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SHORT COMMUNICATION

Improving Nutrition Education with Second-Year Medical Students: From Take-Home Assignment to Large-Group Application Exercise

Julia Bisschops[1] · **Sabyasachi Moulik**[2] · **Gregory W. Schneider**[1]

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Abstract
Augmenting its nutrition education, the Herbert Wertheim College of Medicine Endocrinology course initially used a case-based, take-home assignment on type II diabetes dietary guidelines, with literature search requirement and a module on relevant social determinants of health (SDOH). Course evaluations indicated this assignment did not adequately improve student perceptions of learning. For the subsequent cohort, we changed to a large-group active learning session, requiring one faculty facilitator, where student teams created problem lists including SDOH and reviewed research articles to support evidence-based nutrition recommendations. Survey results indicate that the new session resulted in significantly improved student perceptions of learning.

Keywords Medical education · Nutrition · Literature search

Background

For decades, educators have recognized that medical school curricula lack effective and well-structured training in nutrition. The Council on Foods and Nutrition first noted the lack of nutrition instruction in medical schools in 1963 [1]. More recent efforts include the emphasis by the Association of American Medical Colleges (AAMC), in its 2011 report on social science education, to develop and enhance medical school curricula in nutrition [2]. Experts in nutrition education have instituted proactive approaches to medical education in several institutions nationwide, but these efforts are neither consistent nor universal [3–5]. The Academy of Nutrition and Dietetics in 2017 released its recommendations for medical education, which involve using interprofessional educators and small-group teaching, including case-based and problem-based learning [6].

✉ Gregory W. Schneider
gschneid@fiu.edu

[1] Department of Humanities, Health and Society, Herbert Wertheim College of Medicine, Florida International University, Miami, FL 33199, USA

[2] Department of Cellular Biology and Pharmacology, Herbert Wertheim College of Medicine, Florida International University, Miami, FL 33199, USA

An international systematic review, led by Crowley and colleagues, on nutrition education in medicine revealed a worldwide gap between such recommendations and actual educational practice. They determined that nutrition education is insufficiently incorporated into medical education and encouraged broader efforts to increase students' knowledge, skills, and confidence in providing nutrition education to patients [7]. Clinical nutrition educators have also emphasized the importance of performing a literature search and of taking into account social factors when undertaking patient education. They have encouraged clinicians to systematically select patient education materials, because dietary guidelines for different conditions change, and to assess literacy level, motivating principles, and cultural relevance, since such social determinants are crucial to the success of patient education [8].

In order to enhance nutritional education at Florida International University Herbert Wertheim College of Medicine, we created a case-based module that would incorporate social determinants and skill-based learning on performing a literature search. Our hope was to integrate aspects of the Academy of Nutrition and Dietetics recommendations and to provide students an opportunity to develop skills related to AAMC Entrustable Professional Activity (EPA) 7—Form Clinical Questions and Retrieve Evidence to Advance Patient Care—during the case. Our learning objectives for the session appear in Table 1. The content

Table 1 Session learning objectives

By the end of this activity, participants should be able to:
1. Describe nutritional recommendations for type II diabetes
2. Explain how social determinants of health affect patient care and health outcomes in type II diabetes
3. Select and analyze journal articles, applying understanding of evidence-based medicine
4. Perform a literature search to address a clinical question

focused on improving the understanding of nutritional recommendations for type II diabetes, on recognizing how the social determinants of health (SDOH) affect patient care and health outcomes, and on literature search skills. While licensing exams such as the USMLE have tested on nutrition topics, they typically have concentrated on vitamin deficiencies rather than learning how to take care of an obese or diabetic patient [4]. This paper describes the differences in student perceptions of learning on end-of-course reviews for a take-home case-based module compared to a large-group application exercise version of the same module.

Activity

Our initial format involved a take-home module for second-year students during their Endocrinology course. The first half of the module provided background reading and the second half provided a case with activities for review. The student assignment involved written feedback on the case, a short literature review, and selection of one article the student would recommend for patient education. The Class of 2021 consisted of 117 students. On end-of-course surveys, students self-reported some increases in their knowledge about nutrition and the SDOH and in their skills in doing an evidence-based literature search. The survey scores and feedback from faculty and student representatives at the course review meeting, nevertheless, suggested room for improvement.

For the effort involved, students indicated a desire to participate in an in-class activity. As Zinski et al. have shown, while student expectations of teaching modalities have changed, medical students still express preferences for a mixture of lecture and active learning, small-group experiences [9]. Like many medical schools [10], as HWCOM has attempted to enact more case-based, problem-based, and small-group activities, we have faced challenges having adequate number of faculty facilitators. In response to our initial experience and with resource constraints in mind, we designed an interactive nutrition case-based session that would require minimal faculty facilitation.

The class of 2022 consisted of 121 students. For this cohort, we introduced a large-group application exercise as a mandatory session during the Endocrinology course. The session includes the same content as in the take-home module but administered in an innovative format. The session opens with an introductory lecture and then closes with two self-facilitated small-group case-based activities.

Before arriving, the students needed minimal preparation for the session: to review a nutrition consensus report by the American Diabetes Association (ADA) [11]. A family physician and two staff members moderated the session. The opening lecture introduced students to nutritional guidelines for diabetic patients, summarized the case, modeled an evidence-based literature search, and provided directions for the small-group application exercise. The entire session took place in one room, and upon arrival, the instructors divided students into predetermined groups of around six. The case involved a patient with newly diagnosed type II diabetes. The instructors tasked student teams with developing a problem list, including consideration of SDOH, and finding research articles less than 5 years old that would support evidence-based medicine nutrition recommendations for the patient. Students compared articles from their search to the consensus report by the ADA. Each team then chose one exemplary article, summarized it, and stated why they chose it. Closing the session, instructors randomly chose three teams to present their results. The mandatory session constituted 1% of the total grade for the Endocrinology course. Students who attended and participated in discussion received full credit.

Both the Class of 2021 take-home cohort and the Class of 2022 in-class activity cohort completed identical end-of-course surveys which included questions dedicated to this particular session, known as a "critical thinking assignment." Respondents utilized a 5-point Likert scale specifying their level of agreement from "Strongly Disagree" to "Strongly Agree" [12]. The survey questions included: (1) "The 'critical thinking assignment' activity improved my literature search skills"; (2) "... improved my understanding of nutritional recommendations in Diabetes type II"; and (3) "... improved my understanding of how social determinants of health affect patient care and health outcomes." Using GraphPad, the investigators analyzed differences in mean Likert scale scores between the cohorts on the de-identified post-course surveys. The study was submitted for review and received exempt status from the Florida International University Institutional Review Board.

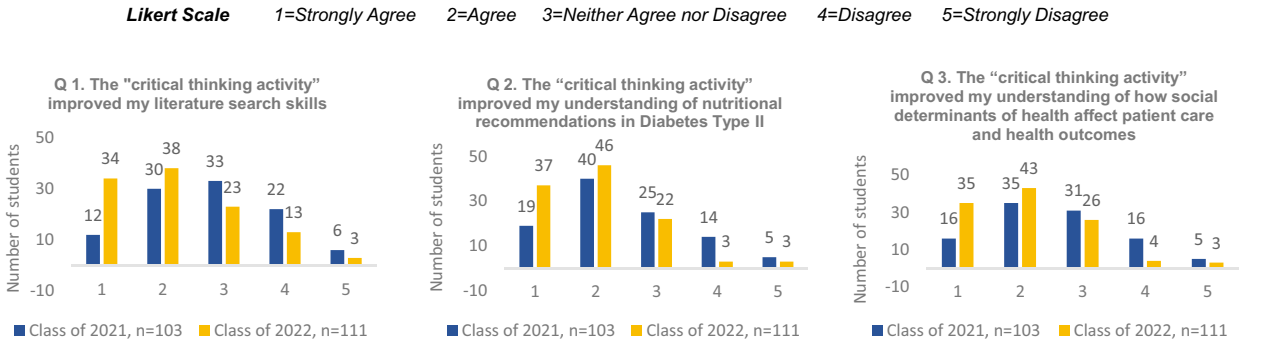
Results

For the Class of 2021, 103 students out of 117 completed the survey. The average score for the literature search skills survey question was 3.19, for the nutritional recommendations question was 3.52, and for how social determinants of health affect patient care and health outcomes was 3.40. Standard deviations were 1.09, 1.09, and 1.08, respectively. On the same survey questions for the Class of 2022, 111 medical students completed the survey out of 121. The Likert scale averages were 3.78, 4.00, and 3.93 for the respective questions. Standard deviations for this cohort were 1.09, 0.94, and 0.97, respectively. *P* values based on unpaired *T* tests for the three questions were <0.001, <0.008, and <0.002, respectively. From the Class of 2021 to the Class of 2022, the students were much more likely to respond "Agree" or Strongly Agree and less likely to respond "Disagree" or Strongly Disagree on all the survey questions (Fig. 1).

Discussion

These results suggest that the large-group application exercise improved student perceptions of their literature search skills, of their understanding of nutritional recommendations, and of their appreciation of how SDOH affects patient care and health outcomes, as compared to the take-home assignment. The session fosters appreciation of evidence-based medicine and helps students identify appropriate resources to answer a clinical question and provide patients with practical up-to-date nutritional recommendations while keeping in mind the effects of SDOH, such as unemployment and poverty, on chronic disease management. The format confirms that effective, case-based learning can be administered with minimal faculty and staff involvement while still achieving high student perceptions of learning. The session was designed with the students' needs in mind, involving minimal pre-session preparation but high yield engagement during the session itself. The format could be applied to other previously developed take-home modules and is a good alternative to faculty-facilitated small-group sessions.

For institutions that do have more resources, a longer, more robust intervention might yield even stronger results. Investigators at the Autonomous University of San Luis Potosi in Mexico, for instance, developed a week-long nutritional education session, involving 3 days of lectures and 4 days of laboratory experience to show correlations among nutritional guidance regarding diabetes and obesity, glycemic index, and actual morning blood sugars. On pre- and post-intervention testing, students showed significant improvement on multiple-choice questions related to metabolism, diabetes, obesity, and glycemic index. On their written lab reports, students indicated a much deeper understanding of the role of diet and glycemic index on serum blood sugars [13].



Question	Class of 2021 Average Response on 5-point Likert Scale, n = 103	Standard Deviations Class of 2021	Class of 2022 Average Response on 5-point Likert Scale, n = 111	Standard Deviations Class of 2022	p-value
Q 1	3.19	1.09	3.78	1.09	<0.001
Q 2	3.52	1.09	4.00	0.94	<0.008
Q 3	3.40	1.08	3.93	0.97	<0.002

Fig. 1 End-of-course survey results for both cohorts

In the future, in order to better assess knowledge and skill acquisition, we will consider pre- and post-session instruments. For the upcoming iteration of the course, we have incorporated a knowledge question related to the session on the final exam. As a session designed to provide nutrition education, information about the SDOH, and skill acquisition related to EPA 7, we believe that our format accomplished much with minimal resources.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40670-021-01342-7.

Availability of Data and Material Available upon request.

Declarations

Ethical Approval The Florida International University Office of Research Integrity reviewed the study and determined that it was Not Human Subject Research (NHSR). The project was exempt and did not require the submission to and approval of the FIU Institutional Review Board (IRB). The IRB exemption statement is available upon request, IRB Protocol NHSR no. IRB-20–0352.

Consent to Participate As this project was not considered Human Subject Research, informed consent was not required.

Consent for Publication Granted by all the authors.

Conflict of Interest The authors declare no competing interests.

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