | | |

| | | Not confident | Somewhat unconfident | Neutral | Confident | Very confident |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 19 | Giving advice on breast feeding or formula feeding an infant with colic. | | | | | |
| 20 | Giving examples of serving size of meat or dairy from the Ministry of Health serving guide. | | | | | |
| 21 | Explaining the role of food constituents in health (phytonutrients, dietary fibre, soy etc). | | | | | |
| 22 | Explaining potentially harmful interactions of medications with herbal or botanical supplements. | | | | | |
| 23 | Defining moderate alcohol consumption and its role in health and disease. | | | | | |
| 24 | Giving nutrition strategies for persons losing weight due to chronic cachexia. | | | | | |
| 25 | Recognising warning signs and symptoms of patients with eating disorders. | | | | | |
| 26 | Interpreting growth chart tables and pertinent trends for a child with failure to thrive. | | | | | |
| 27 | Explaining the indications and contraindications for enteral and parenteral nutrition. | | | | | |
| 28 | Explaining the role of dietary cholesterol and saturated fats in elevating blood lipids. | | | | | |
| 29 | Recommending dietary patterns for patients with non-insulin dependent diabetes. | | | | | |
| 30 | Recognising nutritional risk in elderly patients. | | | | | |

**Nutrition Education**

| | | **Very poor** | **Poor** | **Good** | **Very good** | **Excellent** |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | How would you rate the quantity of nutrition education in your undergraduate medical degree? | | | | | |
| 2 | How would you rate the quality of nutrition education in your undergraduate medical degree? | | | | | |
| 3 | How would you rate the quantity of nutrition education in GP training? | | | | | |
| 4 | How would you rate the quality of nutrition education in GP training? | | | | | |

| | | **Strongly disagree** | **Disagree** | **Neutral** | **Agree** | **Always agree** |
|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** |
| 5 | There is a role for practice nurses to provide nutrition education to patients when referred by the doctor. | | | | | |
| 6 | Patients requiring detailed nutrition counselling require referral to a dietitian/nutritionist. | | | | | |
| 7 | Doctors require the support of health professionals such as nurses and dietitians to reinforce patient nutrition education. | | | | | |

**Section B**

**Demographic information**

1a. What is your age? _____ years

b. What is your gender? Male/ Female

2. List the Clinical Training Centres that you have been based in this year.

_____
_____
_____
_____
_____

**Thank you for your time and effort.**

# Appendix 3. Chapter 8*:* Ethics approval

**Office of the Vice-Chancellor**

Research Integrity Unit

The University of Auckland
Private Bag 92019
Auckland, New Zealand

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THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

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## UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE

26-Jan-2012

**MEMORANDUM TO:**

Dr Clare Wall
Nutrition

**Re: Application for Ethics Approval (Our Ref. 7786)**

The Committee considered your application for ethics approval for your project titled **Student self-assessment of diet, physical activity and other health-related behaviours** on 26-Jan-2012.

Ethics approval was given for a period of three years.

The expiry date for this approval is 26-Jan-2015.

If the project changes significantly you are required to resubmit a new application to the Committee for further consideration.

In order that an up-to-date record can be maintained, you are requested to notify the Committee once your project is completed.

The Chair and the members of the Committee would be happy to discuss general matters relating to ethics approvals if you wish to do so. Contact should be made through the UAHPEC secretary at humanethics@auckland.ac.nz in the first instance.

All communication with the UAHPEC regarding this application should include this reference number: **7786**.

*(This is a computer generated letter. No signature required.)*

**Questionnaire Student Self-Assessment Exercise (Pre-MBCHB)**

We would like to find out your opinions and practices regarding diet, physical activity and other health related behaviours. Please fill out this questionnaire which takes about 10-15 minutes to complete.

We will compile the responses of students and report aggregate results to the class later in the course. At the end of the course, you will be asked to fill out another questionnaire to measure any changes in attitudes or practices. In order to be able to compare the two questionnaires, we ask you to write your student ID number in the space provided below.

**Anonymity and confidentiality**
Please do not write your name on this questionnaire.
We plan to write up this study for publication. No individual student will be identified in any publication or report. This project was approved by the University of Auckland Human Participants Ethics Committee dated 26/01/2012 for (3) years. Reference number: 7786

**Instructions**

1. **Write your student ID number on your paper.**
2. **Answer each question on the front and back of the pages by marking the one circle or box that best reflects your answer.**
3. **Place your completed questionnaires in the labelled, sealed box at the back of the lecture theatre or in the labelled box at the Student Centre by the 9th March..**

Thank you for your time and cooperation.

Student ID:_____

***These first questions ask you about your opinions and behaviour regarding diet and nutrition***.

1. Which statement best describes your eating habits?
O I eat whatever I want without considering whether or not it is healthy.
O I think that I should eat healthy foods, but usually don‘t.
O I think that I should eat healthy foods and sometimes do.
O I think that I should eat healthy foods and usually do.
O I think that I should eat healthy foods and always do.

2. Compared to ***other people your age***, how healthy do you think your diet is?
O Much healthier.
O Somewhat healthier.
O The same.
O Somewhat less healthy.
O Much less healthy.

3. ***Prior to starting your degree***, how healthy do you think your current diet is?
O Much healthier
O Somewhat healthier
O The same.
O Somewhat less healthy.
O Much less healthy.

4. Do you currently restrict ....

| | **Always** | **Usually** | **Sometimes** | **Never** |
|---|---|---|---|---|
| The amount of fat in your diet? | | | | |
| The amount of saturated fat in your diet? | | | | |
| The amount of refined carbohydrates in your diet? (eg white bread or white rice) | | | | |
| The amount of salt in your diet? | | | | |
| The kilojoules in your diet?(to lose or maintain weight) | | | | |
| Anything else in your diet? If yes, what? | | | | |

5. Which of the following best describes the <u>protein</u> sources in your diet?
O I eat no animal products: no red meat, poultry, fish, dairy products or eggs.
O I eat dairy products and eggs but no red meat, poultry or fish.
O I eat dairy products, eggs and fish but no poultry or red meat.
O I eat dairy products, eggs, fish and poultry but no red meat.
O I eat all types of animal products. (*Please go to question #6*)
O Other (please describe)

5a. If you restrict the protein sources in your diet, what is the reason?
O Overall health.
O Weight control.
O Religious beliefs.
O Ethical or environmental concerns.
O Other (please describe): _____

6. Imagine a friend or family member asked for your advice about nutrition:
(eg “Hey, you’re in medical school, what do you think I should be eating?“)
Do you think you know enough about nutrition to be comfortable making recommendations?
O Yes, I know enough and would be **very comfortable.**
O Yes, I know enough and would be **somewhat comfortable**.
O No, I don’t know enough and would be **somewhat uncomfortable**.
O No, I don’t know enough and would be **very uncomfortable.**

7. How confident are you in your ability to assess the nutritional content of a patient’s diet?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

8. How confident are you in your ability to help a patient change his/her dietary habits?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

***The next questions ask about how often you eat certain foods.***
INSTRUCTIONS: For each question, mark the box indicating how often **on average** you have eaten the item(s) **during the past year**. Remember to include things you cook with. These questions are not intended to assess your total diet and you may not find that all the foods you eat listed.

| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more daily** |
|---|---|---|---|---|---|
| 9. Dark green Leafy Vegetables (Spinach, silverbeet, cos lettuce, bok choy | | | | | |
| 10. Broccoli, Cauliflower, Cabbage, Brussel Sprouts | | | | | |
| 11.Carrots | | | | | |
| 12. Other vegetables (eg peas, corn, green beans, tomatoes, pumpkin) | | | | | |
| 13. Citrus Fruits (eg oranges grapefruit, orange juice and grapefruit juice) | | | | | |
| 14. Other Fruits (eg fresh apples or pears, bananas, berries, grapes, melons) | | | | | |
| 15. Whole Milk Dairy Foods (whole milk, hard cheese, butter | | | | | |
| 16. Low Fat Milk Products (eg low fat/skim milk, yoghurt, cottage cheese | | | | | |
| 17. Whole Eggs | | | | | |
| 18. Margarine | | | | | |

| As before, the following questions refer to your **usual** food intake during **the past year.** | | | | | |
|---|---|---|---|---|---|
| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more per day** |
| 19. Whole grain foods (eg whole grain breads, brown rice) | | | | | |
| 20. Pasta, Rice, Noodles | | | | | |
| Baked Products (biscuits, muffins, crackers, cakes, pastries) | | | | | |
| 22. Beef, Pork or Lamb as Main Dish | | | | | |
| 23. Processed Meats (ham, sausages, salami, bacon, luncheon meat, frankfurters) | | | | | |
| 24. Fish/Seafood (not fried, but grilled, baked, poached, canned) | | | | | |
| 25. Deep Fried foods (deep fried chicken, fish or seafood; fries, onion rings) | | | | | |
| 26. How often do you add salt to food at the table? | | | | | |

**27. Do you currently take a multi-vitamin supplement?**

O NO O YES If yes, how many per week? _____

**28. Do you currently take any of the following individual supplements (not counting multi-vitamins)?**

| | | | | Do not write in this box |
|---|---|---|---|---|
| Vitamin A | NO | YES | If 'YES' how many per **day?____** | |
| Calcium | NO | YES | If 'YES' how many per **day?____** | |
| Iron | NO | YES | If 'YES' how many per **day?____** | |
| Vitamin C | NO | YES | If 'YES' how many per **day?____** | |
| Vitamin E | NO | YES | If 'YES' how many per **day?____** | |
| Beta carotene | NO | YES | If 'YES' how many per **day?____** | |
| Other Nutrition Supplements | NO | YES | If 'YES' how many per **day?____** | |
| | | | If 'YES' how many per **day?____** | |
| | | | If 'YES' how many per **day?____** | |

***The next questions ask about physical activity.***

29. Compared to ***other people your age,*** would you say that your level of recreational physical activity is ..

O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

30. Compared to your own **level of activity before this degree**, would you say that your current level of recreational physical activity is ...
O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

31. Imagine a friend or family member asked for your advice about physical activity:
(eg “Hey, you’re in medical school, what kind of exercise should I be doing?“)
Do you think you know enough about physical activity to be comfortable making recommendations?
O Yes, I know enough and would be **very comfortable.**
O Yes, I know enough and would be **somewhat comfortable**.
O No, I don’t know enough and would be **somewhat uncomfortable.**
O No, I don’t know enough and would be **very uncomfortable.**

32. How confident are you in your ability to ***assess a patient’s*** level of physical activity?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

33. How confident are you in your ability to ***help a patient change*** his/her physical activity habits?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

***For the next three questions, estimate your physical activity patterns <u>during the past year ...</u>***

34. What was your **average time per week** spent at each of the following recreational activities?

| | 0 | 1-19 min | 20-59 min | 1 hour | 1.5 hours | 2-3 hours | 4-6 hours | 7+ hours |
|---|---|---|---|---|---|---|---|---|
| Walking or hiking | | | | | | | | |
| Jogging | | | | | | | | |
| Running | | | | | | | | |
| Bicycling | | | | | | | | |
| Aerobics | | | | | | | | |
| Yoga/Conditioning | | | | | | | | |
| Racket Sports | | | | | | | | |
| Group Sports (eg rugby, soccer, netball) | | | | | | | | |
| Other: List | | | | | | | | |

35. What is your usual walking pace outdoors?
O Don't walk regularly.
O Easy, casual (less than 4 km/hour)
O Normal, average (5-5.4 km/hour)
O Brisk pace (5.5 – 5.9km/hour)
O Very brisk pace/ striding (6km/hour or faster)

36. On average how many flights of stairs do you climb daily?
O None
O 1-2 flights
O 3-4 flights
O 5-9 flights
O 15 or more flights

***The next questions ask you about health practices.***

37. Have you smoked 100 or more cigarettes in your life? O Yes O No

38. Do you currently smoke cigarettes every day, some days or not at all?
O I smoke every day.
O I smoke some days
O I do not smoke at all.

***Demographic Information***

39. What year were you born? 19_ _

40. What is your gender? O Female O Male

41. Which of the following best describes your ethnic background?
O European New Zealander
O Maori
O Asian
O Pacific Peoples
O Middle Eastern, Latin American, African
O Other (please specify) _____

42. When you finish your medical science degree, do you think that you'll spend a majority of your time in a primary care practice?
O Yes
O No
O Unsure/don't now

**THANK YOU FOR YOUR PARTICIPATION**

**Student Self-Assessment Exercise (Post-MBCHB)**

We ask you to fill out this follow-up questionnaire to assess your opinions and practices regarding diet and physical activity and how they may have changed over the past three months. In order to be able to compare the two questionnaires, we ask you to write your student ID number in the space provided below. This questionnaire takes about 10-15 minutes to complete.

**Anonymity and confidentiality**
Please do not write your name on this questionnaire.
We plan to write up this study for publication. No individual student will be identified in any publication or report. This project was approved by the University of Auckland Human Participants Ethics Committee on the 26/01/2012 for (3) years. Reference number: 7786

**Instructions**

1. **Write your student ID number on your paper.**
2. **Answer each question on the front and back of the pages by marking the one circle or box that best reflects your answer.**
3. **Place your completed questionnaires in the labelled, sealed box at the back of the lecture theatre or in the labelled box at the Student Centre by the 1st of June.**

Student ID____

Thank you for your time and cooperation.

***These first questions ask about your behaviour regarding diet and nutrition.***

1. Which statement best describes your eating habits?
O I eat whatever I want without considering whether or not it is healthy.
O I think that I should eat healthy foods, but usually don‘t.
O I think that I should eat healthy foods and sometimes do.
O I think that I should eat healthy foods and usually do.
O I think that I should eat healthy foods and always do.

2. Compared to ***other people your age,*** how healthy do you think your diet is?
O Much healthier.
O Somewhat healthier.
O The same.
O Somewhat less healthy.
O Much less healthy.

3. ***Prior to starting your degree*** how healthy do you think your current diet is?
O Much healthier
O Somewhat healthier
O The same.
O Somewhat less healthy.
O Much less healthy.

3a. ***Prior to this course starting*** how healthy do you think your current diet is?
O Much healthier
O Somewhat healthier
O The same.
O Somewhat less healthy.
O Much less healthy

4. Do you currently restrict ....

| | **Always** | **Usually** | **Sometimes** | **Never** |
|---|---|---|---|---|
| The amount of fat in your diet? | | | | |
| The amount of saturated fat in your diet? | | | | |
| The amount of refined carbohydrates in your diet? (eg white bread or white rice) | | | | |
| The amount of salt in your diet? | | | | |
| The kilojoules in your diet?(to lose or maintain weight) | | | | |
| Anything else in your diet? If yes, what? | | | | |

6. Imagine a friend or family member asked for your advice about nutrition:
(eg “Hey, you’re in medical school, what do you think I should be eating?“)
Do you think you know enough about nutrition to be comfortable making recommendations?
O Yes, I know enough and would be **very comfortable.**
O Yes, I know enough and would be **somewhat comfortable**.
O No, I don’t know enough and would be **somewhat uncomfortable**.
O No, I don’t know enough and would be **very uncomfortable.**

7. How confident are you in your ability to assess the nutritional content of a patient's diet?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

8. How confident are you in your ability to help a patient change his/her dietary habits?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

***The next questions ask about how often you eat certain foods.***

INSTRUCTIONS: For each question, mark the box indicating how often **on average** you have eaten the item(s) **during the past year**. Remember to include things you cook with. These questions are not intended to assess your total diet and you may not find that all the foods you eat listed.

| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more** |
|---|---|---|---|---|---|
| 9. Dark green Leafy Vegetables (Spinach, silverbeet, cos lettuce, bok choy | | | | | |
| 10. Broccoli, Cauliflower, Cabbage, Brussel Sprouts | | | | | |
| 11.Carrots | | | | | |
| 12. Other vegetables (eg peas, corn, green beans, tomatoes, pumpkin) | | | | | |
| 13. Citrus Fruits (eg oranges grapefruit, orange juice and grapefruit juice) | | | | | |
| 14. Other Fruits (eg fresh apples or pears, bananas, berries, grapes, melons) | | | | | |
| 15. Whole Milk Dairy Foods (whole milk, hard cheese, butter | | | | | |
| 16. Low Fat Milk Products (eg low fat/skim milk, yoghurt, cottage cheese | | | | | |
| 17. Whole Eggs | | | | | |
| 18. Margarine | | | | | |

| As before, the following questions refer to your **usual** food intake during **the past year.** | | | | | |
|---|---|---|---|---|---|
| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more per day** |
| 19. Whole grain foods (eg whole grain breads, brown rice) | | | | | |
| 20. Pasta, Rice, Noodles | | | | | |
| Baked Products (biscuits, muffins, crackers, cakes, pastries) | | | | | |
| 22. Beef, Pork or Lamb as Main Dish | | | | | |
| 23. Processed Meats (ham, sausages, salami, bacon, luncheon meat, frankfurters) | | | | | |
| 24. Fish/Seafood (not fried, but grilled, baked, poached, canned) | | | | | |
| 25. Deep Fried foods (deep fried chicken, fish or seafood; fries, onion rings) | | | | | |
| 26. How often do you add salt to food at the table? | | | | | |

27. **Do you currently take a multi-vitamin supplement?**

O NO O YES If yes, how many per week? _____

28. **Do you currently take any of the following individual supplements (not counting multi-vitamins) ?**

| | | | | Do not write in this box |
|---|---|---|---|---|
| Vitamin A | NO | YES | If 'YES' how many per **day?**____ | |
| Calcium | NO | YES | If 'YES' how many per **day?**____ | |
| Iron | NO | YES | If 'YES' how many per **day?**____ | |
| Vitamin C | NO | YES | If 'YES' how many per **day?**____ | |
| Vitamin E | NO | YES | If 'YES' how many per **day?**____ | |
| Beta carotene | NO | YES | If 'YES' how many per **day?**____ | |
| Other Nutrition Supplements | NO | YES | If 'YES' how many per **day?**____ | |
| | | | If 'YES' how many per **day?**____ | |
| | | | If 'YES' how many per **day?**____ | |

***The next questions ask about physical activity***

29. Compared ***to other people your age,*** would you say that your level of recreational activity is …

O Somewhat less
O The same
O Somewhat more
O Much more

30. Compared to your own level of activity ***before starting this degree,*** would you say that your current level of recreational physical activity is ...
O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

30a. Compared to your own level of activity ***before this course started,*** would you say that your current level of recreational activity is …
O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

31. Imagine a friend or family member asked for your advice about physical activity:
(eg "Hey, you're in medical school, what kind of exercise should I be doing?")
Do you think you know enough about physical activity to be comfortable making recommendations?
O Yes, I know enough and would be **very comfortable.**
O Yes, I know enough and would be **somewhat comfortable**.
O No, I don't know enough and would be **somewhat uncomfortable.**
O No, I don't know enough and would be **very uncomfortable.**

32. How confident are you in your ability to ***assess a patient's*** level of physical activity?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

33. How confident are you in your ability to ***help a patient change*** his/her physical activity habits?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

***The next questions ask you about the impact of 205 The Digestive System on your own health habits and readiness to discuss health habits with others.***

34a. Has taking 205 The Digestive System made you more aware of your own dietary choices (eg checking nutrition content labels)?

O Yes (If yes, please describe below.) O No

_____

_____

34b. Has taking 205 The Digestive System led you to improve any of your own dietary choices?

O Yes (If yes, please describe below.) O No

_____

_____

34c. Has taking 205 The Digestive System led you to improve any of your own exercise choices?

O Yes (If yes, please describe below.) O No

_____

_____

34d. Has taking 205 The Digestive System led you to make any other changes in your health behaviour or lifestyle?

O Yes (If yes, please describe below.) O No

_____

_____

34e. Compared to ***before this course,*** are you more or less likely to discuss diet, exercise, smoking and other health habits with your family or friends?

O Much more likely
O Somewhat more likely
O No change
O Somewhat less likely
O Much less likely

34f. Compared to ***before this course,*** are you more or less likely to counsel the patients you see in Patient Doctor or other clinical settings about diet, exercise, smoking and other health habits?
O Much more likely
O Somewhat more likely
O No Change
O Somewhat less likely
O Much less likely

***The next questions ask about demographic information.***

39. What year were you born? 19_ _

40. What is your gender? O Female O Male

41. Which of the following best describes your ethnic background?
O European New Zealander
O Maori
O Asian
O Pacific Peoples
O Middle Eastern, Latin American, African
O Other (please specify) _____

**THANK YOU FOR YOUR PARTICIPATION**

**Student Self-Assessment Exercise (Pre-BIOMED)**

We would like to find out your opinions and practices regarding diet, physical activity and other health related behaviours. Please fill out this questionnaire which takes about 5-8 minutes to complete.

At the end of the course, you will be asked to fill out a shorter questionnaire to measure any changes in attitudes or practices. In order to be able to compare the two questionnaires, we ask you to write your student ID number in the space provided below. We will compile the responses of students and report aggregate results after the course.

**Anonymity and confidentiality**
Please do not write your name on this questionnaire.
We plan to write up this study for publication. No individual student will be identified in any publication or report. This project was approved by the University of Auckland Human Participants Ethics Committee on 26/01/2012 for (3) years. Reference number: 7786.

**Instructions**

1. **Write your student ID number on your paper.**
2. **Answer each question on the front and back of the pages by marking the one circle or box that best reflects your answer.**
3. **Place your completed questionnaire in the labelled sealed box at the back of the lecture theatre.**

Thank you for your time and cooperation.

Student ID :_____

***These first questions ask you about your opinions and behaviour regarding diet and nutrition***.

1. Which statement best describes your eating habits?
O I eat whatever I want without considering whether or not it is healthy.
O I think that I should eat healthy foods, but usually don‘t.
O I think that I should eat healthy foods and sometimes do.
O I think that I should eat healthy foods and usually do.
O I think that I should eat healthy foods and always do.

2. Compared to ***other people your age***, how healthy do you think your diet is?
O Much healthier.
O Somewhat healthier.
O The same.
O Somewhat less healthy.
O Much less healthy.

3. ***Prior to starting your degree***, how healthy do you think your current diet is?
O Much healthier
O Somewhat healthier
O The same.
O Somewhat less healthy.
O Much less healthy.

4. Do you currently restrict ....

| | **Always** | **Usually** | **Sometimes** | **Never** |
|---|---|---|---|---|
| The amount of fat in your diet? | | | | |
| The amount of saturated fat in your diet? | | | | |
| The amount of refined carbohydrates in your diet? (eg white bread or white rice) | | | | |
| The amount of salt in your diet? | | | | |
| The kilojoules in your diet?(to lose or maintain weight) | | | | |
| Anything else in your diet? If yes, what? | | | | |

5. Which of the following best describes the <u>protein</u> sources in your diet?
O I eat no animal products: no red meat, poultry, fish, dairy products or eggs.
O I eat dairy products and eggs but no red meat, poultry or fish.
O I eat dairy products, eggs and fish but no poultry or red meat.
O I eat dairy products, eggs, fish and poultry but no red meat.
O I eat all types of animal products. (*Please go to question #6*)
O Other (please describe)

5a. If you restrict the protein sources in your diet, what is the reason?
O Overall health.
O Weight control.
O Religious beliefs.
O Ethical or environmental concerns.
O Other (please describe): _____

6. Imagine a friend or family member asked for your advice about nutrition:
(eg “Hey, you’re in medical school, what do you think I should be eating?“)
Do you think you know enough about nutrition to be comfortable making recommendations?
O Yes, I know enough and would be **very comfortable.**
O Yes, I know enough and would be **somewhat comfortable**.
O No, I don’t know enough and would be **somewhat uncomfortable**.
O No, I don’t know enough and would be **very uncomfortable.**

7. How confident are you in your ability to assess the nutritional content of a patient’s diet?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

8. How confident are you in your ability to help a patient change his/her dietary habits?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

***The next questions ask about how often you eat certain foods.***
INSTRUCTIONS: For each question, mark the circle indicating how often **on average** you have eaten the item(s) **during the past year**. Remember to include things you cook with. These questions are not intended to assess your total diet and you may not find that all the foods you eat listed.

| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more daily** |
|---|---|---|---|---|---|
| 9. Dark green Leafy Vegetables (Spinach, silverbeet, cos lettuce, bok choy | | | | | |
| 10. Broccoli, Cauliflower, Cabbage, Brussel Sprouts | | | | | |
| 11.Carrots | | | | | |
| 12. Other vegetables (eg peas, corn, green beans, tomatoes, pumpkin) | | | | | |
| 13. Citrus Fruits (eg oranges grapefruit, orange juice and grapefruit juice) | | | | | |
| 14. Other Fruits (eg fresh apples or pears, bananas, berries, grapes, melons) | | | | | |
| 15. Whole Milk Dairy Foods (whole milk, hard cheese, butter | | | | | |
| 16. Low Fat Milk Products (eg low fat/skim milk, yoghurt, cottage cheese | | | | | |
| 17. Whole Eggs | | | | | |
| 18. Margarine | | | | | |

As before, the following questions refer to your **usual** food intake during **the past year.**

| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more per day** |
|---|---|---|---|---|---|
| 19. Whole grain foods (eg whole grain breads, brown rice) | | | | | |
| 20. Pasta, Rice, Noodles | | | | | |
| 21. Baked Products (biscuits, muffins, crackers, cakes, pastries) | | | | | |
| 22. Beef, Pork or Lamb as Main Dish | | | | | |
| 23. Processed Meats (ham, sausages, salami, bacon, luncheon meat, frankfurters) | | | | | |
| 24. Fish/Seafood (not fried, but grilled, baked, poached, canned) | | | | | |
| 25. Deep Fried foods (deep fried chicken, fish or seafood; fries, onion rings) | | | | | |
| 26. How often do you add salt to food at the table? | | | | | |

27. **Do you currently take a multi-vitamin supplement?**

O NO O YES If yes, how many per week? _____

28. **Do you currently take any of the following individual supplements (not counting multi-vitamins)?**

| | | | | Do not write in this box |
|---|---|---|---|---|
| Vitamin A | NO | YES | If 'YES' how many per **day?____** | |
| Calcium | NO | YES | If 'YES' how many per **day?____** | |
| Iron | NO | YES | If 'YES' how many per **day?____** | |
| Vitamin C | NO | YES | If 'YES' how many per **day?____** | |
| Vitamin E | NO | YES | If 'YES' how many per **day?____** | |
| Beta carotene | NO | YES | If 'YES' how many per **day?____** | |
| Other Nutrition Supplements | NO | YES | If 'YES' how many per **day?____** | |
| | | | If 'YES' how many per **day?____** | |
| | | | If 'YES' how many per **day?____** | |

***The next questions ask about physical activity.***

29. Compared to ***other people your age,*** would you say that your level of recreational physical activity is ..

O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

30. Compared to your own ***level of activity <u>before</u> this degree***, would you say that your current level of recreational physical activity is ...
O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

***For the next three questions, estimate your physical activity patterns <u>during the past year ...</u>***

34. What was your **average time per week** spent at each of the following recreational activities?

| | 0 | 1-19 min | 20-59 min | 1 hour | 1.5 hours | 2-3 hours | 4-6 hours | 7+ hours |
|---|---|---|---|---|---|---|---|---|
| Walking or hiking | | | | | | | | |
| Jogging | | | | | | | | |
| Running | | | | | | | | |
| Bicycling | | | | | | | | |
| Aerobics | | | | | | | | |
| Yoga/Conditioning | | | | | | | | |
| Racket Sports | | | | | | | | |
| Group Sports (eg rugby, soccer, netball) | | | | | | | | |
| Other: List | | | | | | | | |

35. What is your usual walking pace outdoors?
O Don't walk regularly.
O Easy, casual (less than 4 km/hour)
O Normal, average (5-5.4 km/hour)
O Brisk pace (5.5 – 5.9km/hour)
O Very brisk pace/ striding (6km/hour or faster)

36. On average how many flights of stairs do you climb daily?
O None
O 1-2 flights
O 3-4 flights
O 5-9 flights
O 15 or more flights

***The next questions ask you about health practices.***

37. Have you smoked 100 or more cigarettes in your life? O Yes O No

38. Do you currently smoke cigarettes every day, some days or not at all?
O I smoke every day.
O I smoke some days
O I do not smoke at all.

***Demographic Information***

39. What year were you born? 19_ _

40. What is your gender?
O Female O Male

41. Which of the following best describes your ethnic background?
O European New Zealander
O Maori
O Asian
O Pacific Peoples
O Middle Eastern, Latin American, African
O Other (please specify) _____

**THANK YOU FOR YOUR PARTICIPATION**

**Student Self-Assessment Exercise (Post-BIOMED)**

We ask you to fill out this follow-up questionnaire to assess your opinions and practices regarding diet and physical activity and how they may have changed over the past three months. In order to be able to compare the two questionnaires, we ask you to write your student ID number in the space provided below. This questionnaire takes about 5-8 minutes to complete.

**Anonymity and confidentiality**
Please do not write your name on this questionnaire.
We plan to write up this study for publication. No individual student will be identified in any publication or report. This project was approved by the University of Auckland ethics Committee on 26/01/2012 for (3) years. Reference number: 7786.

**Instructions**

1. **Write your student ID number on your paper.**
2. **Answer each question on the front and back of the pages by marking the one circle or box that best reflects your answer.**
3. **Place your completed questionnaire in the labelled, sealed box at the back of the lecture theatre.**

Student ID____

Thank you for your time and cooperation.

***These first questions ask about your behaviour regarding diet and nutrition.***

1. Which statement best describes your eating habits?
O I eat whatever I want without considering whether or not it is healthy.
O I think that I should eat healthy foods, but usually don‘t.
O I think that I should eat healthy foods and sometimes do.
O I think that I should eat healthy foods and usually do.
O I think that I should eat healthy foods and always do.

2. Compared to ***other people your age,*** how healthy do you think your diet is?
O Much healthier.
O Somewhat healthier.
O The same.
O Somewhat less healthy.
O Much less healthy.

3. ***Prior to starting this degree*** how healthy do you think your current diet is?
O Much healthier
O Somewhat healthier
O The same.
O Somewhat less healthy.
O Much less healthy.

3a. ***Prior to this course starting,*** how healthy do you think your current diet is?
O Much healthier
O Somewhat healthier
O The same.
O Somewhat less healthy.
O Much less healthy

4. Do you currently restrict ....

| | **Always** | **Usually** | **Sometimes** | **Never** |
|---|---|---|---|---|
| The amount of fat in your diet? | | | | |
| The amount of saturated fat in your diet? | | | | |
| The amount of refined carbohydrates in your diet? (eg white bread or white rice) | | | | |
| The amount of salt in your diet? | | | | |
| The kilojoules in your diet?(to lose or maintain weight) | | | | |
| Anything else in your diet? If yes, what? | | | | |

6. Imagine a friend or family member asked for your advice about nutrition:
(eg “Hey, you’re in medical school, what do you think I should be eating?“)
Do you think you know enough about nutrition to be comfortable making recommendations?
O Yes, I know enough and would be **very comfortable.**
O Yes, I know enough and would be **somewhat comfortable**.
O No, I don’t know enough and would be **somewhat uncomfortable**.
O No, I don’t know enough and would be **very uncomfortable.**

7. How confident are you in your ability to assess the nutritional content of a patient's diet?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

8. How confident are you in your ability to help a patient change his/her dietary habits?
O Very confident.
O Somewhat confident.
O Not very confident.
O Not at all confident.

***The next questions ask about how often you eat certain foods.***
INSTRUCTIONS: For each question, mark the box indicating how often **on average** you have eaten the item(s) **during the past year**. Remember to include things you cook with. These questions are not intended to assess your total diet and you may not find that all the foods you eat listed.

| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more** |
|---|---|---|---|---|---|
| 9. Dark green Leafy Vegetables (Spinach, silverbeet, cos lettuce, bok choy | | | | | |
| 10. Broccoli, Cauliflower, Cabbage, Brussel Sprouts | | | | | |
| 11.Carrots | | | | | |
| 12. Other vegetables (eg peas, corn, green beans, tomatoes, pumpkin) | | | | | |
| 13. Citrus Fruits (eg oranges grapefruit, orange juice and grapefruit juice) | | | | | |
| 14. Other Fruits (eg fresh apples or pears, bananas, berries, grapes, melons) | | | | | |
| 15. Whole Milk Dairy Foods (whole milk, hard cheese, butter | | | | | |
| 16. Low Fat Milk Products (eg low fat/skim milk, yoghurt, cottage cheese | | | | | |
| 17. Whole Eggs | | | | | |
| 18. Margarine | | | | | |

| As before, the following questions refer to your **usual** food intake during **the past year.** | | | | | |
|---|---|---|---|---|---|
| | **<1 per week** | **Once per week** | **2-4 times per week** | **Nearly daily or daily** | **Twice or more per day** |
| 19. Whole grain foods (eg whole grain breads, brown rice) | | | | | |
| 20. Pasta, Rice, Noodles | | | | | |
| 21. Baked Products (biscuits, muffins, crackers, cakes, pastries) | | | | | |
| 22. Beef, Pork or Lamb as Main Dish | | | | | |
| 23. Processed Meats (ham, sausages, salami, bacon, luncheon meat, frankfurters) | | | | | |
| 24. Fish/Seafood (not fried, but grilled, baked, poached, canned) | | | | | |
| 25. Deep Fried foods (deep fried chicken, fish or seafood; fries, onion rings) | | | | | |
| 26. How often do you add salt to food at the table? | | | | | |

27. Do you currently take a multi-vitamin supplement?

O NO O YES If yes, how many per week? _____

28. Do you currently take any of the following individual supplements (not counting multi-vitamins) ?

| | | | | Do not write in this box |
|---|---|---|---|---|
| Vitamin A | NO | YES | If 'YES' how many per **day?**____ | |
| Calcium | NO | YES | If 'YES' how many per **day?**____ | |
| Iron | NO | YES | If 'YES' how many per **day?**____ | |
| Vitamin C | NO | YES | If 'YES' how many per **day?**____ | |
| Vitamin E | NO | YES | If 'YES' how many per **day?**____ | |
| Beta carotene | NO | YES | If 'YES' how many per **day?**____ | |
| Other Nutrition Supplements | NO | YES | If 'YES' how many per **day?**____ | |
| | | | If 'YES' how many per **day?**____ | |
| | | | If 'YES' how many per **day?**____ | |

***The next questions ask about physical activity***

29. Compared to ***other people your age,*** would you say that your level of recreational physical activity is ..

O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

30. Compared to ***your own level of activity before starting this degree,*** would you say that your current level of recreational physical activity is ...

O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

30a. Compared to ***your own level of activity three months ago,*** would you say that your current level of recreational physical activity is ...

O Much less
O Somewhat less
O The same
O Somewhat more
O Much more

**Demographic information**

39. What year were you born? 19_ _

What is your gender? O Female O Male

41. Which of the following best describes your ethnic background?

O European New Zealander
O Maori
O Asian
O Pacific Peoples
O Middle Eastern, Latin American, African
O Other (please specify) _____

**THANK YOU FOR YOUR PARTICIPATION**

## Appendix 4. Additional peer reviewed papers

1. Data published in: *J Multidiscip Healthc* 2014.7:209-15.

# Nutrition in medical education: reflections from an initiative at the University of Cambridge

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**Abstract** Landmark reports have confirmed that it is within the core responsibilities of doctors to address nutrition in patient care. There are ongoing concerns that doctors receive insufficient nutrition education during medical training. This paper provides an overview of a medical nutrition education initiative at the University of Cambridge, School of Clinical Medicine, including 1) the approach to medical nutrition education, 2) evaluation of the medical nutrition education initiative, and 3) areas identified for future improvement. The initiative utilizes a vertical, spiral approach during the clinically focused years of the Cambridge undergraduate and graduate medical degrees. It is facilitated by the Nutrition Education Review Group, a group associated with the UK Need for Nutrition Education/Innovation Programme, and informed by the experiences of their previous nutrition education interventions. Three factors were identified as contributing to the success of the nutrition education initiative including the leadership and advocacy skills of the nutrition academic team, the variety of teaching modes, and the multidisciplinary approach to teaching. Opportunities for continuing improvement to the medical nutrition education

initiative included a review of evaluation tools, inclusion of nutrition in assessment items, and further alignment of the Cambridge curriculum with the recommended UK medical nutrition education curriculum. This paper is intended to inform other institutions in ongoing efforts in medical nutrition education.

**Keywords**: undergraduate medical education, nutrition, curriculum

**Introduction** The importance of nutrition in maintaining good health is widely recognized.[1–3] Landmark reports have confirmed that it is within the core responsibilities of doctors to address nutrition in patient care.[4,5] Doctors commonly report insufficient knowledge and skills related to nutrition,[6,7] and there are ongoing concerns that doctors receive insufficient nutrition education during medical training.[8–11] Key mandates exist within countries such as the United Kingdom and United States to enhance the nutrition education received by medical students.[4,5,12–14] However, the integration of nutrition into medical education is a continuing challenge worldwide. For the purpose of this paper, "medical education" refers only to the study of medicine by medical students, not other health care professionals.

Factors limiting the integration of nutrition into medical education include curriculum crowding,[15] scarcity of nutrition advocates and specialist teachers,[16] and lack of consensus on optimal delivery and evaluation of medical nutrition education.[8] The pervasive nature of nutrition creates a challenge to identify the most appropriate location for nutrition within medical curricula. Equally, this pervasiveness creates an opportunity to encourage interdisciplinary specialty teaching within medical education. Previous initiatives to enhance nutrition in medical education have focused on approaches to integrate nutrition into curricula[17,18] as well as modes of delivery of nutrition education to students including, for example, web-based resources created to enhance student learning.[17,19,20] These initiatives provide valuable information and examples to other medical institutions and facilitate

ongoing development in this area of medical education. In line with this, our paper is intended to be utilized by other institutions to inform ongoing efforts in medical nutrition education.

The Need for Nutrition Education/Innovation Programme (NNEdPro) is an independent education and evaluation program that aims to equip "tomorrow's doctors" with clinically relevant, foundation nutrition and public health knowledge to enhance nutrition care in health care settings.[21] In England, the University of Cambridge, Nutrition Education Review Group (NERG) is linked with NNEdPro and is comprised of doctors, dietitians, and nutritionists who are academic and research staff. The aim of the NERG is to develop, implement, and evaluate the medical nutrition education, particularly clinical and public health nutrition, provided to undergraduate and postgraduate medical students at the university. In early 2011, the University of Cambridge, School of Clinical Medicine, Department of Public Health and Primary Care, in collaboration with the NERG, piloted a nutrition education session in the first clinical year of the undergraduate medical degree. This teaching was shaped by the early work of the NNEdPro group[22,23] and was incorporated into undergraduate and graduate medical curricula following favorable evaluations.

The medical nutrition education initiative at the University of Cambridge, School of Clinical Medicine receives ongoing review and evaluation for delivery, content, and outcomes of teaching and students' nutrition knowledge, attitudes, and practices. In this paper, we provide an overview of the progress of this initiative, specifically the evolution of teaching methods; the outcome evaluation; and areas identified for future improvements.

## Approach to the medical nutrition education initiative

The University of Cambridge, School of Clinical Medicine offers a 6-year undergraduate medical degree and a 4-year graduate medical degree.[24] The overall aim of the medical nutrition education initiative is to increase nutrition awareness and skills of undergraduate and graduate medical students through a vertical, spiral approach which builds upon previous learning experiences. We provide an overview of the medical nutrition education within Cambridge medical training in Table 1.

**Table 1 Nutrition education in the undergraduate and graduate degrees at the University of Cambridge, School of Clinical Medicine**

| Undergraduate degree (6 years; ~150 students) | Graduate degree (4 years; ~15 students) | Current nutrition education | Future nutrition education (~250 students by 2017) |
|---|---|---|---|
| Y1–3 – Medical and Veterinary Science Tripos (preclinical years)<br>Y4 – clinical year 1 | N/A[a]<br><br>Y1 – clinical year 1 | Minimal specified nutrition education.<br>4-hour session (undergraduates); 1.5 hour session (graduates), including under and over nutrition, nutrition screening, and assessment. Evaluated by students through a questionnaire completed online before and 1 month after the session to assess nutrition knowledge, attitudes, and practices. An open-ended questionnaire also collects qualitative feedback from both students and the teaching team for overall feedback. | Ongoing curricular review to identify opportunities for nutrition education. Maintain current teaching (update each year). Evaluation by students through a quantitative questionnaire completed online before and 1 month after the session to assess attitudes and confidence in nutrition care. An open-ended questionnaire distributed after the session to be completed by students and the teaching team for overall feedback. |
| Y5 – clinical year 2[b] | Y2 – clinical year 2[b] | Minimal specified nutrition education. | Podcasts to supplement students' learning of clinical conditions and diseases. These will be supported by short face-to-face interactions. The same questionnaire used in the previous year will be administered again, pre- and post-teaching. |
| Y6 – clinical year 3 | Y3 – clinical year 3 | 2-hour session on the relationship between diet and disease and its application to lifestyle behavior | Incorporation of nutrition leadership into current nutrition education. The same questionnaire used in Y4/Y1 will be administered pre- and post teaching. |

**Notes:** [a]Graduate students do not complete the 3-year Medical and Veterinary Science Tripos; [b]undergraduate and graduate courses align from middle of clinical year**.**
**Abbreviations:** Y, year; N/A, not applicable.

## Preclinical years

The first 3 years of the undergraduate degree are dedicated to foundation natural science courses, known as the "Tripos". Students gain a thorough understanding of the science-base underpinning medicine and health and grounding in the basic knowledge and skills necessary for working with patients.[24] Within these 3 years, students cover some topics that are related to nutrition such as biochemistry and physiology. Based on students' experiences from other universities, the mode of learning is not typically recognized as "nutrition-related"; hence, it is likely that the importance of nutrition in patient care is not highlighted.[25,26]

## Clinical year 1

Students' initial exposure to medical nutrition education occurs during the first clinical year of each degree. One component of the curriculum, "Clinical and Public Health Nutrition", covers nutrition issues and their relevance to clinical practice by addressing some of the nutrition curriculum recommendations of the Academy Nutrition Group of the Academy of Medical Royal Colleges.[27] The overall aim of this curriculum component is to equip students with information and resources to appropriately identify and address nutrition-related issues in the hospital setting.

For undergraduate students, the cohort is divided into two groups, each undertaking a 4-hour session. The session begins with a plenary, following which students are split into three smaller groups. Each group rotates between three "carousel-style" workshops that focus on a particular area of nutrition, with topics including under-nutrition, obesity in the hospital setting, nutrition screening and assessment, fluids and electrolytes, and others, based on tutor availability. Each workshop is facilitated by a multidisciplinary team of doctors, dietitians, nutritionists, and nurses to present nutrition-related clinical scenarios that students may

encounter in training and practice and demonstrate how each health profession may contribute to providing nutrition care to patients. The sessions aim to be as interactive as possible including opportunities to taste supplements, practice patient communication, and conduct anthropometric measures on fellow students. Graduate students experience a similar session in their first clinical year. The smaller student cohort allows for efficiencies of time, with similar learning outcomes achieved in a 1-hour session also facilitated by a multidisciplinary team typically including a doctor, dietitian, and public health nutritionist.

**Clinical year 2**

As yet there are no specific nutrition education sessions in the second clinical year of the undergraduate and graduate degrees. However, plans have commenced to integrate nutrition into existing teaching through podcasts that supplement students' learning of clinical conditions and diseases. These podcasts will be accompanied by short face-to-face interactions which will add elements of blended learning to this component of the initiative. This is similar to the innovative online approach used in the "Nutrition in Medicine" project in the USA.[8]

**Clinical year 3**

Since 2013, a nutrition education session has been included in the curriculum for students in the third clinical year of each degree. The aim of this 2-hour session is for students to develop a deeper understanding of the relationship between diet and disease and its application to lifestyle behavior,[26] in line with the "preparation for practice" component of the third year curriculum. To achieve this, the session focuses on 1) noncommunicable diseases, 2) chronic disease prevention, and 3) leadership skills in nutrition. Overall, this component of the

initiative aligns with the latest UK recommendations for the need to continually reinforce the importance of nutrition knowledge and skills throughout medical training.[5]

**Elective studies**

In addition to the curriculum initiative, the NERG has developed a "student selected component" for self-driven undergraduate students in their first clinical year who take a particular interest in further developing their nutrition awareness. This 5-week elective includes educational and practical components through the affiliated work of NNEdPro and hospital-based medical nutrition clinics. Students can select from four possible themes; nutrition support, obesity, public health nutrition, or nutrition research. These experiences give students the opportunity to utilize their nutrition knowledge and skills in patient care and to observe interprofessional approaches to address nutrition in clinical settings.[26]

**Evaluation of the medical nutrition education initiative**

Evaluation is an important and evolving feature of the medical nutrition education initiative at the University of Cambridge, School of Clinical Medicine. To facilitate evaluation at the initial stages, a feasibility pilot of a nutrition education session was conducted prior to its inclusion in the curriculum. Outcome measures were based on principles of formative evaluation. Since this time, the evaluation has focused on the nutrition education sessions within the first clinical year to ensure ongoing quality improvement with each successive session. The evaluation of these sessions has three aspects: 1) quantitative measurement of changes in students' nutrition knowledge, attitudes, and practices through a pre- and post teaching multiple-choice questionnaire; 2) qualitative feedback from students on the delivery of the workshop; and 3) peer-facilitated feedback for workshop facilitators by the NERG members.

Prior to the commencement of nutrition education teaching in the first clinical year, students are encouraged to complete an online multiple-choice questionnaire to measure nutrition knowledge, attitudes, and practices. The questionnaire has been construct-validated against key clinical learning outcomes from previous NNEdPro nutrition education interventions.[22] One month after the nutrition education session, students are invited to complete the questionnaire again, and changes in the mean responses are calculated.

Overall, the changes observed in nutrition knowledge, attitudes, and practices 1 month after the nutrition education sessions are promising. For example, the proportion of responding students who strongly agreed with the item "From a public health perspective, do you think that nutrition is important in reducing the global burden of disease?" increased from 0% to 70% after the delivery of a recent session. In addition, there is often a noticeable increase in the proportion of students who appropriately respond to items on nutrition-related clinical practices. However, limitations in cohort sizes and response rates prevent further statistical analysis or interpretation of this data.

At the conclusion of nutrition education teaching in the first clinical year, students provide written feedback on the delivery and content of the workshops as well as suggestions for future improvements. Students frequently report that the workshops are comprehensive, appropriately interactive, and useful for informing future practice. Suggestions for improvements typically relate to providing more teaching time to cover additional nutritional topics, a common challenge reported within other medical schools.[8,28,29] As a result, the course delivery has been appropriately modulated to allow students sufficient time to experience allocated activities.

The nutrition education in the first clinical year is also evaluated through peer-facilitated feedback by NERG team members who observe all of the workshops and collaboratively

develop written feedback for workshop facilitators. The feedback includes aspects of the workshop delivery that were perceived to be successful as well as recommendations for improvement. The feedback covers issues such as workshop structure, slide format, oral delivery, body language, depth of content, interaction with students, and time management, in line with best-practice teaching in higher education.[30]

**Factors contributing to the success of the medical nutrition education initiative**

We have identified three principal factors that have contributed to the success of the medical nutrition education initiative. Firstly, strong academic leadership in nutrition and support from the wider medical faculty facilitated the trial of a nutrition education session in the first clinical year of the undergraduate medical degree, which has since become a component of the undergraduate and graduate curricula.[31–33] In line with this, the NERG advisory panel and teaching faculty is comprised of senior academics in clinical and public health nutrition, which provides a strong foundation for leadership and advocacy in nutrition education.[34]

Secondly, the medical nutrition education initiative utilizes a variety of teaching approaches to integrate nutrition into existing content. Across the duration of the medical degrees, nutrition education will be implemented using combinations of problem-based learning, small group experiences, online learning activities, and didactic seminars. Diverse teaching modes are recommended by other institutions to successfully integrate nutrition into existing content within restricted time frames in medical education.[28] The learning experiences available to students through the elective student selected component add further diversity to the teaching approaches and provide additional integration of nutrition into the existing training of students.[26]

Thirdly, the medical nutrition education initiative is founded on a multidisciplinary approach to nutrition teaching and practice. The NERG enlists the support of medical practitioners, dietitians, nutritionists, and nurses in the delivery and evaluation of nutrition education sessions. Multidisciplinary teaching is a key focus of education guidelines for future health professionals[35,36] and is widely encouraged by other institutions to model the contribution of health professionals in addressing nutrition in patient care.[37,38]

**Continual improvement to the medical nutrition education initiative**

A challenge for medical nutrition education is the lack of consensus on the best way to develop and deliver nutrition education within medical training.[8] As a result, the integration of nutrition into medical curricula is at the discretion of individual medical schools.[8] Continual evaluation is required for all aspects of medical nutrition education initiatives to identify opportunities for improvements.[39] Recently recommended approaches to enhance medical education focus on 1) practice skills, 2) continuous learning, and 3) patient care outcomes through collaborative interprofessional team work.[40] In the context of nutrition education, these approaches highlight a movement towards recognizing competences required for effective practice and provide a model for universities to overcome challenges when integrating nutrition into traditional medical curricula.[41]

We identified three key opportunities for improvement to the medical nutrition education initiative at the University of Cambridge, School of Clinical Medicine. Firstly, we believe that the evaluation of students' nutrition competence could be enhanced in the first clinical year. Given the challenges involved in obtaining completed responses to the evaluation questionnaire, strategies to ensure that all students complete the questionnaire before and 1 month after the nutrition education sessions are recommended. These strategies may include incentives for completion of the survey or promoting the survey as a mandatory nongraded

piece of assessment. In addition, the existing ten-item questionnaire was based on a previously developed tool[42] which informed the questionnaire used in the early work of NNEdPro.[22] Since this time, other tools such as the Nutrition in Patient Care Survey and Nutrition in Medical Education Survey have been developed[43] and provide a more comprehensive investigation of students' changes in nutrition knowledge, attitudes, and practices.[7,43–45] It is also important to comprehensively evaluate knowledge, attitudes, and practices as inadequacies in these areas are known to adversely impact on doctors' ability and willingness to perform nutrition counseling.[46–48] Therefore, we recommended that the questionnaire is reviewed to provide an objective, in-depth investigation of students' changes in confidence and skills.

Secondly, we believe the NERG could include nutrition in written and practice-based clinical exams to drive student learning and provide additional information on students' nutrition-related competence.[26] While the nutrition content is currently not assessed, preliminary discussions have occurred to incorporate nutrition into the written and practical examinations for students in their first clinical year. Incorporation of nutrition into assessments raises the profile of nutrition and reinforces the importance of nutrition in patient care to both students and academics.[39] In addition, we suggest it provides a means to measure relevant indicators of nutrition-related clinical effectiveness such as nutrition knowledge, malnutrition identification, along with referral to dietitians and other health professionals.

Thirdly, the current structure of the medical nutrition education initiative utilizes a vertical, spiral approach, where students develop nutrition competence as they progress through their degree. For example, during a practical obesity session in clinical year 1, students have the opportunity to learn and practice appropriate ways to speak with obese patients. Clinical year 3 expands on learning this through incorporating methods of applying these skill and by

adapting change management and leadership techniques into their work. To continue the spiral learning process, we recommend that nutrition content is integrated into clinical year 2 and the curriculum in the preclinical years. Horizontal integration into other specialties to increase students' exposure to nutrition and interdisciplinary specialty nutrition teaching would also be encouraged. Within the preclinical years, nutrition concepts can be signposted in subjects such as biochemistry and physiology or body systems such as gastroenterology, endocrinology, hematology, oncology, and cardiovascular, pulmonary, and renal systems. Signposting is imperative to emphasize the role of diet in disease etiology and provide relevance to the nutrition received by students.[25]

Finally, we suggest that the current curriculum be mapped against the national recommendations of the Academy Nutrition Group of the Academy of the Medical Royal Colleges.[27] Mapping the current curriculum to these recommendations will identify components of the recommended curriculum already covered and those that require inclusion after future curricula reviews. Further alignment of the current medical nutrition education with these recommendations is likely to result in comprehensive coverage of relevant nutritional areas.

## Conclusion

In this paper, we have provided an overview of the progress of medical nutrition education at the University of Cambridge, School of Clinical Medicine. A vertical, spiral medical nutrition education initiative occurs during the clinically focused years of the undergraduate and graduate medical degree. We identified three factors that have contributed to the success of the initiative, which are the leadership and advocacy skills of the nutrition academic team, the variety of teaching modes, and the multidisciplinary approach to teaching and practice. We outlined opportunities for continuing improvement to the medical nutrition education

initiative including review of evaluation tools, inclusion of nutrition in assessment items, and further alignment of the current curricula with the recommended curriculum for medical nutrition education in the UK.

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# Confidence and attitudes of doctors and Dietitians towards nutrition care and nutrition advocacy for hospital patients in Kolkata, India

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**Abstract**

Malnutrition results in increased duration of patient stay and increases hospital costs. However, few studies address this issue in the Indian context. A recent UK study showed that intensive nutrition training was effective in increasing awareness of health professionals. In order to inform such educational interventions in India, a needs assessment was conducted in Kolkata by measuring doctors' and dietitians' attitudes and confidence regarding nutrition care, advocacy, and leadership. A total of 123 doctors (including general medicine, endocrinology, and critical care) and 56 dietitians completed a questionnaire (response proportion of 76%). Doctors displayed moderate confidence in providing nutrition care but were less confident in their skills relating to advocacy and leadership. Dietitians displayed greater confidence than doctors in providing nutrition care but similarly lacked confidence in

skills relating to advocacy and leadership. Overall, doctors and dietitians displayed equally positive attitudes towards nutrition inpatient care. The greater confidence of dietitians compared to doctors in providing nutrition care may be the result of specialised training. Despite the limitations of this study, this paper provides a first glance at the gaps in nutritional practice within the doctors and dietitians community of Kolkata such that targeted future studies can now be planned.

## 1. Introduction

Malnutrition in hospitalised patients contributes to morbidity and mortality, prolongs the length of hospitalisation, and results in a reduced quality of life [1, 2]. Impediment associated with malnutrition not only results in increased duration of patient care and hospital costs but also affects the cost of recovery for the patients [3]. Hospital malnutrition in the UK has been reported to be as high as 40% [4–6]. However, very few studies have assessed malnutrition in hospital patients in India or South Asia. In a study of 500 patients admitted to the intensive care unit of a tertiary hospital in Kolkata, India, 198 (39.6%) patients were noted to be moderately or severely malnourished [7]. This study suggests that the prevalence of malnutrition in Kolkata is comparable to that in developed countries and warrants interventions to reduce this avoidable burden.

Nutritional care by health professionals has been shown to increase the dietary intake and quality of life of malnourished hospital patients [2]. However, health professionals experience barriers in providing nutrition care to patients. These barriers include low nutrition knowledge [1, 3], low confidence [3], and unfavourable attitudes to incorporating nutrition in patient care [1, 3, 8, 9]. Doctors and dietitians are the two main providers of nutrition counselling within the hospital setting in both Western countries and the Indian

subcontinent. The nutrition knowledge of these professions and the effectiveness of nutrition education interventions has been investigated in Western countries [8, 9]. It may not always be possible to translate these findings directly to the Indian context, especially taking into consideration the rapidly changing economy, effects of urbanisation, and nutrition transition in India. Hence, it is more important than ever before to fully understand the attitudes and confidence of doctors and dietitians in India prior to designing, and implementing sustainable interventions.

A recent study from the UK showed that an intensive clinical and public health nutrition training programme was effective in increasing the nutrition awareness of health professionals [10]. The training programme was conducted with junior doctors from three hospitals in England and combined organisational management and leadership strategies. This multifaceted educational approach is relevant and applicable to other healthcare contexts due to the global nature of the hospital malnutrition burden and requirement for an evidence-based approach to leadership and advocacy. Therefore, a similar educational intervention was considered to be appropriate in cities such as Kolkata, India. In order to inform such an educational intervention, a needs assessment was studied for the first time for Kolkata doctors and dietitians by measuring their attitudes and confidence regarding nutrition care, nutrition advocacy, and leadership.

## 2. Methods

A survey of invited/selected participants was conducted to investigate the attitudes and confidence of Kolkata doctors and dietitians regarding nutrition care, nutrition advocacy, and leadership. The study was undertaken as part of a larger project on doctors' and dietitians' nutrition education needs and was exempt from ethical approval due to the nonsensitive,

anonymous, educational nature of the survey. Due to time and logistic constraints, it was not possible to randomly sample and invite doctors and dietitians practicing in Kolkata hospitals and so a convenience-based selective sampling strategy was followed. Doctors and dietitians were invited to participate in this survey from a wide catchment of tertiary level hospitals/clinics, utilising a network provided by the Remedy Clinic Study Group in Kolkata which acts as the regional agency for one of the Royal Colleges of Physicians. It was estimated that these hospitals and clinics serve a population of several million per annum in the West Bengal region of India.

Potential participants were doctors and dietitians working in Kolkata, India, in February, 2014. Data collection occurred via two nonprobability convenience sampling strategies: (i) after presentations on evidence-based medicine and nutrition at the B. R. Singh Hospital and the Pan Asia Hotel, Kolkata; (ii) through further sampling by the Remedy Clinic Study Group in Kolkata. For the participants at B. R. Singh Hospital and the Pan Asia Hotel, data collection occurred immediately after the presentation via a paper based questionnaire. For the participants at Remedy Clinics, 150 paper-based questionnaires were mailed to doctors and dietitians and were returned via post within three weeks.

An adapted questionnaire was developed using the UK Need for Nutrition Education/Innovation Programme (NNEdPro) Group's previous experience of health professionals' attitudes and confidence in nutrition care [11]. This included three sections. Section One contained three questions related to the demographic characteristics of participants, including profession, designation, and years of experience. Section Two contained twelve questions related to participants' confidence in nutrition care, nutrition advocacy, and leadership. Section Three contained eight questions related to participants'

attitudes regarding nutrition in patient care. Each item in Sections Two and Three was measured using a 5-point Likert scale where one indicated low confidence or disagreement and five indicated high confidence or strong agreement.

Data analysis was conducted using SPSS version 22. Participants were identified as either dietitians or doctors based on their current designation. Mean and standard deviation was calculated for participants' years of experience. Descriptive statistics were calculated for each survey item. The association between participants' responses and their profession (doctor or dietitian) was investigated using Pearson's chi-square analyses. In order to comply with the assumptions underpinning chi-square analyses, categories were collapsed into three (confident/agree; neutral; not confident/disagree) to ensure that <20% of cells remained below minimum counts. Statistical significance was set at $P \leq 0.05$.

Six participants who were not identified as dietitians or doctors in their job description (e.g., nurse administrator) were removed from the sample of participants. If any of the questions in section two or three had multiple answers in the Likert scale, these responses were removed from the analysis. As the numbers of responses removed were very small this would not have introduced selection bias. As participants self-selected themselves into this study, the sample of participants in this study was not considered to be representative of all doctors and dietitians in Kolkata.

In addition, though the answers were anonymised any "observer" bias owing to practitioners providing "desirable/ideal" answers could not be ruled out. However, prior to the study the participants were encouraged to provide answers that reflected the reality of practices in hospitals. Participants were not blinded to the aim of the study.

## 3. Results

A total of 123 doctors and 56 dietitians completed the questionnaire. Participants were from a variety of specialties (including general medicine, endocrinology, and critical care) and were working in a variety of designations (including trainee/registrar, resident, and chief/consultant). The dietitians had been working for an average of 5.6±6.9 years, and the doctors had been working for an average of 5.2±5.8 years.

*3.1. Confidence in Nutrition Care and Leadership.* The confidence of doctors and dietitians towards nutrition care, nutrition advocacy, and leadership is displayed in Table 1. Doctors displayed moderate confidence in providing nutrition care to patients and were less confident in their skills relating to nutrition advocacy and leadership. Dietitians displayed greater confidence than doctors in providing nutrition care to patients but similarly lacked confidence in their skills relating to nutrition advocacy and leadership.

*3.2. Attitudes towards Nutrition in Patient Care.* The attitudes of doctors and dietitians towards nutrition in patient care are displayed in Table 2. Overall, doctors and dietitians displayed equally positive attitudes towards nutrition in patient care. Participants reported variable perceptions regarding the adequacy of nutrition-related training of doctors. Dietitians were more likely than doctors to report that doctors are not adequately trained to discuss nutrition with patients.

**Table 1: Confidence of doctors and dietitians towards nutrition care, nutrition advocacy, and leadership (n = 179).**

| Item | Confident | | Neutral | | Not confident | | Difference between groups |
|---|---|---|---|---|---|---|---|
| | Doctor *n* (%) | Dietitian *n* (%) | Doctor *n* (%) | Dietitian *n* (%) | Doctor *n* (%) | Dietitian *n* (%) | |
| Provide evidence-based nutritional advice to patients and other healthcare professionals responsible for their care. | 69 (56) | 51 (91) | 34 (28) | 3 (5) | 20 (16) | 2 (4) | Dietitians more confident than doctors, $P < 0.001$ |
| Treat patients using information from the most valid scientific literature and/or current guidelines. | 86 (70) | 50 (89) | 23 (19) | 5 (9) | 13 (11) | 1 (2) | Dietitians more confident than doctors, $P = 0.018$ |
| Signpost patients and the public to other specialist nutrition resources as needed. | 55 (45) | 31 (55) | 39 (32) | 10 (18) | 26 (21) | 9 (16) | $P > 0.05$ |
| Act as an advocate for health in various policy contexts—whether in the healthcare system or beyond. | 54 (44) | 24 (43) | 37 (30) | 16 (29) | 29 (24) | 13 (23) | $P > 0.05$ |
| Recognise the healthcare policy, service level, and individual level challenges posed by the "double burden of malnutrition." | 66 (54) | 35 (63) | 29 (24) | 9 (16) | 27 (22) | 5 (9) | $P > 0.05$ |
| Provide advice on the importance of nutrition in primary prevention or screening programmes. | 81 (63) | 51 (91) | 29 (24) | 4 (7) | 12 (10) | 0 (0) | Dietitians more confident than doctors, $P = 0.001$ |
| Provide advice on the importance of nutrition in secondary prevention or early diagnosis/treatment. | 86 (70) | 48 (86) | 30 (24) | 2 (4) | 5 (4) | 4 (7) | Dietitians more confident than doctors, $P = 0.003$ |
| Provide advice on the importance of nutrition in tertiary prevention or rehabilitation/disability limitation. | 80 (65) | 45 (80) | 28 (23) | 5 (9) | 13 (11) | 5 (9) | $P > 0.05$ |
| Work with nutritionists, dietitians, doctors, scientists, educators, public health specialists, policymakers, patients, and the public in | 78 (63) | 48 (86) | 29 (24) | 5 (9) | 16 (13) | 2 (4) | Dietitians more confident than doctors, $P = 0.05$ |

Table 1: Confidence of doctors and dietitians towards nutrition care, nutrition advocacy, and leadership (n = 179) continued

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| effective partnerships. | | | | | | | |
| Combine management and leadership with clinical/technical knowledge and skills. | 65 (53) | 38 (68) | 34 (28) | 10 (18) | 24 (20) | 6 (11) | $P > 0.05$ |
| Understand the “role of ” and “when to” refer to a multi-professional nutrition support team is needed (e.g., parenteral nutrition specialists). | 73 (59) | 48 (86) | 32 (26) | 5 (9) | 18 (15) | 3 (5) | Dietitians more confident than doctors, $P = 0.02$ |
| Understand the principles of ethics relating to nutrition and feeding. | 62 (50) | 33 (59) | 41 (33) | 13 (23) | 20 (16) | 8 (14) | $P > 0.05$ |

**Table 2: Attitudes of doctors and dietitians towards nutrition care ($n$ = 179).**

| Item | Confident | | Neutral | | Not confident | | Difference between groups |
|---|---|---|---|---|---|---|---|
| | Doctor $n$ (%) | Dietitian $n$ (%) | Doctor $n$ (%) | Dietitian $n$ (%) | Doctor $n$ (%) | Dietitian $n$ (%) | |
| Nutrition advice and counselling should be part of routine care by all healthcare professionals, regardless of specialty. | 114 (93) | 49 (88) | 7 (6) | 0 (0) | 0 (0) | 6 (11) | $P > 0.05$* |
| It is important to address the importance of diet whenever caring for a patient. | 116 (94) | 54 (96) | 3 (2) | 0 (0) | 1 (1) | 1 (1) | $P > 0.05$* |
| Most doctors are not adequately trained to discuss nutrition with patients. | 76 (62) | 39 (70) | 21 (17) | 13 (23) | 24 (20) | 3 (5) | Dietitians agree more than doctors, $P = 0.044$ |
| It is important to advocate diet and activity balance to promote weight control. | 111 (90) | 53 (95) | 7 (6) | 2 (4) | 1 (1) | 0 (0) | $P > 0.05$* |
| It is important to recognise and treat risk of malnutrition as required. | 115 (93) | 53 (95) | 5 (4) | 1 (2) | 0 (0) | 1 (2) | $P > 0.05$* |
| Patients requiring more specialised nutrition advice require referral to a dietitian/nutritionist. | 111 (90) | 54 (96) | 6 (5) | 0 (0) | 3 (2) | 0 (0) | $P > 0.05$* |
| Doctors require the support of health professionals such as nurses and dietitians to reinforce patient nutrition education.. | 113 (92) | 51 (91) | 8 (7) | 3 (5) | 0 (0) | 0 (0) | $P > 0.05$* |
| Dietitians require the support of healthcare professionals such as doctors and nurses to reinforce patient nutrition education. | 114 (93) | 52 (93) | 6 (5) | 2 (4) | 0 (0) | 1 (2) | $P > 0.05$* |

* violated the assumptions of chi-square analyses (expected cell count <5).

## 4. Discussion

It was reassuring to note that the doctors and dietitians had positive attitudes towards the importance of nutritional awareness in order to maximise clinical outcomes. This finding is generally supported by previous findings of the NNEdPro group and the wider literature [12, 13]. The greater confidence of dietitians compared to doctors in providing nutrition care to patients was expected as dietitians are usually provided more specialised training in nutrition care.

The variability in views regarding doctors' adequacy of nutrition training is widely debated in international literature. In a recent study the amount of nutrition education in a national survey of all 127 medical schools in the US, the amount of nutrition education was found to be inadequate [14]. It is proposed that the inadequate nutrition education is likely to affect attitudes and confidence to provide nutrition care.

*4.1. Strengths.* Although this study provides only a cross-sectional snapshot of the state of play in the region, a standardised approach for assessing the attitudes of doctors and dietitians minimised bias in the analysis of the results and the finding may therefore be considered as a first piece of evidence towards defining the nutrition education and training needs of the local healthcare workforce. The response rate (76%) of participants was also high in this study and as the majority of participants were able to complete the questionnaire on an anonymous basis, the likelihood of reporting bias was also reduced.

*4.2. Limitations.* Due to the self-reported nature of the questionnaire the true extent of the doctors' and dietitians' local clinical practices may not have been fully explored. It would also have been helpful to perhaps adapt the questionnaire further as applied to the Indian

context. For the participants who completed the questionnaire at the presentations, the results may have been influenced by the content of the presentations provided immediately prior to data collection for some of the participants. It should also be noted that in case of questionnaires sent out by the Remedy Clinic, full anonymisation was not possible and perhaps, as a result, some of this some questions could have been answered in a biased manner. Taking these factors into consideration, the results of this study may not be widely representative of the views of doctors and dietitians practicing in the Kolkata area. It is likely that the results in this survey could be more optimistic than those produced if a fully representative sample were surveyed.

Despite the acknowledged limitations of this survey, taking into consideration the variety of responses obtained, it may be possible to extrapolate that this paper provides a general idea of the nutrition education needs of doctors and dietitians of the inner city of Kolkata to the extent that future studies can now be planned appropriately. This is especially relevant in planning further work, as doctor's priorities for nutrition care in relation to other areas of patient care require further investigation to determine the emphasis placed on nutrition. The impact of attitudes and confidence on actual practices as well as the subsequent impact of actual practices on patients' health outcomes also requires full investigation.

In future studies based in Kolkata, the intention is to recall the cohort of healthcare professionals surveyed in this study and to deliver, as well as evaluate, a bespoke educational intervention package in order to assess the potential for changes resulting from education. Alongside this it would be necessary to conduct a wider more systematic and representative survey of the majority of doctors and dietitians in Kolkata or indeed in West Bengal, following which the relevant nutrition educational intervention can potentially be upscaled.

## Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication.


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## Hydration: Knowledge, Attitudes, and Practices of UK Dietitians

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*Abstract*

*Aim*. The aim of this study was to investigate dietitians' knowledge, attitudes, and practices (KAP) regarding hydration and patient care.

*Methods*. A cross-sectional online survey was administered to UK dietitians via the British Dietetic Association monthly newsletter and included 18 items on hydration knowledge ($n$ = 8), attitudes ($n$ = 4), and practices ($n$ = 6). KAP scores were calculated by adding the total number of correct knowledge responses and by ranking attitude and practice responses on a Likert scale.

*Results*. 97 dietitians completed the online survey and displayed varying levels of KAP regarding hydration and patient care. The mean unweighted scores were knowledge 5.0 (±1.3) out of 8; attitude 13.9 (±1.3) out of 16; practice 14.9 (±2.6) out of 24. Dietitians appeared to be guided by clinical reasoning and priorities for nutrition care.

*Conclusions*. There may be scope to further assess and potentially enhance the KAP of dietitians regarding hydration and patient care. Innovative approaches to hydration promotion are warranted and may include focusing on dietitians' personal hydration status, increasing communication with other healthcare professionals, and partnering with patients to take a proactive role in hydration monitoring.

## 1. Introduction

Hydration is a recognised determinant of health status for all population groups [1]. Mild dehydration can have negative health effects such as impaired physical function and cognitive decline [2]. There is limited understanding of the extent to which the hydration status of population groups increases health-related costs. There is, however, a growing evidence base of the use of health economics models for specific disease modalities [3, 4]. Dehydration is recognized as a component of malnutrition, for which the United Kingdom (UK) health-related costs are estimated to be at least 13bn pounds annually [5].As a result, national guidance widely encourages optimal hydration in UK hospital and community settings [6, 7].

Guidance exists for the promotion of hydration in UK hospitals [8]. The guidance provides practical advice for health care staff in England and Wales on how to minimise the risk and potential harm that dehydration can cause and offers solutions to improve the provision of fluids to patients in hospitals. Despite this guidance, it has been reported that patients continue to lack access to fresh drinking water and continued efforts to promote optimal hydration are needed [9]. Furthermore, over 90% of malnourished patients are cared for in community settings [10], suggesting that continued efforts for hydration promotion should occur in both hospital and community settings.

Healthcare professionals (HCPs) are expected to engage in best-practice care to address nutrition-related conditions in a multidisciplinary manner [11]. Registered dietitians are HCPs who assess, diagnose, and treat nutritional problems for individuals in the UK [12]. It is recommended that dietitians take a coordinated and integrated approach to addressing the nutritional care of patients, including promotion of optimal hydration, and lead on relevant knowledge transfer to other HCPs [13]. Dietitians should be competent in assessing patients' hydration requirements, developing strategies to meet hydration needs, and providing user outcome focussed services in all care settings as part of a holistic integrated package of care [14]. However, the competence of UK dietitians regarding hydration and patient care has not been studied.

The knowledge, attitudes, and practices (KAP) of HCPs have been widely investigated as indicators of behaviours [15–17]. Investigating the KAP of UK dietitians regarding hydration will inform strategies to support optimal hydration of patients in hospital and community settings. These strategies are important due to the recognised influence of hydration status on health outcomes [1] and will contribute to a reduction in health-related costs [18]. The aim of this study, therefore, was to investigate dietitians' KAP regarding hydration and patient care.

## 2. Methods

*2.1. Overview.* This study utilised a cross-sectional online survey to describe dietitians' KAP regarding hydration and patient care. The survey was conducted before the British Dietetic Association fluid factsheet was released in 2014. The study was undertaken as part of a larger project on hydration education in health care, and was exempt from ethical approval due to the nonsensitive, anonymous, educational nature of the survey.

*2.2. Survey Instrument.* A cross-sectional online survey (SurveyMonkeyPro) was developed following a review of relevant scientific literature (developed into evidence tables), published texts, "grey" literature, and expert opinion from dietitians, doctors, and hydration experts. Topics requiring investigation were categorised into key areas: facts regarding hydration, dehydration and fluid intake, kidney function and associated conditions, cognitive function, vulnerable groups regarding hydration (e.g., dysphagia and older adults), hydration assessment and advice in practice, personal and clinical attitudes towards hydration, and perceived importance of hydration training.

The survey was piloted on a range of HCPs at various levels including medical students, junior doctors, and GPs and reviewed by GPs, GP trainers, dietitians, scientists, and hydration experts for feedback on the interpretation and understanding of survey items. Recommendations to survey content, wording, and layout were completed prior to data collection. The finalised survey included 18 items on knowledge ($n$ = 8), attitudes ($n$ = 4), and practices ($n$ =6), and each practice question also included an open ended textbox for respondents to justify their response. The survey was intended to take approximately five minutes to complete following recommendations by the GP reviewers that a short survey would promote participant completion. The survey was only available in English.

**Table 1: Dietitians' knowledge of hydration and patients care (n=97)**

| Knowledge area | Proportion of participants answering correctly n (%) |
|---|---|
| Definitions of dehydration | 74 (76) |
| Physical signs of dehydration | 89 (92) |
| Impact on performance tasks | 91 (94) |
| Fluid requirements for adults | 39 (40) |
| Fluid requirements for older people | 59 (61) |
| Water content of food and drinks | 34 (35) |
| Water content of human body | 44 (45) |
| Recommended water intake | 53 (55) |

*2.3. Participant Sampling.* The potential participant pool was dietitians working in the UK who were registered with the British Dietetic Association in February 2014. Information about the survey was included in the monthly newsletter for February 2014, including a brief description of the study, assurance of confidentiality, link to complete the survey, and contact details of the research team.

*2.4. Data Analysis.* Data analysis was conducted using the SPSS statistical software package version 22. Frequency distributions were calculated for each survey item, as well as mean and range for participants' years of experience. Knowledge scores were calculated for each participant by adding up the total number of correct answers for the knowledge questions. Attitudes and practice scores were calculated for each participant by ranking each response on a scale from 1 to 4 where 1 indicated low attitude or infrequent practice and 4 indicated high attitude or frequent practice. Data are presented as mean (±standard deviation).

## 3. Results

A total of 126 dietitians accessed the survey during the data collection period, and 97 (77%) completed the survey. Participants were from a combination of hospital and community

settings and had been working as a dietitian for a mean of 6 years (range of 0–40 years). More than one third ($n$ = 39; 40%) of participants reported being in their current post for≤2 years, 28% ($n$ = 27) for 3–5 years, 11% ($n$ = 11) for 6–9years, and 21% ($n$ = 20) for 10+ years.

*3.1. Knowledge.* Table 1 outlines the hydration knowledge of participating dietitians. The mean number of questions correctly answered was 5.0 (±1.3) out of 8. Most dietitians were able to recognise the physical signs of dehydration (92% correct) and knew the impact that dehydration has on performance tasks (94% correct). However, fewer dietitians knew the water content of the human body (45% correct), fluid requirements for adults (40% correct), and the water content of foods and drinks (35% correct).

**Table 2: Dietitians attitudes towards hydration in patients care (n=97)**

| **Attitude area** | **Response** | **Proportion of participants' responses n (%)** |
|---|---|---|
| Person responsible for managing hydration intake of patients | Dietitian | 0 (0) |
| | Doctor | 0 (0) |
| | Patient | 0 (0) |
| | All the above | 97 (100) |
| Risk of excess water consumption on health | No risk | 0 (0) |
| | Minimal risk | 25 (26) |
| | Moderate risk | 59 (61) |
| | Significant risk | 13 (13) |
| Importance of hydration for kidney stones | Very important | 65 (67) |
| | Somewhat important | 24 (25) |
| | Unimportant | 0 (0) |
| | Very unimportant | 8 (8) |
| Importance of hydration education for dietitians | Very important | 61 (63) |
| | Somewhat important | 32 (33) |
| | Unimportant | 3 (3) |
| | Very unimportant | 1 (1) |

*3.2. Attitudes.* Table 2 outlines the hydration attitudes of participating dietitians. The mean attitudes score was 14.0 (±1.3) out of a maximum score of 16. All dietitians (100%) reported that hydration management is the combined responsibility of HCPs and patients and recognised some degree of risk in consuming excess water. Nearly all participants (96%) reported that hydration education for dietitians is important.

*3.3. Self-Reported Practices.* Table 3 outlines the hydration practices of participating dietitians. The mean practice score was 14.9 (±2.6) out of a maximum score of 24. Most dietitians (91%) promoted hydration in standard care by encouraging intake of water and other beverages and reported wide variation in time spent promoting hydration to patients. Variations in practices were also apparent for promoting hydration to stroke patients and assessing urine colour. The majority of dietitians (58%) rated their personal hydration practices as bad or average but reported using water dispensing facilities at their place of work.

Dietitians reported that it is important to promote liberal intakes of all fluids to facilitate compliance and maximise the likelihood of patients reaching optimal hydration status. The amount of time dietitians spent on hydration promotion was dependent on the nutritional priorities of patients. Free text responses from dietitians who never promoted hydration to stroke patients reported that it was either not applicable to their current post ($n$ = 20) or that cognitive impairments of patients hindered communication ($n$ = 1; $n$ = 2 did not comment). Self-reported urine colour was deemed to be a practical and valid indicator of hydration status. The main barrier to dietitians consuming adequate fluids at work was lack of time and not remembering to drink.

## 4. Discussion

This study investigated the KAP of dietitians in the UK regarding hydration and patient care. This is important as dietitians are ideally placed to advise and educate on the benefits of appropriate hydration alongside nutrition [14, 19]. The dietitians in the current study displayed approaches to hydration and patient care that are realistic to practice settings. However, there were noted opportunities for improved hydration KAP.

The hydration knowledge of dietitians in this study appeared to be lacking. Whilst dietitians displayed very good understanding of physical signs of dehydration and its impact on cognitive performance, fewer dietitians provided correct answers to other knowledge questions, such as recommended water intakes and water content of food, drinks, and the human body. It is important to note that the evidence relating to specific hydration issues such as water content of foods and hydration requirements of patients is evolving [20, 21]. Based on the EFSA fluid intake from beverages recommendations, the most recent hydration guidelines promoted 8–10 glasses (200mL glass) per day [22] which is higher than the previous guidelines of 6–8 glasses per day [23]. As a result, dietitians may have variable understanding of specific hydration issues and require further education to maintain clinical relevancy.

Participants appeared to recognise the need for improved hydration knowledge given that only 4% of participants regarded hydration education as unimportant. As a registered dietitian in the UK, it is a requirement to remain competent to practice [14, 24, 25], thus requiring a need for career-long learning to maintain evidence-based knowledge and skills [26, 27]. While the dietitians in this study recognized that nutrition and hydration are integral to optimise patient outcomes, the dietetics curriculum framework does not specifically mention

hydration [14]. It has been said that water is the forgotten nutrient [8] and it could be suggested that it is important to be explicit in documentation to state nutrition and hydration together.

**Table 3: Dietitians' self-reported practices regarding hydration in patient care (n=97)**

| Practice are | Response | Proportion of participants' responses n (%) |
|---|---|---|
| Usual method of promoting hydration in standard care | Not part of care | 7 (7) |
| | Encourage reduced caffeine intake | 1 (1) |
| | Encourage water intake only | 1 (1) |
| | Encourage water and other beverages | 88 (91) |
| Average time spent providing hydration advice I a 4-hour clinical session | 0 minutes | 4 (4) |
| | Between 0 and 10 minutes | 30 (31) |
| | Greater than 10 minutes | 32 (33) |
| | Unable to quantify | 31 (32) |
| | Never | 23 (24) |
| Frequency of promoting hydration to stroke patients | Occasionally | 17 (18) |
| | Regularly | 22 (22) |
| | Always | 35 (36) |
| | Never | 6 (6) |
| Frequency of assessing patients self-reported urine colour | Occasionally | 36 (37) |
| | Regularly | 38 (39) |
| | Always | 17 (18) |
| Personal rating of hydration status at work | Bad | 14 (14) |
| | Average | 43 (44) |
| | Good | 26 (27) |
| | Excellent | 14 (14) |
| Workplace access and use of dispensing facilities | Yes, and I use it | 64 (66) |
| | Yes, but I do not use it | 10 (10) |
| | No, but I would use it if available | 22 (23) |
| | No, I would not use it | 1 (1) |

Dietitians in this study displayed positive attitudes towards hydration and its impact on prevention and patient care. They recognised the importance of a multidisciplinary approach

to hydration promotion, particularly for at-risk patient groups and for dietitians to be well educated on hydration. However, it has been previously established that UK HCPs place less importance on hydration compared with counterparts in Mediterranean countries, which may be due to variations in climate [19]. Strategies to enhance a multidisciplinary approach to hydration care may lower the gap between UK HCPs and other countries by, for example, increased focus on the NHS nutrition and hydration awareness weeks [6].

Qualitative responses from free text boxes indicated that self-reported hydration practice was influenced by higher nutrition priorities for their patients. Therefore, despite the participants having a good attitude towards hydration care, this may not always translate into patient care. Less than half of the dietitians in this study reported good personal hydration while at work, with 24% indicating that this was due to lack of access to water dispensing facilities in their workplace. This is particularly pertinent for health care professionals working in a community setting and carrying out domiciliary visits where there will be a lack of access to water dispensing and bathroom facilities. The impact of dietitians' personal habits on their counselling practices has not been investigated; however, doctors with healthy personal habits or a desire to improve their own health are more likely to counsel patients [28–30]. Similarly, interventions that focus on medical students' personal nutrition behaviours have been shown to improve the frequency of nutrition counselling [31]. These studies suggest that emphasis should be given to dietitians' workplace hydration practices to facilitate improvements in their own hydration status and the hydration-related care provided to patients.

As previously mentioned, in some hospitals and practice settings there were no water dispensing facilities available for staff. This has been related to guidance on preventing

legionella and pseudomonas outbreaks in care settings, leading to infection control guidance, strict use and service maintenance records, or withdrawal of dispensers [32, 33]. HCPs should be cognisant of sourcing water throughout the day which could be supported if the substantive evidence of how to maintain water dispensing facilities is appropriately applied [32–34].

Innovative approaches to promoting adequate fluid intake are required in UK hospitals and community settings [7]. One approach that has experienced positive outcomes is enhancing patients' participation in their health and medical care [35–37]. These studies report that patients are receptive to taking a proactive role in health care, which suggests that there are similar opportunities for hydration promotion initiatives utilising patient-participation. For example, initiatives could facilitate patients to self-monitor fluid balance, in order to reach targets set in collaboration with dietitians. A similar approach has been successfully trialled in Australia to enhance patients' protein and energy intake [38] and warrants further consideration.

Key limitations of the present study should be noted. Firstly, the strategy used to recruit participants may have resulted in some selection bias [39]. It is likely that those agreeing to participate may have had a particular interest in hydration and therefore may have resulted in an overestimation of dietitians' KAP. Secondly, a response rate could not be calculated as it is unknown how many dietitians read the newsletter/advertisements and chose not to participate. Similarly, questions relating to demographic characteristics were not included in the survey, which limited investigations into the representativeness of the participating dietitians in relation to the overall UK dietetic workforce. Finally, the self-reported nature of

the survey may have resulted in participants providing more clinically desirable responses than a true reflection of their attitudes and practices.

There may be scope to further assess and potentially enhance the KAP of dietitians regarding hydration and patient care. The dietitians in the current study appear to be guided by clinical reasoning and priorities for nutrition care. There is also a potential opportunity to follow up this sample of dietitians to investigate whether release of the British Dietetic Association's fluid factsheet has influenced KAP regarding hydration. The current study suggests that promotion of optimal hydration for patients requires a broader focus involving patients and other HCPs. The NNEdPro Group is currently examining the KAP in relation to the hydration education of medical doctors and will continue this work with other HCPs to determine their need for further training. Innovative approaches to hydration promotion are warranted and may include focusing on dietitians' personal hydration status and their leadership role in educating other HCPs and partnering with patients to take a proactive role in hydration monitoring.

**Conflict of Interests**
Joan Gandy works as a consultant for Danone Waters.

**Authors' Contribution**
Pauline Douglas, Lynn McGuffin, Celia Laur, Minha Rajput-Ray, Joan Gandy, and Sumantra Ray contributed to the conception and design of the project. Pauline Douglas, Celia Laur, Lynn McGuffin, and Sumantra Ray designed the survey instrument. Lauren Ball and Jennifer Crowley conducted the data analysis and drafted the paper. All authors participated in finalisation of the paper.

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# Appendix 5: Co-authorship forms

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## Co-Authorship Form

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| | |
|---|---|
| Please indicate the chapter/section/pages of this thesis that are extracted from a co-authored work and give the title and publication details or details of submission of the co-authored work. | Chapter 3: Nutrition beyond drugs and devices: a review of the approaches to enhance the capacity of nutrition care provision by general practitioners. |
| Nature of contribution by PhD candidate | Critically reviewed literature to develop main findings and recommendations of the study. |
| Extent of contribution by PhD candidate (%) | 70 |

**CO-AUTHORS**

| Name | Nature of Contribution |
|---|---|
| M. Leveritt | Reviewed literature to develop findings and recommendations of study. Revised manuscript |
| L. Ball | Reviewed literature to develop findings and recommendations of the study. Revised manuscript |
| C. Wall | Reviewed literature to develop findings and recommendations of the study. Revised manuscript |
| | |
| | |

**Certification by Co-Authors**

The undersigned hereby certify that:

- the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
- in cases where the PhD candidate was the lead author of the work that the candidate wrote the text.

| Name | Signature | Date |
|---|---|---|
| Michael Leveritt | | 22/4/2015 |
| Lauren Ball | L Ball | 26 April 15 |
| Clare Wall | Clare Wall | 30/04/2015 |
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# Co-Authorship Form

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Please indicate the chapter/section/pages of this thesis that are extracted from a co-authored work and give the title and publication details or details of submission of the co-authored work. Chapter 4: New Zealand general practitioners views on providing nutrition care to patients with chronic disease: a focus group study.

| | |
|---|---|
| Nature of contribution by PhD candidate | Critically reviewed literature to develop study design. Recruited participants and developed general practitioner continuing medical education meetings. Data analysis, interpretation and recommendations for the study. |
| Extent of contribution by PhD candidate (%) | 70 |

## CO-AUTHORS

| Name | Nature of Contribution |
|---|---|
| M. Leveritt | Reviewed literature for study design. Data analysis and interpretation. Revised and approved manuscript. |
| L. Ball | Reviewed literature for research design. Data analysis and interpretation. Revised and approved manuscript. |
| B. Arroll | Reviewed literature for research design. Recruited participants. Revised and approved manuscript. |
| S. Buetow | Research design. Data analysis and interpretation. Revised and approved manuscript. |
| A-T McGill | Recruited participants. Revised and approved manuscript. |
| C Wall | Reviewed literature for research design. Data analysis and interpretation. Revised and approved manuscript |

## Certification by Co-Authors

The undersigned hereby certify that:

- the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
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Nutrition guidelines for undergraduate medical curricula: a six country comparison. (Chapter 5)

Nature of contribution by PhD candidate: Critically reviewed literature to develop research design, main findings and recommendations of the paper.

Extent of contribution by PhD candidate (%): 70

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|---|---|
| Please indicate the chapter/section/pages of this thesis that are extracted from a co-authored work and give the title and publication details or details of submission of the co-authored work. | Chapter 6 ; New Zealand medical students have positive attitudes and moderate confidence in providing nutrition care. |
| Nature of contribution by PhD candidate | Critically reviewed literature to develop research design, main findings and recommendations of the paper. Recruited participants |
| Extent of contribution by PhD candidate (%) | 70 |

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| M. Leveritt | Data interpretation and recommendations. Revised and approved manuscript |
| L. Ball | Critically reviewed literature to assist with research design, main findings and recommendations. Approved manuscript. |
| B. Arnall | Critically reviewed literature to assist with research design, main findings and recommendations. Revised manuscript. |
| D-Y Han | Statistical analyses |
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Please indicate the chapter/section/pages of this thesis that are extracted from a co-authored work and give the title and publication details or details of submission of the co-authored work. Chapter 7: Doctors' attitudes and confidence towards providing nutrition care in practice: comparison of New Zealand medical students, GP registrars and GPs.

| | |
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| Nature of contribution by PhD candidate | Critically reviewed literature to develop research design, main findings and recommendations of the paper. Recruited participants |
| Extent of contribution by PhD candidate (%) | 70 |

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| L. Ball | Critically reviewed literature to assist research design, main findings and recommendations. Revised manuscript. |
| D-Y Han | Statistical analysis. |
| A-T McCaill | Recruited participants. Revised and approved manuscript |
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Please indicate the chapter/section/pages of this thesis that are extracted from a co-authored work and give the title and publication details or details of submission of the co-authored work. Chapter 6: Impact of an undergraduate course on medical students' self-perceived nutrition intake and self-efficacy to improve their health behaviours and counselling practices.

Nature of contribution by PhD candidate: Critically reviewed literature to develop research design, main findings and recommendations of the paper. Recruited participants

Extent of contribution by PhD candidate (%): 70

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| B. Arroll | Critically reviewed literature to develop research design. Revised and approved manuscript. |
| D Y Han | Statistical analysis |
| C. Wall | Critically reviewed literature to develop research design. Revised and approved manuscript. |

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