



THE IMPACT OF MEDICAL EDUCATION ON FAMILY MEDICINE PHYSICIANS' UNDERSTANDING AND APPLICATION OF EPIDEMIOLOGICAL PRINCIPLES IN CLINICAL PRACTICE

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Abstract

The Flexner Report had a major impact on medical education in the twentieth century. It emphasized the study of the molecular basis of disease processes, while giving little attention to the social and environmental factors that affect health. When analyzing the prevailing diseases of the current era, increasing health inequalities, and substantial transformations in the healthcare system of the United States, it is crucial to consider wellness and illness within a broader framework of public health, rather than solely focusing on the biomedical model. Although there are an increasing number of undergraduate programs in public health, it is equally important for medical curricula to acknowledge the significance of the interconnected socio-ecological factors that contribute to health, well-being, and sickness. To mitigate the likelihood of non-communicable illnesses and enhance health equality, it is essential for medical education to include fundamental public health knowledge and skills. Physicians need to adopt a public health strategy, alongside their clinical expertise, in order to deliver fair and equal treatment in response to modern health concerns. The COVID-19 pandemic highlights the need to reduce the impact of socio-ecological factors that influence health. The program emphasizes the crucial connections between medical education, socio-ecological impacts on health, and public health, and presents seven critical suggestions. As the health concerns in society and communities change, the training of future doctors must also adapt. Medicine and public health have a responsibility to tackle the common health issues faced by our global society.

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1. Introduction

Abraham Flexner's study on the condition of American medical school in 1910 sparked a significant reevaluation of the training methods for new doctors. The significance of science as the fundamental basis of medical education was highlighted, while the elements of what we now refer to as socio-ecological determinants of health were diminished. Consequently, several medical schools underwent substantial reform. In light of evolving socioeconomic conditions and increasing health costs, it is advisable to redirect the focus of medical education towards a public health approach. The health of individuals is influenced by many interconnected elements, including the expanding disparity in income, the social and economic environment, the physical surroundings, and individual habits (1).

Twentieth century medical education focused primarily on teaching the basics of anatomy, physiology, pathology, and biochemistry. However, other important subjects such as health economics, sociology of disadvantage, community-level factors like violence and employment opportunities, and socio-ecological factors throughout a person's life were given very little attention. The essential principles of medical anthropology and medical sociology have significant importance to public health. When studying the most common diseases of the 21st century, such as cardiovascular disease, cancer, and chronic inflammatory conditions, there is a significant imbalance between the extensive knowledge about the molecular mechanisms underlying these diseases and the limited understanding of how to approach wellness and sickness from a broader public health perspective. The concept of "one patient at a time" may be suitable for detecting some rare genetic disorders or uncommon cancers, but it becomes ineffective and pointless in a situation when predictable disease patterns affect millions of people.

Incorporating socio-ecological factors that influence health into medical education and healthcare systems is a significant change in our society. However, the implementation of the 2010 Patient Protection and Affordable Care Act (ACA) and the establishment of the Triple Aim have acknowledged important principles of public health and health equity. With the growing emphasis on evidence-based decision making in healthcare, the relevance of public health abilities in clinical practice has increased significantly.

The innovations in the public health area have had a considerable impact on the changing landscape and evolution of the medical profession, leading to

improvements in health. In the past century, the average lifespan in the United States (US) has increased by over 30 years. Out of this increase, 25 years can be attributed to improvements in public health. These improvements include the reduction of illnesses that can be prevented by vaccines, the prevention of injuries and deaths through motor-vehicle safety measures, and advancements in family planning that have led to a decrease in infant and maternal mortality rates (3). The growing proportion of elderly individuals and the rising diversity within the population of the United States make it even more crucial to adopt a coordinated systems approach, comprehend the socio-ecological factors that influence health, and possess cultural competency in a complete medical education. These elements are fundamental to the field of public health.

The COVID-19 epidemic highlights the need to reconsider the importance of fairness in healthcare. The pandemic exacerbates pre-existing health disparities and has shown the inseparable interdependence and susceptibility of society. The enduring consequences of COVID-19 on low-income and other vulnerable populations will be acknowledged via a range of health outcomes even after the measures to mitigate the transmission of the virus have been abolished. The epidemic serves as a worldwide demand to address and reduce the impact of socio-ecological factors that influence health. It has also revealed several shortcomings in the US healthcare system, namely in terms of community-based preventive treatment for the most susceptible groups. Despite the current historical context, there are already valuable insights that may be promptly implemented in healthcare settings, as well as in medical and public health curriculum. Addressing the social and ecological factors that influence health is a fundamental strategy for promoting fairness in health outcomes.

Although there may be some conceptual similarities among the terminology discussed, each phrase really pertains to a distinct area of knowledge and application. Socio-ecological determinants of health encompass a wide range of factors that are not related to genetic conditions. These factors include issues such as inadequate housing, low quality air and water, limited access to nutritious food, and challenging economic and sociological circumstances that lead to deprivation and increase the risk of developing diseases (4). Public health focuses on the health outcomes and their assessments. It generally involves community-level interventions to decrease the risk and lower the expense of managing chronic

illnesses that may be improved via prevention. Equity, which encompasses both the process and the consequence of reducing health inequalities, continues to be a fundamental principle in the field of public health. Health promotion encompasses efforts at both the individual and community/national levels to address the socio-ecological factors that influence health. Its goal is to decrease the likelihood of illness and injury and to improve overall health and well-being (7). In this sense, nutrition pertains to the mitigation of the likelihood of diet-related diseases.

2. Future healthcare providers engage in a variety of activities

According to Westerhaus et al. (8), the current medical education system does not effectively connect the important biological processes with the social environment in which they occur. Cooke et al. (9) further argue that U.S. medical education has overlooked the social aspects of health, which are often the underlying causes of many conditions, due to its focus on context-free scientific knowledge based on the basic sciences. Physicians' daily experience undoubtedly involves scientific problem-solving that requires a profound comprehension of the biological sciences. Patients with complicated medical conditions may exhibit unusual symptoms or have complications from taking several medications, requiring a deep grasp of the underlying disease processes and the effects of drugs. Nevertheless, the belief that this constitutes the bulk of a physician's labor, namely using cognitive resources to apply scientific knowledge to a patient's primary concern, overlooks the significant potential to enhance a patient's overall health and mitigate risks associated with socio-ecological factors.

3. Prospective medical practitioners

Prospective medical practitioners may eventually assume three distinct responsibilities. Initially, they will continue in their customary responsibility to provide medical care to patients on an individual basis. This includes their physical requirements as well as their emotional need for understanding and sympathy. Furthermore, the COVID-19 pandemic has emphasized the role of doctors as integral members of the frontline response to new dangers, particularly during acute short-term emergencies. In order to mitigate the effects of chronic and communicable illnesses, adopting a public health viewpoint will increase the probability of exchanging data and engaging

in collaborative activities to establish a systematic method to alleviate their impact.

Healthcare providers will play an increasingly important role in the digitalization of healthcare information. This includes tasks such as collecting data, managing datasets, communicating with administrative leaders, and participating in statistical analysis. Examining individual health and community-level data takes a rigorous quantitative approach. It also demands a strong sense of empathy to understand the influence of socio-ecological determinants of health, especially in relation to inequality. Comprehending statistical language and methods is essential for developing this ability and is a fundamental skill in public health.

4. Transitioning to the field of Public Health Education

The pursuit of a bachelor's degree in public health is a relatively recent development and is gaining popularity among students who are preparing for medical school. The percentage increase in the attainment of a bachelor's degree in public health between 2003 and 2015 was 662% (10). In the last twenty years, the number of universities providing undergraduate public health degrees has risen from 45 in 1992 to 176 schools in 2012 (11). If the diseases that physicians currently and in the future face are mostly caused by societal factors, the failure of institutions to educate individuals on effective health practices and strategies to reduce risks will demonstrate that the current medical education system has limitations in preparing physicians to treat patients with these diseases.

The field of premedical studies has undergone significant transformation since the implementation of public health as a bachelor's degree program. Many premedical students are choosing to get a bachelor's degree in public health in order to tackle the many intricate issues that the US healthcare system is now experiencing. The inclusion of socio-ecological medical components, spanning from local to global levels, and the emphasis on preventive treatment via nutrition and health promotion concepts, are essential elements in public health undergraduate curriculum and provide significant benefits to premedical students.

The significant increase in the number of undergraduate students choosing public health as their major, especially among those who are studying premedical subjects, demonstrates the growing interest and acknowledgement of the importance of public health in clinical practice. The latest modifications made to the Medical

College Admissions Test (MCAT) to include behavioral and social sciences demonstrate an acknowledgment of the interconnectedness between health and society (12). The importance of nutrition education is closely linked to a public health viewpoint, since it is considered a crucial element in addressing many health concerns (13). In the United States, there are over 140 recognized medical schools that mandate a minimum of 25 hours of nutrition teaching. However, a staggering three-fourths of these medical schools do not achieve the basic criteria (14). Given our increasing comprehension of the importance of socio-ecological factors in determining health and well-being (1), it is crucial to include education on public health and nutrition as mandatory components of medical school requirements and curriculum.

In medical education, it is important to recognize that factors affecting health, which go beyond the traditional biomedical understanding of physiological diagnosis, must be acknowledged. This includes the increasing prevalence of chronic diseases like type 2 diabetes, cancer, and cardiovascular disease, which have replaced communicable diseases as the primary health concerns. The socio-ecological determinants of health and nutrition are elements that are causing the distinction between public health and medicine to become less clear (15). Public health education encompasses training in community organizing, stakeholder communications, interdisciplinary collaboration, strategic planning, logistics, and innovation. These skills are pertinent to clinical practice and have played a crucial role in the COVID-19 response. Public health language exhibits substantial convergence with military institutions (such as campaigns, mobilization, surveillance, deployment), which originate from collaborative endeavors during times of conflict. Public health also highlights the need of effectively communicating health information using culturally-sensitive methods, including the use of data-driven narratives.

The conventional medical curricula are appropriately synchronized with the subsequent assessments, but inadequately synchronized with the actual ailments and distress experienced by patients in real-life situations. Contemporary clinical training places a strong emphasis on the scientific examination of pathophysiology, which is further strengthened by the evaluation of this knowledge. Patients get optimal care at the advanced stages of intricate illnesses, but not in terms of mitigating the risk of these diseases or

managing the most prevalent chronic diseases afflicting our society.

The IOM (16) and other experts (17, 18) have advocated for the incorporation of fundamental public health skills into medical school, acknowledging that the conventional biological approach overlooks the many socioeconomic elements that influence health and well-being. Progressive medical schools across the country have demonstrated notable positive examples, with an increased focus on developing skills to work with patients in order to mitigate the risk of disease. However, the evaluation of most institutions is primarily based on their molecular science curricula, and student performance is assessed through standardized testing in molecular science. Despite the World Health Organization (21) and Centers for Disease Control and Prevention (22) identifying training providers in public health as a crucial step towards improving population health, incorporating a public health approach into medical education has proven to be challenging. Additionally, the Healthy People Curriculum Task Force (23,24) has released the Clinical Prevention and Population Health Curriculum Framework to further support this effort. An essential next step is to consistently integrate social-ecological concepts, nutrition education, and prevention into medical school curriculum.

5. Conclusion

Medicine focuses on precisely diagnosing illnesses and providing effective treatments for diseases. Public health practice complements clinical practice by focusing on avoiding illnesses, increasing the health of populations, and decreasing health inequities (25). We contend that the integration of fundamental public health skills into medical education will result in the production of more proficient physicians, thereby benefiting both the clinical practice and the community being treated. Moreover, when the country confronts progressively intricate interconnected health issues and expanding health disparities, such as the situation with the COVID-19 pandemic, it becomes an urgent need.

There is a definite need to place more emphasis on the socio-ecological dimensions of healthcare and the reform of medical training (25, 26). Flexner himself recognized the need for medical education to adapt to evolving scientific, social, and economic conditions (2). Nevertheless, this does not suggest that change is an easy undertaking (27, 28). In order to adapt to the changing requirements of society, medical school should

prioritize previously overlooked factors that impact health, such as socio-ecological variables, as the focus shifts from treating acute diseases to preventing and managing chronic diseases.

Implementing this will need modifications to medical education, as well as a shift in the thinking of clinicians toward their position. With the rise of social media and other technological advancements like telemedicine, the availability of health information has expanded. This has led to increasing empowerment for both clinicians and patients. Therefore, regular visits to a healthcare professional may serve as a key source of accurate and trustworthy health information. Instead of just concentrating on the management of sudden disease, patients have the chance to acquire knowledge about public health and health promotion concepts from their doctors. The responsibility for implementing this complete strategy lies with the healthcare professional, regardless of their expertise. This further emphasizes the need for doctors to have training that includes preventive, promotion, and nutrition. The significance of nutrition education for the health and well-being of doctors themselves is not receiving sufficient emphasis. With the increasing burnout rate among doctors, there is a growing need for nutrition and wellness education within this group (29).

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