

Impact of an Online Nutrition Course to Address a Gap in Medical Education: A Feasibility Study

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Abstract

Background and Objectives: Nutrition is a foundation of health, yet there is a deficiency of nutrition training in graduate medical education. The purpose of this feasibility study was to assess the impact of a brief online clinical nutrition course on medical residents' knowledge and attitudes related to the role of nutrition in clinical practice.

Methods: Medical residents from two institutions took a 3-hour, online, self-paced and interactive clinical nutrition course that reviewed macronutrients, evidence-based dietary patterns, a rapid nutrition assessment, and motivational interviewing. We administered surveys of nutrition knowledge and attitudes at three time points: (1) just prior to taking the online course, (2) immediately following, and (3) 3 months after course completion.

Results: Seventy-six residents enrolled in the study and 47 (62%) completed the online course and postcourse surveys. For residents who completed the study, the summated nutrition knowledge scores assessed both immediately after taking the course and 3 months later showed significant improvement ($P < .001$). Three months after completing the course, residents were more likely to believe it was their role to personally provide detailed nutrition information to patients ($P = .045$) and to endorse the view that a healthy diet is important for self-care ($P < .001$). The estimated time residents spent counseling patients on nutrition did not change after the intervention.

Conclusion: This feasibility study demonstrated the potential of a 3-hour, online, self-paced nutrition course administered to medical residents to result in a significant and sustained increase in nutrition knowledge and positive attitudes about the role of nutrition in clinical practice.

Introduction

Clinical practice guidelines from leading medical associations call for nutrition and lifestyle modification as first-line management of common conditions such as diabetes, hypertension, coronary artery disease, and hyperlipidemia.¹⁻⁴

Despite the unequivocal link between diet and health,⁵ nutrition education is severely limited in medical school and often completely absent from graduate medical education.^{6,7} A study of the perceptions of residents in a primary care training program found that 94% of survey respondents felt an obligation to discuss nutrition with their patients, yet only 14% felt prepared to do so.⁸

Notably, recent requirements for residency training issued by the Accreditation Council for Graduate Medical

Education highlight the growing problem of burnout and cite the importance of a healthy diet for resident physician well-being.⁹ Nevertheless, due to lack of training in nutrition, residents are in no better position than the general public to understand the composition and importance of a healthy diet.¹⁰

Medical residency programs need innovative strategies to teach evidence-based, clinically relevant information about nutrition, with minimal time reallocated from competing priorities and without overstepping duty hour restrictions. Online nutrition self-study modules are a means of striking this balance. This feasibility study examined the impact of a self-paced, online nutrition course on residents' understanding of clinical nutrition, attitudes regarding the role of nutrition in clinical practice, and perception of the importance of nutrition for self-care.

Methods

Resident physicians from all years of training from two institutions, family medicine at Northwestern McGaw University (NU) and internal medicine at the University of Minnesota (UMN), were invited to participate. The institutional review boards of both institutions approved this study. Participation was voluntary and no incentive or compensation was provided. Data from both sites were combined for analysis. Prior to this study, the formal curriculum of both residency programs did not include content dedicated to the role that nutritional factors play in the prevention and management of chronic illness.

Nutrition Education Course

We gave study participants access to the 3-hour, online course approved for continuing medical education, *Nutrition Science for Health and Longevity: What Every Doctor Needs to Know*. The course was developed by the nonprofit Gaples Institute.¹¹ The course consists of four modules that address macronutrient nomenclature, food sources of macronutrients, and key clinical nutrition trials (see course outline in [Appendix 1](#)).

Each module incorporates interactive elements that prompt learners to actively engage with the content. In simulated patient encounters, learners must choose how to counsel patients from a range of potential responses, and contextually relevant feedback is provided depending on the chosen response.

The two institutions presented the nutrition course to residents in different ways based on scheduling opportunities: NU allocated a half day during which residents individually completed the modules. UMN residents accessed the modules as time allowed throughout a month-long outpatient rotation with no specific time reserved for completion of the nutrition course.

Surveys

We surveyed residents at three time points: (1) immediately before taking the online nutrition course, (2) immediately following, and (3) 3 months after completing the course. Survey questions included inquiries regarding personal dietary practices, attitudes regarding nutrition in practice, and nutrition science knowledge. We calculated the nutrition knowledge score from 14 questions that covered a range of concepts considered foundational by the investigators (see [Appendix 2](#)).

Statistical Analysis

We calculated and presented descriptive statistics using means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. To assess change from pre- to immediate-post and to 3-month post, participants who completed all three surveys were included. Linear mixed models (for continuous outcomes) or generalized linear mixed models (for categorical outcomes) were used to evaluate change over time. We performed analyses for each site separately and for two sites combined; we used the software program SAS 9.3 (SAS Institute, Cary NC) for statistical analysis. We set statistical significance at a *P* value <.05.

Results

A total of 76 residents were enrolled in the study and 47 (62%) completed all three surveys: 29/32 (91%) from the NU cohort, and 18/44 (41%) from the UMN cohort. Data presented is from the 47 residents who completed all portions of the study.

Nutrition Knowledge

The nutrition knowledge scores increased substantially both immediately after the course, as well as at the 3-month postcourse assessment ($P<.001$), see Table 1. Subgroup analysis of each of the two cohorts showed a significant increase in knowledge scores at 3-month follow-up for both groups: UMN (9.5 to 11.4, $P=.003$) and from NU (9.2 to 10.7, $P=.001$).

Attitudes Regarding Nutrition in Practice

A persistent shift in the residents' view of the role of nutrition in medical care was noted at 3 months. While at baseline 66% of the residents in the study believed that their role includes providing nutrition information to their patients, 83% endorsed that view at 3 months following the intervention ($P=.045$). The self-reported time spent counseling patients on nutrition (3.2 minutes per clinic visit at baseline), did not significantly change throughout the study period.

Self-Care

After completing the nutrition course, residents were more likely to believe that maintaining a healthy diet was important for self-care, with persistence of this belief noted at 3-month follow-up ($P=.0003$). Self-reported vegetable and fruit consumption totaled 2.98 servings/day at baseline and did not significantly change throughout the study.

Discussion

This feasibility study of an interactive 3-hour nutrition course resulted in a significant increase in the summated nutrition knowledge scores, which persisted at 3 month follow-up. The increase in nutrition knowledge score is likely to be clinically significant, as it demonstrates an improved understanding of nutrition concepts that were assessed a priori to be foundational for clinical practice.

After completion of the online nutrition course, significantly more residents believed it was their personal responsibility to provide nutritional information to their patients. Nevertheless, the time residents spent counseling patients about nutrition did not change. As no attempt was made to change the structure of clinic visits during the study, it is possible that lack of time and the absence of modeling by clinical mentors were limiting factors.¹²

Compared to baseline, the study group reported a greater belief in the importance of nutritional self-care. As rates of burnout rise among residents, data suggests that improved dietary self-care among physicians could help to promote resilience and promote a sense of greater well-being.^{13,14} Although no difference was reported in residents' intake of vegetables and fruit, the possibility that other dietary changes were made cannot be excluded.

The Nutrition in Medicine Project developed at the University of North Carolina has offered an online curriculum since 1995.¹⁵ Since then, a variety of other online programs have become available, with structures ranging from video to slide-type presentations.^{16,17}

Research on effective learning in online curricula for medical education has shown that the addition of interactivity results in up to a 75% improvement in retention of new material over more passive methodologies.^{18,19} The online curriculum used in this study included extensive use of interactive elements that require learners to make choices, estimate effects, and experience simulated clinical encounters that present a range of feedback options.

Limitations of this feasibility study include the small sample size and an incomplete data set. We observed knowledge and attitudinal changes at 3 months, but longer-term changes could not be assessed. Although

developed a priori by a consensus of senior clinical educators, the survey instrument utilized has not been validated. The possibility of bias resulting from the lack of data from those who did not complete the study cannot be excluded. The UMN residents had a lower completion rate compared to the NU group. A credible hypothesis is that the allocation of a specific time to complete the 3-hour course, as was done in the NU group, served to establish the curriculum as a priority and thereby enhanced engagement. A longer-term investigation with a validated survey would be useful for further study.

Strengths of this study included the inclusion of training programs in two institutions with different types of course delivery. The incorporation of interactivity, a prominent feature of the nutrition course studied, encourages active learning and has been shown to result in substantial improvement in retention of new material compared to more passive methodologies.^{18,19}

Conclusion

This pilot study demonstrates the feasibility of a brief, interactive, online nutrition course in graduate medical education. The potential for utilizing this type of program for resident education in clinical nutrition is promising, as it is easily scalable, independent of local expertise, and time efficient.

Tables and Figures

Table 1: Change Over Time Among Residents Who Completed All Three Surveys (N=47). Data Are Presented as Mean (SD) or n (%)

Survey Item	Pre	Post	3 Months	Pre vs Post P Value	Pre vs 3 Months P Value
How important do you think it is:					
...for you to maintain a healthy diet? (score 1-5)	4.39 (0.71)	4.74 (0.49)	4.74 (0.49)	.0003	.0003
...for physicians to understand nutrition? (score 1-5)	4.57 (0.62)	4.77 (0.48)	4.72 (0.50)	.016	.054
...for physicians to model healthy behaviors? (score 1-5)	4.38 (0.68)	4.72 (0.50)	4.51 (0.72)	.002	.23
On average, how many servings of fruits and vegetables combined do you eat every day?	2.98 (1.31)	3.23 (1.20)	3.02 (1.05)	.068	.76
Minutes spend counseling patients on nutrition during patient visit	3.16 (2.91)	3.04 (2.40)	2.99 (2.24)	.74	.63
Overall knowledge of nutrition (score 0-14)	9.43 (1.56)	12.38 (1.24)	11.04 (1.61)	<.0001	<.0001
Philosophy Regarding Nutrition in Medical Practice					
I do not believe my role is to counsel patients about nutrition. OR I believe my role is limited to giving some basic nutrition info to my patients.	16 (34%)	10 (21%)	8 (17%)	.14	.045
Involve personally, providing detailed nutrition information to patients and answering common dietary questions	31 (66%)	37 (79%)	39 (83%)		

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