Clinical Nutrition Education of Doctors and Medical Students: Solving the Catch 22

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ABSTRACT

There is a well-documented pandemic of malnutrition. It has numerous sequelae, including physical and psychological ill health, early death, and socioeconomic burden. The nutrition landscape and dynamics of the nutrition transition are extremely complex, but one significant factor in both is the role of medical management. Doctors have a unique position in society from which to influence this scenario at global, public, and personal levels, but we are failing to do so. There are several reasons for this, including inadequate time; historical educational bias towards disease and therapeutic intervention—rather than diet, lifestyle, and prevention; actual or perceived incompetency in the field of nutrition; confusion or deflection within medicine about whose role(s) it is on a medical team to address nutrition; and public confusion about whom to turn to for advice. But the most fundamental reason is that current doctors (and thus the trainers of medical students) have not received—and future doctors are thus still not receiving—adequate training to render them confident or competent to take on the role. A small number of important educational approaches exist aimed at practicing doctors and medical students, but the most effective methods of teaching are still being evaluated. Without properly trained trainers, we have no one to train the doctors of tomorrow. This is a "catch 22." To break this deadlock, there is an urgent need to make appropriate nutrition training available, internationally, and at all levels of medical education (medical students, doctors-in-training, and practicing doctors). Until this is achieved, the current pandemic of nutrition-related disease will continue to grow. Using important illustrative examples of existing successful nutrition education approaches, we suggest potential approaches to breaking this deadlock. *Adv Nutr* 2019;10:345–350.

Keywords: nutrition education, nutrition training, global malnutrition, nutrition education of doctors, nutrition education of medical students, lifestyle education, dietary education, primary prevention, nutrition teachers

Introduction

Malnutrition is one of the biggest health challenges of the 21st century (1). Globally, obesity- and hunger-malnutrition underlie most major illnesses and deaths (1–3).

Obesity-malnutrition, smoking, excess alcohol, and insufficient exercise underlie 80% of cardiovascular diseases, 90% of type 2 diabetes, and 35–70% of cancers (1, 3). Obesity-malnutrition occurs in a range of economic, political, educational, and practical settings (2). It affects all ages and socioeconomic groups, and increasingly, all parts of the world. Until the second half of the 20th century, obesity-malnutrition was limited to wealthy countries. In 1995, ~200 million adults and 18 million children aged <5 y were overweight. Five years later, the number of obese adults had

increased to >300 million (3), and today, ~641 million adults worldwide are obese (2, 3). Over 115 million of these people are in developing countries (approximately one-third of the global obese population). Globally, 41 million children are obese, and over one-third of obese children are in developing countries (2). Obesity is thus a global problem likely to get worse as the generation of obese children become adults. Obesity-malnutrition may arise from a large array of disparate situations, including poor food choice (voluntary and involuntary), excess food consumption, access constraints to healthy food, and limited physical activity. Pressures of time, location, finance, education, and social or family support are relevant factors (2).

At the same time, hunger-malnutrition is growing. Today, ~815 million people in the world (~1:9) are hungry—an increase from 777 million in 2015 (2). Annually, 10 million children aged <5 y die from malnutrition. One in 3 have malnutrition-related illness, 155 million children are stunted, and poor nutrition causes 45% of their deaths (3.1 million/y).

The authors reported no funding received for this study.

Author disclosures: SBB and AK, no conflicts of interest.

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One-third of women of reproductive age are anemic. Most of these people live in developing countries, but not all. Food insecurity is rising in Europe, affecting, in some parts, ~20% of the population (4). The highest rates are in those regions where economic pressures are greatest: Lithuania (19.6%), Romania (18.9%), and Greece (17.2%); the lowest rates are in Sweden (3.1%), Germany (4.3%), and Denmark (4.9%). However, Great Britain, the sixth largest economy in the world, ranks in the bottom half of the European scale: ~8.4 million people (10% of the population) have insufficient food and 5% go a whole day without food because of poverty. In the United States, food insecurity is underdocumented and its health impact underestimated (5).

The medical consequences of hunger-malnutrition were once primarily low weight and deficiency diseases, but it is no longer so simple. Today, there are also the hungry-obese—a paradox resulting when food that is cheap and filling (6) [and possibly “addictive” (7)], but high in energy and low in nutrients (“empty” calories), is chosen in preference to food that is more expensive, possibly less immediately filling or tasty, but more nutrient dense (6–8). The obese-malnourished are at double risk of obesity-related conditions and deficiency diseases and infections (8).

Both kinds of malnutrition affect all ages, all socioeconomic groups, and every area of medical practice (1, 3). And although their global distribution is uneven, they increasingly coexist (2). The medical, surgical, psychological, and socioeconomic repercussions of these dietary-related pandemics are huge. The US bill is \$147 billion annually (9). Furthermore, the trend in most countries is getting worse, not better.

This dire situation is of paramount importance to all doctors, whatever their specialty and wherever they practice. But although government and medical education policymakers have recognized the need for increased medical presence in the field of nutrition for decades, the objectives are elusive: doctors are failing to provide adequate nutrition care (1, 10–14).

Only a small percentage of doctors routinely offer nutrition care, and methods are haphazard (10–12). In the United States, where the role of nutrition in disease has probably received more intense media and research attention than anywhere else in the world, only one-third of obese patients are diagnosed and counseled by their physicians (13). In the United Kingdom, general practitioners (GPs) spend only 16% of clinic time on prevention (14) and few routinely offer nutrition advice (14, 15). Instead, nutrition work is often deferred to nutritionists or dietitians, whose input is invaluable. However, because doctors are usually the first port of call for medical problems, including those that are nutrition-related, their inadequate nutrition care lays the field open for alternative, variably qualified and regulated nutrition advisers: journalists, bloggers, chiropractors, nutrition therapists, personal trainers, and celebrity chefs.

Not surprisingly, the public does not know who to turn to. In 1997, even before the Internet was widespread, a UK survey showed that most people obtained their nutrition

information from the media; only half trusted their GP (11). A survey in 2016 revealed that although 85% trusted advice from their GP, 58% equally trusted their personal trainer, 41% a “healthy eating blogger” (75% of the 18- to 24-y age group), 35% a television chef, and 59% friends or family (16). The Internet, available 24/7 without appointment, is increasingly the go-to source for health information. On average, people spend 2 h/d Internet surfing on their phones; 50% of these users obtain their nutrition advice online (17).

Reasons for the Medical Silence in Nutrition

There are several reasons for the medical silence in the field of nutrition. One reason is time: doctors are too busy fire-fighting the consequences of malnutrition (15, 18). Accessibility to GPs, at least in the United Kingdom, is so poor there has been a recent parliamentary inquiry (19). A second reason is a failure to practice what we (would) preach. One of the best correlates of a doctor offering advice, and whether he/she will be listened to, is if the doctor practices it him- or herself (20, 21). From the patient’s perspective, “image matters.” Advice from a “slimmer” doctor (20, 21) or online blogger (17) is given more “weight.” This is a 2-pronged problem: on the one hand, it deters doctors from counseling and, on the other, patients from listening. It seems that to effectively give advice—and advice that will be listened to—doctors must first heal themselves, and lead by example. A third reason is “mind set”: medical training and practice is historically heavily disease, diagnosis, and drug treatment orientated (22), and there is not yet a prevalent-enough notion that nutrition is a key part of the doctor’s responsibility rather than that of other members of the health care system (23). For this to change to a situation where preservation of health and prevention of disease are at the forefront requires a paradigm shift in how medicine is taught and practiced. But by far the most important reason is that doctors lack the expertise and/or confidence to counsel on dietary patterns and diagnose nutrition deficiencies, because they are not, or do not feel, adequately trained to do so (22–29).

Ironically, the position of nutrition training in medical education has actually declined over much the same period as its relevance to health care has surged (8, 22, 28). In the first half of the 20th century, scientific understanding of the role of nutrition in preventing and treating deficiency diseases was booming (the Golden Age of nutrition) and nutrition education formed a significant part of the training of all doctors (22). In medicine, nutrition was primarily seen for its role in deficiency diseases and medical school curricula matched that emphasis.

But the world was a different place in the first half of the 20th century (22, 30). Food was “natural” and unprocessed; production had not yet mushroomed through commercial farming. It was supply, not demand, driven. This situation quickly changed after the Second World War (22, 30). Food shortages resulting from both world wars, economic crises, and infectious diseases led to international steps to address global public health. Commercial production methods and

fortification of foods brought a better diet to more people. By the mid-20th century, many classic deficiency diseases had declined in parts of the Western world, although iron deficiency continues to be a major problem (2). But these same changes in food supply coupled with mass marketing, chain stores, and fast-food outlets, led to an excess and easy availability of certain types of food (30). Much of this food is unhealthy, tastily tempting, quite possibly “addictive,” and often cheaper than healthier options (6, 7, 30), thus providing additional appeal to the poor (31). In addition, lifestyle has become increasingly sedentary and indoors (31–33). At the same time, basic science research shifted away from nutrition towards cell and molecular biology and enzyme and endocrine function (22). Diagnostics and therapeutics expanded, shifting the focus of medical training from physiology, biochemistry, prevention, and holistic care towards drug treatment (22). From the 1950s onwards, the importance of nutrition in medical training and clinical practice became increasingly obscure; its teaching hung on precariously in a few medical schools, straddling different disciplines (22).

Concurrently, in the last 50 y—the period during which most currently practicing doctors were trained—the global health demographics altered dramatically and quickly. Heart disease, stroke, obesity, and type 2 diabetes increased (32, 33). The links between these “new” diseases and lifestyle and diet are now well established (32, 33).

The consequences of this combination of events are as follows:

- (1) Few practicing doctors worldwide have appropriate nutrition knowledge to properly serve the malnutrition-related ill health of the global population.
- (2) Training in nutrition for future doctors has not adapted to changes in disease demographics nor to the scientific understanding of their nutrition basis.
- (3) There are few trained trainers available to train these future doctors: a “catch 22.”

What Are the Obstacles to Implementing Nutrition Education in Medical Schools?

Leaders in medical training and policy have long been aware of the relevance of nutrition in world health. In 1985, the US National Academy of Sciences recommended a minimum of 25 h of nutrition education in medical schools (22). In 1989, the WHO made recommendations for schools in Europe and elsewhere (34). In 2009, in Britain, the General Medical Council emphasized nutrition training in “tomorrow’s doctors” (35). In 2014, the Association of American Medical Colleges stipulated required objectives (36).

Despite these recommendations, most medical schools worldwide have neither adequate training in nutrition nor qualified nutrition faculty (37–43). The 2 are obviously connected. Today, 30 y after the National Academy of Sciences’ recommendations, only one-quarter of US schools meet them (38). Medical schools in Western Europe (39),

Japan (40), Ghana (41), the United Kingdom and Australia (23, 29, 42), and India (43) fare far worse. Five of the 6 medical schools in Greece were contacted by the authors. Two have no nutrition course. Athens University Medical School has a student-selected 28-h lecture course. Ioannina and Patras Medical Schools have a small number of nutrition lectures within the epidemiology-hygiene course. The sixth Greek medical school, at the University of Crete, has had a dedicated nutrition course since 1989 (discussed below).

How to Reform Nutrition Training

There are several obstacles to implementing training in nutrition. Putting aside the financial obstacles, 2 of the most fundamental obstacles are uncertainty about how—and by whom—nutrition should be taught.

Training the trainers

A major stumbling block to implementing training in nutrition for medical students (and thus future doctors) is that there are few incumbent doctors trained to do this (23, 37, 38, 42)—a catch 22. It is clearly impossible to educate medical students—and thus build up a body of specialists in a particular field—if there are no appropriately trained teachers with which to start.

The United States is the leader in the training of doctors in nutrition, with dedicated programs in some schools since the 1970s. This has enabled the growth of a body of suitably trained doctors with specialist nutrition knowledge. Yet, even in the United States, the acquisition of nutrition training for practicing doctors who trained before the implementation of nutrition courses (or who trained in medical schools without a nutrition course) is largely self-driven (28). Nevertheless, there are encouraging developments in the formalized nutrition training of medical graduates in the United States. Recently the Nutrition in Medicine (NIM) online project (2010) (44) has extended its program to residents wishing to study nutrition, while some nonprofit organizations, such as the Gaples Institute in Illinois (45), now offer nutrition training for physicians. In addition, graduate fellowships exist for those wishing to specialize (e.g., Arizona integrative medicine courses; Harvard University Medical School Public Health Fellowship).

In other parts of the world, few medical schools have appropriately trained nutrition faculty to teach undergraduate nutrition programs, and there are no programs for educating practicing doctors (39–43). In the United Kingdom, the intercollegiate group on nutrition responded to the General Medical Council’s proposals for nutrition educational requirements of future doctors with various proposals (46, 47) and renewed requirements for newly qualified doctors in 2013 (48), but there are no avenues governed or provided by any of the royal colleges through which physicians can obtain approved medical training in nutrition. The University of Surrey offers “the only evidence-based Masters degree of its kind in Europe and is the only Masters degree in Nutrition Medicine to be accredited by the Association for Nutrition” (49). However, at 5 y, it is

too long to be practicably useful to practicing doctors. It seems that motivated physicians with an interest in nutrition mostly have to acquire their knowledge voluntarily, through self-education. Because malnutrition is a global health issue, strategies for tackling the problem should ideally include internationally standardized training programs in nutrition for medical students and doctors. Nutrition training of practicing doctors is important for another reason: without suitably trained faculty, it is challenging to effect a suitable nutrition course for medical students and future doctors (25, 27, 28).

Approaches to Nutrition Education in Medical Schools

Putting aside the immediate obstacle of insufficient faculty and trainers, there are other uncertainties about how to teach nutrition in medical schools (31–42). Various approaches to teaching nutrition have been used (Text Box 1): required or student-selected modules, dedicated or intercalated cross-discipline, lecture-based and/or clinical bedside teaching, online courses, and courses where the students are actively involved in the assessments and teaching.

Text Box 1

Approaches to nutrition teaching

- Student-selected modules
- Compulsory modules
- Dedicated nutrition modules
- Intercalated cross-discipline modules
- Lecture-based teaching
- Clinical/bedside teaching
- Online courses
- Students as subjects and mentors

These different approaches vary in their degree of reliance on faculty-led teaching. Here we present some of the most instructive approaches.

United States

The United States is the leader in the field of nutrition education of its doctors, and yet even there only 25% of medical schools have any kind of nutrition education element. Of those, a few have implemented important nutrition education courses and have evaluated the different approaches to teaching (50–55).

Harvard Medical School has recently changed its course from a dedicated to integrated curriculum, and this resulted in no change in medical students' attitudes or knowledge about nutrition (50). Boston University implemented a student-centered model (51). This team-based approach focuses on case-based learning in the classroom, practice-based learning in the clinical setting, extracurricular activities, and a virtual curriculum over 4 y. Despite only 20.5 h of teaching, the American Academy's objectives were covered and student satisfaction was high.

The NIM online project (2010) (44) provides a free core nutrition curriculum to medical schools in the United States and abroad. Student-directed learning is intercalated throughout undergraduate training using Web-based modules. This enables medical schools to cover the curriculum economically, while circumventing personnel problems.

The Crete experience

The University of Crete, Greece, has the first and oldest nutrition course for medical students in Europe. In 1989, the university implemented a dedicated course for third-year students consisting of 6 h of lectures and 25 h of practical session (52, 53). It was conducted by a team of 8 (2 physician nutritionists, 2 dietitians, 1 physical activity expert, 2 nurses, and 1 statistician). Students actively participated in the teaching process by performing a health and nutrition assessment on each other supervised by the physicians (tools included: dietary history, clinical examination and sociocultural data, anthropometric measurements, physical activity—ergometric bicycle—hematological and biochemical tests). Students also assessed the health and nutrition status of pediatric and adult patients. Cases were presented on the last day of the course, emphasizing nutrition deficiencies and excesses, and documented changes after the students' interventions.

United Kingdom

Cambridge University has implemented a “vertical spiral” nutrition course during the clinically focused years of both the undergraduate and graduate medical degrees (54). Its success is based on 3 factors: leadership and advocacy skills of the teaching team, variability of teaching mode, and multidisciplinary review of evaluation tools.

Israel

Students at Hebrew University Medical School have implemented a novel student-led intercalated curriculum that covers nutrition, exercise, and lifestyle behaviors at preclinical and clinical levels (55). The students emerge ready to explore it both as a coach and in their personal lives.

Conclusions

Nutrition is at the root of today's preventative ill health (32, 33). It follows that doctors must develop a leading role in the field of nutrition and, furthermore, one that leads by example. The key point is the primary and secondary prevention of all chronic diseases.

Today's doctors are inadequately trained to fulfil this role. There is an urgent need for training of existing doctors worldwide in nutrition. This is important not only for the provision of appropriate health care but also for the education of future doctors. Without suitably trained doctors, there is nobody to teach the doctors of tomorrow. This deadlock will continue until the specialty of Physician Nutritionist becomes widely established. Although a Physician Nutrition Specialist now exists in the United States, it is not widespread or indeed widely known about either within or outside of

the medical field. But all trainee doctors need adequate basic nutrition knowledge and skills so that they emerge from training with an understanding of nutrition and how it is part of their role as a doctor, and not solely the responsibility of other professionals in the health care team. Urgent provision of training to both practicing physicians and doctors-in-training is required, preferably using internationally standardized methods, either through approved fellowships and/or online training such as that provided by the NIM. The latter is low-cost, requires minimal personnel, and would result in international uniformity in curriculum, with obvious advantages when dealing with the global issue of malnutrition.

A second obstacle is uncertainty about the most efficient approaches to teaching nutrition. The above examples from different medical schools demonstrate several nutrition education programs that are effective and do not necessarily require huge resources in terms of cost or manpower.

A stepped approach that could be adapted as the medical profession builds up its body of specialist physician-nutritionist teachers could include the following:

- (1) The immediate implementation of 2 separate online nutrition courses aimed at medical students and practicing doctors, such as those devised by the NIM project.
- (2) A combined clinical and practical course, such as that operating in the final year of the Crete experience—but starting as early as possible. This is light on teaching personnel and involves the students in the teaching process. Importantly, the approach has added value in that students analyze their own behavior—and thus learn to lead by example.
- (3) The ultimate goals would be to achieve a comprehensive nutrition course throughout the entire period of training, such as the Cambridge (United Kingdom) and Harvard models, with the aims of ensuring that all newly qualified doctors are trained in nutrition and value it as a key element in their role as a doctor and, concurrently, to develop a specialty of Nutrition and Lifestyle Medicine such as the Physician Nutrition Specialist that exists in some US medical departments.

In summary, clinical nutrition education is essential in the training of all current and future doctors. This is vital if we are to tackle the root of today's pandemic of preventable diseases. But training today's practicing doctors is also urgently needed to provide the required body of trainers of medical students. Without the latter the future training of doctors in nutrition will remain challenging. Expedient implementation of training at both undergraduate and postgraduate levels could use free, internationally standardized online material, coupled with creative clinical teaching methods involving doctors and students themselves. Finally, one of the most effective tools a doctor has in modifying patient behavior is to lead by example.

Acknowledgments

Demetre Labadarios from Stellenbosch University, South Africa, helped initiate the course in Crete. Manolis Linardakis and Christos Hatzis helped run the course. The authors' responsibilities were as follows—SBB and AK: jointly conceived the idea for the manuscript; SBB: was the primary researcher, with data for Crete University Medical School and other Greek medical schools provided and researched by AK; and both authors: read and approved the final manuscript.

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