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Published

2014

Journal Title

Journal of Primary Health Care

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

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ABSTRACT

INTRODUCTION: Doctors are increasingly involved in the management of chronic disease and counsel patients about their lifestyle behaviours, including nutrition, to improve their health outcomes.

AIM: This study aimed to 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 The University of Auckland 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.

DISCUSSION: 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.

KEYWORDS: Exercise; health behavior; medical education; nutritional sciences

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Introduction

The prevalence of chronic disease is increasing and is influenced by lifestyle risk factors, including poor nutrition.¹ Doctors are increasingly involved in the management of chronic disease and counsel patients about their lifestyle behaviours to improve their health outcomes.² 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.³ Individuals living with chronic disease prefer to receive nutrition care from doctors rather than other health professionals, and hold this care in high regard.^{4,5}

Historically, medical schools have included limited or no curriculum relating to nutrition and exercise, which has led students to report

J PRIM HEALTH CARE
2014;6(2):101–107.

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that they are under-prepared to counsel patients about nutrition and exercise.^{6,7} In addition, medical students have been shown to be pessimistic about their ability to learn these skills.^{8,9} Medical students' perceptions of the importance of prevention in medicine are related to their own health habits.¹⁰ 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.¹¹⁻¹³ Medical students' counselling practices are improved after health promotion interventions throughout medical school that focus on students' personal health practices.¹⁴

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.¹⁵ 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.¹⁶⁻¹⁸ Importantly, students report an enhanced understanding of the principles of behaviour change and improved ability to perform behavioural change counselling.¹⁹

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 that 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 The University of Auckland. 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 that 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.²⁰ The questionnaire was adapted from a previous evaluation of a nutrition course at Harvard Medi-

cal School.²¹ 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.

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%. The demographic characteristics of the participants are described in Table 2. There were no differences

WHAT GAP THIS FILLS

What we already know: Medical students' perceptions of the importance of prevention in medicine are related to their own health habits. Medical students' counselling practices are improved after health promotion interventions throughout medical school that focus on students' personal health practices.

What this study adds: Medical students can increase awareness of their own personal nutrition behaviour after undertaking a course that includes nutrition content in the initial stages of their degree. Further investigation of how their confidence to provide nutrition advice evolves throughout training, as well as the optimal approach to incorporate nutrition into medical education, is required.

between the participating and non-participating students in terms of age, gender and ethnicity. However, the participating medical students were an average of two years older than the participating non-medical students ($p=0.004$).

Table 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 than 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.

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' ($p=0.046$).

Table 1. Questionnaire 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-point Likert scale
		Comparison to other individuals	5-point Likert scale
		Perceived change since the start of degree	5-point Likert scale
		Perceived change since start of course*	5-point Likert scale
Current diet restrictions	Provide an indication of current dietary behaviour	Moderation of fat intake	4-point Likert scale
		Moderation of saturated fat intake	4-point Likert scale
		Moderation of refined carbohydrate intake	4-point Likert scale
		Moderation of salt intake	4-point Likert scale
		Energy content of current diet	4-point Likert scale
Confidence to provide dietary recommendations	Assess whether undertaking the course modified students' confidence to provide dietary recommendations	Confidence to provide nutrition recommendations [†]	4-point Likert scale
		Confidence to assess nutrition content of diets [†]	4-point Likert scale
		Confidence in helping patients change their diet [†]	4-point Likert scale
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-fried foods; added salt	5-point Likert scale
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-point Likert scale
		Comparison to other individuals	5-point Likert scale
		Perceived change since the start of degree	5-point Likert scale
		Perceived change since start of course*	5-point Likert scale
		Outdoor walking pace [‡]	5-point Likert scale
		Flights of stairs climbed daily [‡]	5-point Likert scale
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 [†]	4-point Likert scale
		Confidence to assess physical activity level of patients [†]	4-point Likert scale
		Confidence in helping patients change physical activity patterns [†]	4-point Likert scale
Perceptions of course[§]	Investigates perceived impact of the course on dietary choices, physical activity habits and lifestyle behaviour	Perceived impact on dietary choices	Dichotomous
		Perceived impact on improving dietary choices	Dichotomous
		Perceived impact on exercise choices	Dichotomous
		Other changes in health behaviour or lifestyle	5-point Likert scale
		Confidence to discuss lifestyle behaviours with friends, family and patients	5-point Likert scale
Demographic characteristics	Allows indication of representativeness of the sample by comparison with others in group	Year of birth	Multiple choice
		Gender	Dichotomous
		Ethnicity	Multiple choice

* Medical and non-medical students post-course questionnaire only

† Medical students pre- and post-course questionnaire only

‡ Medical and non-medical students pre-course questionnaire only

§ Medical students post-course questionnaire only

|| Response categories were developed according to the New Zealand Census ethnicity categories

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 that 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.

Table 2. Demographic characteristics of participating students

Demographic characteristics	Medical students (n=61)	Controls (n=44)
Age* (mean \pm SD)	23 \pm 5 years	21 \pm 3 years
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 (25.0%)	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%)

* Participating medical students were an average of two years older than the participating non-medical students (23 vs 21 years; $p=0.004$)

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 US found an increase in awareness of dietary choices, as well as improvements in dietary choices.²¹ 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

Table 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

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.¹¹⁻¹³ 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 US 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.^{18,22} 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.²¹ 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.²³⁻²⁵ 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.²¹

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.^{26,27} Detailed comparison of the present study and the outcomes from Conroy et al.²¹ 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.^{21,28} Previous initiatives in medical nutrition education are highly variable in intent, delivery and depth of content.^{27,29} Notably, the current course was primarily didactic in nature, and incorporated a small interactive practical component. The approach of recent initiatives appears 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.²⁹ As a result, students may be confident in their ability to address basic nutrition concepts, but 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.²⁹ Enhancing the nutrition education in medical curricula is difficult, due to the competition for time in the curriculum and resistance to adding new courses.²⁶ 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.^{27,30}

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,²¹ 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.

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FUNDING

The authors would like to acknowledge funding support for the first author from The University of Auckland as part of a PhD research grant.

COMPETING INTERESTS

None declared.