A Student-Directed Curriculum to Overcome Nutrition Education Barriers in Medical School

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Abstract
Background: For more than 50 years investigators raised concerns regarding insufficient nutrition education in medical schools. Many barriers, such as curricular guidance remain, hindering its progress. This study addressed curricular barriers by (1) implementing 4 teaching strategies into an applied nutrition medical school course and (2) evaluating which strategy was most preferred amongst students.
Methods: The investigators incorporated 4 teaching strategies into an applied nutrition course for medical students. An end of course survey measured the most preferred strategy and a pre/posttest measured the change of nutrition knowledge.
Results: Seventy-seven students (n=36 male) completed the course. A total of 59.5% of students preferred the student directed curriculum (SDC) compared to 15.5%, 13.6%, and 11.4% of students who preferred the group activities, media review, and mobile application respectively. The most requested topics in the SDC included supplements/fad diets (n=42 requests) and weight loss/chronic disease (n=32). Pre/posttests demonstrated increased nutrition knowledge (50% versus 87% correct at pretest versus posttest ($t=24.6$, $p<0.001$).
Conclusions: Incorporating a SDC into medical school nutrition courses may be a promising strategy to overcome barriers in nutrition education. The SDC may also serve as a model in other teaching environments to address needs that might have been omitted otherwise.

Keywords: curriculum, education, medical student, nutrition, obesity

Introduction

Since the early 1900s educators recognized nutrition education as an important part of medical students' (MSs) training [National Research Council Committee on Nutrition in Medical Education (NRC), 1985]. In 1963, the Council on Food and Nutrition [1963] made an urgent request to address the lack of nutrition education in medical curricula. Though some schools improved, the overall state of nutrition education has not across the world [Association of American Medical Council (AAMC), 2007; Chung et al., 2014; Murphy et al., 2014]. In 2010, 27% of US medical schools met the recommended hours of nutrition education compared to 38% in 2004 [Adams, 2010]. Though more European medical schools met recommendations in a 2014 survey, one-third of graduates complete training with insufficient nutrition education [Chung, 2014]. With a worldwide obesity crisis [Popkin, 2012], multi-billion dollar supplement industries [Buell, 2013], and worsening global food insecurities [Food and Agriculture Organization, 2014], applied nutrition is vital in medical education.

Applied nutrition uses scientific principles to address nutrition-related clinical problems [Medical Dictionary, 2016]. Nutrition training provides future physicians the self-efficacy to advise patients in nutrition [Schulman & Wolfe, 2000]. However, barriers such as time constraints and a lack of curricular guidance hinder progress in medical schools [AAMC, 2007; Ball, 2014; Dimaria-Ghalili et al., 2013; Hark, 2006]. Curricular guidance is particularly

important to address fluid topics in applied nutrition, such as fad diets and supplements, and to assist in understanding student baseline knowledge and questions.

The current study addressed curricular guidance in nutrition education by (1) implementing 4 teaching strategies (i.e., group activities, media review, mobile application, student-directed curriculum [SDC]) into an 8-week applied nutrition MS course and (2) evaluating the most preferred strategy to learn the material. The investigators hypothesized that MSs would report a dominant teaching strategy. To ensure that these strategies did not adversely affect MS learning of fundamental concepts, a pre/posttest was distributed. While group activities are well established in education [Armstrong & Koffman, 2000; Ball et al., 2014; Lenders et al., 2013], there is a paucity of literature describing the use of mobile applications in nutrition education [Teri et al., 2014] and no reported studies using the media review or SDC in any education venue.

Methods

Participants. All first-year MSs (MS1s) (n=188) at Baylor College of Medicine (BCM) (Houston, Texas) were eligible to take the elective course (maximum capacity=89) and enroll in the study through Blackboard Learn (Blackboard Incorporated; Washington, DC). Investigators excluded MSs who did not complete the pre/posttest or survey from the analysis. The Institutional Review Board at BCM approved publication of the study's findings.

Course Description. The 8-week course contained an interactive lecture of fundamental applied nutrition topics (Table) [Harvey, 2014; Sizer & Whitney, 2013]. In addition, each class contained 4 teaching strategies (i.e., group activities, media review, mobile application, SDC) to assist students in learning and applying material from the lecture. Classes met weekly for one hour and contained an even distribution of each teaching strategy.

Four Teaching Strategies.

Group activities. This strategy involved forming groups of 2-5 students. These groups collaborated on activities related to the weekly lecture topic. These activities included nutrition case studies, review questions from previous weeks, fast food nutrition information analysis, calculating nutrient needs, and probing questions for future lectures. After the group completed their collaboration, the entire class discussed the activity and addressed any unclear areas.

Media Review. Each MS brought in a current event article regarding the weekly lecture topic. Several MSs chosen at random gave brief summaries of his/her article. After, MSs who did not have a chance to present had the opportunity to do so.

Mobile Application. The goal of this strategy was to teach MSs how to utilize technology to apply principles from the weekly lectures (e.g., weight loss, counseling, chronic disease management). To achieve this, MSs identified a friend or family member trying to lose weight who owned a Smart Phone, had a Body Mass Index $\geq$25 kg/m^2, and was willing to work with the MS during the course. The individual downloaded a weight loss app (*Lose It*®) onto his/her Smart Phone and met with the MS weekly until the end of the course. Weekly, the investigators guided MSs through motivational interviewing, goal setting, and answering potential patient questions (e.g., supplements, exercise).

SDC. This strategy integrated student questions into the course. Week one, each MS turned in 2-3 requested questions to address during the course. The investigators categorized these questions into the lecture of which they were most related. The instructor then answered the questions weekly in a lecture format.

Course Analysis. At the end of the course, MSs completed a 9-part retrospective survey to assess the most preferred teaching strategy to learn applied nutrition. To ensure the teaching strategies did not adversely affect fundamental nutrition knowledge, MSs completed a pre/posttest. Investigators analyzed the survey data using SigmaPlot software 12.0 (Systat Software; San Jose, CA). Paired sample t-tests were used to compare pre/posttests.

Results

The course reached maximum capacity (n=89, 47.3% MS1s). Twelve students did not meet the study inclusion criteria because of missing data. The final analysis contained 77 MSs (n=36 male). MSs significantly improved their applied nutrition knowledge. Scores increased from 10.0/20.0 (±2.0) correct at pretest to 17.4/20.0 (±2.0) correct at posttest ($t=24.6$, $p<0.001$).

SDC. The investigators collected a total of 210 questions from the SDC. The most commonly requested SDC topics related to specific supplements and fad diets (n=42), weight loss strategies and chronic diseases (n=32), general nutrition requirements (n=27), sports nutrition (n=22), and nutrition counseling (n=21).

Table: Course curriculum for an 8-week applied nutrition medical student course.

Week	*Curricular Topic*
1	Carbohydrates, fats, and protein
2	Obesity and the *perfect* diet
3	Diet questions for specific diseases
4	Dietary supplementation and fad-diets
5	Food safety and genetic engineering
6	Sports nutrition and alcohol
7	Global health nutrition
8	Finals week

Survey Results. The majority (59.5%) of students preferred the SDC compared to 15.5%, 13.6%, and 11.4% of students who preferred the group activities, media review, and mobile application respectively. The mobile application increased self-efficacy for obtaining caloric assessments for 67.5% of MSs but only 33.8% thought that it provided helpful information. MSs varied in opinion regarding the mobile application; some found it helpful to address dietary needs whereas others found difficulty in navigating the database and accessing its friend network. Still others had prior experiences with different applications of which were, in their opinion, less cumbersome. In addition, the course led to increased counseling self-efficacy in fad diets/supplements (96.1%), 89.7% reported very good/excellent instructor teaching effectiveness, 93.5% stated that they would recommend the course to a colleague.

Discussion

The investigators incorporated 4 teaching strategies into an applied nutrition course. High demand for nutrition education was noted with maximum enrollment. Knowledge of fundamental concepts was not adversely affected by including the teaching strategies. The most notable finding was that the majority of MSs preferred the SDC, with the most commonly requested questions related to fluid topics (i.e., supplements and fad diets) containing subtopics (e.g., specific fad diet) that likely would have been omitted if the SDC was not included.

The SDC is promising to bridge the barrier in nutrition curricular guidance education [AAMC, 2007; Ball, 2014; Dimaria-ghalili et al., 2013; Hark, 2006] by assisting in understanding student interests, baseline knowledge, and current topics that may not yet be in nutrition textbooks while not adversely affecting fundamental nutrition knowledge. By including these current and often fluid topics, students will be better equipped to advise patients in dietary needs [Dimaria-Ghalili et al., 2013]. Further, the SDC may be generalized to different learning environments such as in other undergraduate coursework, resident rotations, or faculty workshops. In all of these situations, the educator would survey the learners at the beginning of the course or rotation and incorporate requested areas of interest during the learning experience.

Since there are no reported studies that utilize these 4 teaching strategies in a nutrition course, we cannot compare our findings to others. However, we may speculate that students preferred the SDC due to autonomy, requiring the least amount of work, and/or continual engagement. The other strategies may not have been preferred due to technical concerns (mobile application), intimidation to speak in

large groups (media review), or familiarity (group activities). Study limitations included no control group for comparison since this was the first applied nutrition course offered at the institution.

Conclusions

The SDC is a model for educators to tailor content to learners' interests/weaknesses while providing insight into key areas that might have been omitted otherwise, equipping trainees to be confident and competent future clinicians. With the high demand for nutrition education and widespread nutrition-associated diseases, continued pursuit to overcome curricular barriers to nutrition education is needed. Given the potential of the SDC, additional studies such as SDC use in other educational venues, with varying levels of learners (e.g., undergraduate, postgraduate, faculty), and in clinical settings (e.g., teaching rounds) would benefit the medical and educational communities at large.

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