

Hungry for More? An Assessment of Nutrition Education in Geisinger's Total Health Curriculum

Alexis Notarianni^{1†‡}, Mahdi Taye^{1†‡}, Karla Feeley^{1†‡}, Matthew Hamers^{1†‡}, Sireesha Mamillapalli¹, Gabi N. Waite¹, and Sonia Lobo¹

¹Geisinger Commonwealth School of Medicine, Scranton, PA 18509

[†]Doctor of Medicine Program

[‡]Authors contributed equally

Correspondence: anotarianni@som.geisinger.edu

Abstract

Background: A national survey of nutrition education in United States medical schools indicates that most fall short of providing students with adequate training, thus impacting their ability as future physicians to provide nutritional counseling. The National Academy of Sciences recommends a minimum of 25 hours of nutrition instruction throughout medical school, and the American Society of Clinical Nutrition suggests 37 to 44 hours. In this study, we sought to assess and quantify nutrition education content in Geisinger Commonwealth School of Medicine's (GCSOM) Total Health Curriculum to establish if recommended minimum instruction hours are being met.

Methods: Using recommended undergraduate medical education nutrition competencies, we established 73 nutrition search terms and assessed the four-year Total Health Curriculum for nutrition content. Using these search terms, we reviewed 4,374 learning objectives (LOs) to generate a curricular map and quantify nutrition-related course content using time estimates of required reading assignments and pre-recorded lecture materials. In total, 188 LOs met search criteria and were included in the study.

Results: During the 2021–2023 academic years, roughly 14 hours of didactic instruction were focused on nutrition. The Integrated Science Course, which includes Case-Based Learning, and the Physician and Patient-Centered Care course accounted for 10.25 hours and 10 minutes of dedicated nutrition education time in the preclinical phase, respectively. In the clinical phase, the pediatric clerkship accounted for 3 hours. These results do not account for informal nutrition instruction gained through independent learning, extracurricular activities, or clinical interactions.

Conclusion: The 14 hours spent on nutrition education at GCSOM fall short of national recommendations with nutrition instruction predominating in the preclinical phase and centered on the basic sciences. Additionally, nutrition content is not longitudinal, with gaps between formal preclinical and clinical instruction and a lack of focus on chronic disease prevention. These shortcomings are not unique to GCSOM's medical curriculum and warrant deeper qualitative investigation to identify barriers.

Introduction

The influence of diet on common causes of death, including heart disease, cancer, stroke, and diabetes, is significant in the United States (U.S.). In fact, poor dietary choices are the strongest risk factors for death and disability in the U.S., having

an even greater negative impact on health than tobacco use (1). According to the World Health Organization, over 80% of current chronic disease burden is attributable to dietary and lifestyle factors (2), with the economic costs of this burden rising steadily. Maintenance of a healthy lifestyle pattern that includes healthy eating and weight loss, can substantially reduce cancer risk (3), coronary heart disease mortality (4), and risk of Type 2 diabetes (5) and should be prioritized for chronic disease prevention.

Despite the significant influence of diet on health, limited curriculum time is devoted to the teaching of nutrition in medical schools worldwide (6–7); thus, it is not surprising that most medical practitioners report lacking competence and confidence at providing accurate and effective nutrition counseling to their patients (8). In the U.S., a national survey of nutrition education in medical schools indicated that only 27% of medical schools met the minimum hours set by the National Academy of Sciences in 2010; in 2004, 38% of schools did so (9). Current recommendations for nutrition instruction in medical school come from the 1985 National Academy of Sciences report, which recommends 25 hours of nutrition instruction as a minimum (10), and the 1989 American Society of Clinical Nutrition, which suggests 37 to 44 hours (11). Regardless of the source, most medical schools fall short of meeting the recommendations for providing students with adequate training, thus impacting their ability as future physicians to provide nutritional counseling. To effectively treat and prevent chronic conditions like diabetes, cancer, obesity, and cardiovascular disease, physicians must be able to recognize and treat the underlying nutritional root causes.

Geisinger Commonwealth School of Medicine's (GCSOM) Total Health Curriculum aims to train compassionate physicians who provide individualized patient care and promote health in the communities they serve. Equipping students with adequate nutrition knowledge advances these curricular goals. In this study, we sought to characterize and quantify nutrition education content in GCSOM's undergraduate medical curriculum and determine if nationally recommended minimum instruction hours are being met.

Methods

GCSOM's Total Health Curriculum (Figure 1) is a four-year, three-phase curriculum including a 15-month first phase, Principles of Medical Science and Practice, a 12-month second phase, Core Clinical Immersion, and a 16-month third phase, Career Differentiation and Exploration. The first phase includes three semesters and is organized into integrated, system-based

blocks that feature learning through the Clinical Presentation Model. This preclinical phase contains no lectures and has only two parallel courses—the Integrated Science Courses (ISC-I, II, and III and Case-Based Learning [CBL]) and the Physician and Patient Centered Care Course (PPCC I, II, and III)—that integrate all science and clinical content together. Phases 2 and 3 comprise the core clinical clerkship experiences and electives that develop advanced clinical skills and training to suit individual interests and career goals. Additionally, the curriculum emphasizes six themes, including Social Justice and Health Equity, Health System Citizenship, Primary Care, Personal and Professional Development, Community Immersion, and Population Health.

Using nutrition competencies recommended by Adams et al. and the National Board of Medical Examiners (i.e., USMLE Content Outline) for undergraduate medical education as a benchmark (9), we established 73 search terms for nutrition or related topics and reviewed nutrition content throughout the Total Health Curriculum in the context of disease and wellness in both preclinical and clinical phases. Learning objectives (LOs) for each course were reviewed using these search terms, and the course content was reviewed to generate a curriculum map and to assess the number of hours dedicated to teaching

each nutrition topic. In total, we reviewed 4,374 learning objectives—3,564 from the Integrated Science Course (ISC-I, ISC-II, and ISC-III), 638 from the Physician and Patient Centered Care Course (PPCC-I, PPCC-II, and PPCC-III), 70 from the themes in the preclinical phase, and 102 from clerkships and electives in the clinical phases. Nutrition-related course content identified from the LOs was assigned a time value in minutes using time management resources provided to students, including time estimates of reading assignments, time-stamped lecture transcripts, and pre-recorded lecture materials (Table 1). In total, 188 learning objectives across 45 lectures contained a key search term and were included in the study. For CBL, we reviewed questions from each case using established search terms to identify nutrition-focused content. For quantification purposes, the total CBL session time was divided by the number of questions to yield an average time estimate for each nutrition-related question. Because the clinical phase predominantly involves clerkship rotations and electives, we only included content with LOs pertaining to nutrition.

Results

During the 2021–2023 academic years, roughly 14 hours of didactic instruction were focused on nutrition. The dedicated

nutrition content was plotted as a layered pie chart revealing the estimates for each course during the preclinical and clinical phases of the curriculum. All the LOs that met the search criteria with a given time value were assigned a content area identified from Adams et al. For quantification purposes, the times for all the LOs that fell within a particular content area were pooled to estimate total time for five-content areas in each course. Additionally, the time estimate described as overlap contained the LOs that included multiple content areas. These total time estimates were plotted against each course as shown in Figure 2.

The number of hours dedicated to teaching nutrition in the preclinical phase (Phase 1) was 10.42 hours and in the clinical phase (Phases 2 and 3), 3.58 hours. The major contributing courses included ISC-I, ISC-II, and ISC-III, which accounted for 9.67 hours of dedicated nutrition education time in the preclinical phase and the pediatric clerkship for 3.58 hours in the clinical phase. Additionally, 0.17 hours of dedicated nutrition instruction occurred in the PPCC longitudinal course and 0.58 hours within CBL sessions. These results may be an underestimate of the total learning time spent on nutrition, as it does not account for informal instruction gained through independent learning, extracurricular activities, optional assignments and lectures, or clinical interactions with preceptors and patients. Notably, a formal elective in culinary medicine with a medical

	FALL	SPRING	SUMMER
Year 1	Phase 1 Integrated Sciences Course I Patient and Physician Centered Care Course I	Phase 1 Integrated Sciences Course II Patient and Physician Centered Care Course II	
Year 2	Phase 1 Integrated Sciences Course III Patient and Physician Centered Care Course III	Phase 2 Preparation for Clerkship Course Core Clinical Clerkship	Phase 2 Core Clinical Clerkship
Year 3	Phase 2 Core Clinical Clerkship	Phase 2-Phase 3 Core Clinical Clerkship Transition to Phase 3 Course	Phase 3 Clinical Cores Electives
Year 4	Phase 3 Clinical Cores Electives	Phase 3 Electives Transition to Residency Course	

Figure 1. Overview of Geisinger Commonwealth School of Medicine's Total Health Curriculum. The Total Health Curriculum is a four-year, three-phase curriculum including a 15-month first phase, Principles of Medical Science and Practice, a 12-month second phase, Core Clinical Immersion, and a 16-month third phase, Career Differentiation and Exploration. The first phase is an active learning-based, integrated curriculum that uses the clinical presentation model, within system-based blocks. This phase contains no lectures and has only two parallel courses—the Integrated Science Courses (ISC-I, II, and III and Case Based Learning) and the Physician and Patient Centered Care (PPCC-I, II, and III) course—that integrate all science and clinical content together over three semesters. Phase 2 contains a Transition to Clerkship/Orientation session, five clerkship blocks, bridge weeks, a capstone experience, and components of the required Career Pathway Program. Phase 3 includes required core clinical rotations, expanded elective exploration opportunities, and a formal Transition to Residency component.

Block	Week	Lecture	LO	USMLE Content Outline	Adams et al Content Area	Nutrition Concept	Time Estimate (min:sec)
GI	Abdominal Pain	Physiology: Secretions Small Intestine and Colon	Describe the role of CFTR in fluid secretion in the small intestine.	Electrolyte and water metabolism	Fluid and electrolyte balance	Foundation in nutrition science	4:00
GI	BMI Abnormalities	Biochemistry: Macronutrients and Dietary Energy Content	Define AMDR and identify the AMDR for each macronutrient.	Protein calorie malnutrition	Protein, carbohydrate, fat, fiber intake	Nutrition assessment	2:15

Table 1. Sample Analysis with Content Areas and Time Estimates Assigned. The table includes a sample analysis of nutrition-related course content identified from the LOs and assigned a time value in minutes using time management resources provided to students, including time estimates of reading assignments, time-stamped lecture transcripts, and pre-recorded lecture materials.

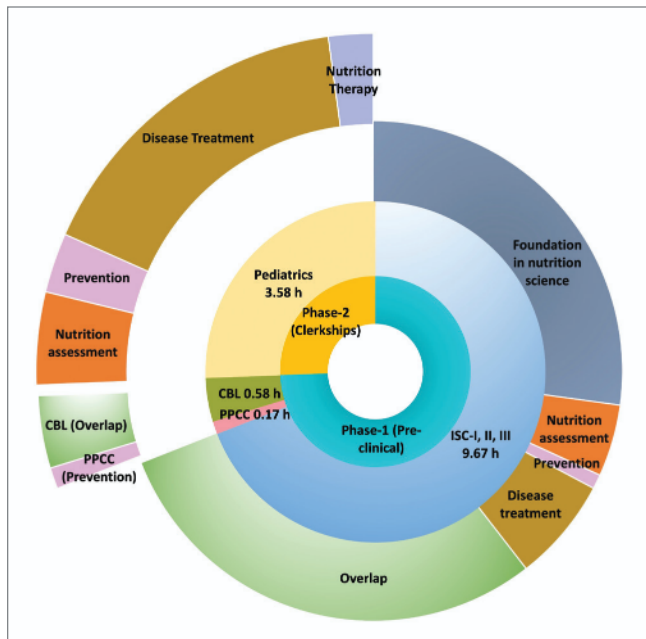


Figure 2. Percentage of Nutrition Content by Phase, Course, and Content Area as Described by Adams et al (9). During the 2021–2023 academic years, roughly 14 hours of didactic instruction were focused on nutrition. The Integrated Science Course, (ISC-I, II and III) which includes Case-Based Learning (CBL) and the Physician and Patient-Centered Care Course (PPCC-I, II and III), accounted for 9.67, 0.58 and 0.17 hours of dedicated nutrition education time in the preclinical phase, respectively. In the clinical phase, the pediatric clerkship accounted for 3.58 hours. Foundational aspects of nutrition science and disease treatment take precedence over other nutritional competencies covered in pre-clinical and clinical (clerkship) phases respectively.

nutrition component is offered to students in the clinical phase of the curriculum, and as part of the health system science interprofessional selective, students can participate in the Fresh Food Pharmacy option, which incorporates nutrition as part of the diabetic care. Since 2021, one student has participated in the culinary medicine elective, and 27 students in the Fresh Food Pharmacy option.

Discussion

A careful review of the Total Health Curriculum indicates that the 14 hours allocated for nutrition education at GCSOM does not meet recommended minimum targets set by the National Academy of Sciences in 1985 (25 hours) (10) or the American Society of Clinical Nutrition (37–44 hours) (11). Notably, this deficiency is not exclusive to our medical curriculum, as it extends to other medical schools as well. Surveys conducted between 2000 and 2021, 2004, and 2008–2009 indicate that 68%, 63%, and 73% of U.S. medical schools, respectively, did not meet these standards (9). Moreover, a systematic review on nutrition in medical education reveals that the absence of nutrition education in medical schools persists even a decade later (12). This suggests that very little progress has been made in incorporating adequate nutrition education into medical curricula. It is disheartening to observe that over the span of 30

to 40 years, there has been minimal advancement in addressing the issue of insufficient nutrition education in medical schools (13), despite the consensus among experts that nutrition plays a central role in maintaining a healthy lifestyle and managing patients effectively (14) and the frequently voiced opinion that clinically relevant nutrition education should be embedded in medical school, residency, and fellowship curricula (15).

The question then arises: what could explain this lack of progress? Firstly, nutrition education throughout the clinical years of medical schools is predominantly embedded within the hidden curriculum (16). For instance, during rounds in the clerkships, attending physicians may casually discuss the nutritional requirements of a patient with colon cancer while walking in the hallway. Students might gain insights into best practices for a team approach when they observe a family physician effectively collaborating with a dietitian for patient management. Additionally, students may participate in a research study aimed at enhancing the nutritional information provided in pamphlets given to patients whose body mass index falls outside the healthy weight range. These valuable learning instances, which are not explicitly included in the LOs, emphasize that nutrition is treated as an incidental aspect of medical training. Consequently, the extent to which supervisors integrate nutrition into patient care can vary significantly, creating an inconsistent experience for the learner. Moreover, nutrition education cannot be captured in curricular maps, which are necessary to create meaningful longitudinal links between preclinical and clinical instruction. Secondly, many medical schools have opted to condense their preclinical learning curriculum, often by six or even 12 months, giving preference to “high-yield” learning material (17). Unfortunately, there persists a perception that nutrition content is considered “low yield,” with limited testing or easily answerable questions in licensing exams (18).

Consequently, dedicated activities focused on nutrition learning have been eliminated in favor of topics like the mechanisms of gastrointestinal nutrient absorption or the blood cell indices of vitamin deficiency anemia. The emphasis on learning of perceived high-yield medical material extends into the clinical years of education, where differential diagnosis and disease-based management take priority over learning about food as medicine. Moreover, nutrition is often viewed as inherent knowledge that can be left to nutritionists or other specialists to handle if necessary (16). At GCSOM, we have recently partnered with a health care system that is committed to transitioning toward a culture of value-based care. This model involves providers being reimbursed based on their patients' health outcomes, which in turn opens opportunities for the inclusion of reimbursement for lifestyle counseling, including nutrition. As a result, nutrition education now holds a prominent position in the realm of high-yield knowledge. As we look towards the future, our work will entail conducting qualitative assessments with key stakeholders within Geisinger. This assessment will aim to identify perceived gaps and competencies in the delivery of nutrition education and solicit proposals for improvement and interventions. Our goal is to actively contribute to a cultural shift that recognizes nutrition as a clinical tool of equal importance to surgical procedures like bypass surgery in healing patients.

Conclusion

Based on our review of the Total Health Curriculum, the 14 hours spent on nutrition education at GCSOM falls short of current national recommendations of a 25-hour minimum established by the National Academy of Sciences. Formal nutrition instruction predominates in the preclinical phase of the curriculum and is centered around the basic sciences, lacking a focus on chronic disease prevention. These shortcomings are not unique to GCSOM's medical curriculum and have become a national issue resulting in congressional resolutions calling on medical education programs to place a higher emphasis on nutritional education. Indeed, studies show that nutrition education increases knowledge and confidence in dietary counseling both in medical students (19) and in residents (20); thus, cultivating the skill and competence of physicians to recognize and appropriately tackle nutrition-related challenges in their patients should be a priority.

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Disclosures

The study authors reported no conflicts of interest.

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