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STUDENT ESSAY

The Case for an Updated Premedical Curriculum in the United States

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Abstract

In today's world of stark inequalities, medical education is increasingly recognizing the importance of exposing future physicians to topics such as health equity, social justice, public health, and human rights. A human rights-based approach (HRBA) to medical education centers these concepts as the foundation of equitable and accessible health care systems, comprising professionals who are literate in the social determinants of health and work to combat underlying inequalities. While medical schools and residency programs have preliminarily embraced this approach, the premedical curriculum has remained effectively stagnant since the early 20th century, adopting a narrow focus on the basic sciences and competitive individualism. In this essay, I argue that the premedical years represent a crucial, yet thus far overlooked, time frame in which to cultivate the values, qualities, and career expectations required of physicians under an HRBA to medical education, and critique how the current system generally fails to accomplish this. As a potential solution to realign the premedical curriculum with an HRBA and promote greater synergy within the medical education pipeline, I promote the introduction of premedical service-learning courses, which combine formal instruction in social justice, public health, and human rights with student-led community service projects.

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Introduction

Recent decades have seen a growing movement to incorporate the social determinants of health, human rights, health equity, and social justice into medical education. The World Health Organization and United Nations (UN) have promoted a human rights-based approach (HRBA) to health care education, a framework that considers health a fundamental human right and emphasizes equality, dignity, and nondiscrimination in the provision of care.[1] Individual scholars, nongovernmental organizations, and medical regulatory bodies such as the Association of American Medical Colleges (AAMC) have issued similar recommendations for the pedagogical integration of these topics.[2] More recently, the COVID-19 pandemic brought renewed emphasis on curricular reform in medical education, and many medical schools and residency programs in the United States have begun teaching the social determinants of health, public health, and social justice topics to physician trainees.[3]

Yet the academic regimen for entry into American medical schools, known as the premedical curriculum, has remained focused on the basic sciences despite commendable advancements in health and human rights training at higher levels of medical education. There has been growing scholarly interest in the premedical experience, and the literature suggests that these years profoundly influence the moral foundation, socialization, and career expectations of future physicians.[4] Students not only gain a scientific foundation during this time but also begin crystallizing their identities in relation to leadership and social accountability. Thus, the mismatch between the biomedically focused, metrics-driven culture of the premedical experience and the humanistic, collaborative, and socially responsive model of care that characterizes modern medicine is increasingly troubling.

Ultimately, the current premedical system is fundamentally out of sync with modern physician values and health care realities, as well as with numerous expert opinions indicating the need for departure from a curriculum that still reflects 20th-century priorities. In the following sections, I critically examine how the US premedical curriculum falls outside of an HRBA to medical education and offer a conceptual framework for reform.

A rights-based approach to medical education

An HRBA to medical education affirms that health is a fundamental human right, inextricably linked to the realization other rights and freedoms (e.g., housing, food, education) and asserts that health care systems—and the professionals within them—have a duty to promote equity, dignity, accessibility, and nondiscrimination.[5] This perspective expands the role of physicians beyond their traditional biomedical focus, calling for them to act as social and political advocates for patients.[6] Since the right to health was first enshrined in international documents such as the World Health Organization Constitution and the Universal Declaration of Human Rights in 1948, an HRBA to medical education has been promoted in other global instruments and across the academic literature, indicating a growing embrace of this perspective by medical practitioners.[7]

Two notable documents—the UN Special Rapporteur on the right to health's 2019 report on a rights-based approach to health workforce education and the World Health Organization's *Guidelines for Transforming and Scaling Up Health Professionals' Education and Training*—outline a vision for medical education reform that centers public health, social justice, and human rights.[8] Both reports stress the need to reimagine the goals and methods of health care education amid global epidemiological shifts, widespread economic inequality, and social injustice, in addition to promoting collaborative, community-embedded learning models. The realization of these reforms will require a concurrent shift in how health care professionals view their roles, which should occur "from the selection of students, to the curricula taught."[9] I believe that this ideological transformation must begin in college as students decide whether to pursue a career in medicine. If we want future physicians to fully espouse and practice the principles of an HRBA to medical education, we must intentionally shape these values and commit-

ments during the formative years of their education.

The premedical curriculum

Before the 20th century, there were no universal academic prerequisites for admission to medical school. In 1904, the Council on Medical Education was formed to restructure medical education and set admission standards.[10] It oversaw the commissioning of Abraham Flexner, an educational specialist, to assess the state of medical education in the United States and Canada. His famous *Flexner Report*, published in 1910, called for the standardization of curricula and emphasized scientific rigor, setting the blueprint for modern medical education.[11] Notably, his recommendations solidified the now familiar academic regimen for premedical students, including biology, chemistry, physics, and organic chemistry as required courses.[12]

These reforms lent consistency and scientific rigor to the premedical curriculum—an essential overhaul at the time but one that unintentionally cemented a rigid and narrow educational path. Flexner himself noted that medical education should be responsive to changing socio-ecological circumstances.[13] Yet in the 115 years since his report, the only major changes to the premedical requirements have been the addition of calculus and the extension of organic chemistry from one to two semesters.[14] Critiques of the Flexnerian model trace back to only a few decades after the report was published. Recently, the UN Special Rapporteur on the right to health directed attention to the *Flexner Report* as a turning point in medical education, suggesting that over a century later, "it is again time for a paradigm shift, to overhaul the many failings of medical education and its impacts on health systems."[15]

Critiquing the premedical curriculum through a rights-based lens

Mismatch with physician competencies and public health needs

One of the most common critiques of the premedical requirements is that they target outdated educational objectives, increasingly disconnected from the competencies and values of the ideal modern physician. Accordingly, they have come under scrutiny both for the nature and teaching methodology of the material they cover and for the content they fail to include. At most US colleges, premedical science classes are taught in a traditional lecture format and often include hundreds of students, many of whom intend to pursue careers in the sciences other than medicine.[16] Consequently, premedical students learn science concepts devoid of their applicability to medical practice (along with significant extraneous information) and in a way that favors passive learning and memorization over critical thinking and cross-disciplinary application of knowledge.[17] Organic chemistry is the course most frequently cited in studies of attrition among premedical students, prompting many to question "whether a single course should contribute to eliminating persons who might otherwise excel as physicians."[18]

Overall, there appears to be consensus among the medical education community that the content and format of these required courses do not maximally prepare students for the study of medicine. One critic compared the premedical requirements to hazing rituals for fraternities in that "they both require difficult tasks that contribute little or nothing to the career aspirations of the student."[19] Some have even argued that courses such as physics and calculus should not be required at all, given the minimal evidence suggesting their relevance to medical practice and the excessive stress and time burden required to succeed in them.[20] Certain pipeline programs, such as the HuMed Program at Mount Sinai School of Medicine, have arisen across the country, offering qualified college undergraduates early acceptance to a medical school without needing to take organic chemistry, physics, calculus, or even the Medical College Admission Test (MCAT). Studies have confirmed that these students performed comparably to their traditionally prepared peers in medical school, observing no significant differences in clerkship honors (except psychiatry, where HuMed students outperformed their traditional peers), overall academic distinctions, or graduation honors.[21]

While basic science subjects of dubious medical relevance continue to be required for admission to most US medical schools, topics including the social determinants of health, human rights, and social justice remain largely overlooked as a foundational element of the premedical experience, despite their clear applicability to modern-day practice. Considering the 21st-century disease climate, dominated by chronic conditions such as cardiovascular disease and cancer, it is essential for physicians to understand the complex social etiologies of these conditions.[22] In the past few decades, robust evidence from the public health literature has suggested that the synergistic interplay of many social determinants of health might contribute more to population health outcomes than do actual health care services, underscoring the importance of a public health perspective in the training of providers.[23] If the premedical curriculum is supposed to lay the scholarly foundation for a future in medicine and assist in the selection of students fit for this profession, it is both disappointing and insufficient for these subjects to be excluded from medical education's modern "renaissance" toward an HRBA.

According to an HRBA to medical education, structural violence (e.g., systemic discrimination, poverty, and housing instability) and direct violence (e.g., trafficking, torture, and physical or sexual assault) both constitute human rights abuses that are deeply responsible for the health disparities reflected in epidemiological data.[24] A commentary written by students at Boston University Medical School noted that within American medical education, the nexus of health and human rights has historically and inaccurately been sequestered within "global health" electives or taught at the will of individual educators.[25] This outdated perspective that patients facing human rights violations exist primarily outside of US borders—and that dedicated instruction about their care is thus not a curricular priority for medical trainees in the United States—is starkly out of touch with clinical realities. As the authors of this commentary describe, patients facing human rights violations routinely appear in many major teaching hospitals across the United States, especially given today's high incidence of migration, displacement, and transnational crises.[26] Therefore, American medical education can no longer sideline the connection between human rights and health. While some American medical schools and residency programs have begun formally incorporating the social determinants of health and human rights into their training, the premedical curriculum's emphasis on context-free scientific knowledge has endured. The result is a disconnect between the competencies today's physicians need to truly care for the full spectrum of patients (including vulnerable populations) and the current academic barriers to enter this career.

The endurance of a biomedical perspective and the resistance to integrating human rights and social justice into US premedical education does not exist in a vacuum; rather, it reflects a more widespread institutional and ideological resistance to systemic change from within health fields. Decades ago, Jonathan Mann described in his essay "Human Rights and the New Public Health" how traditional public health approaches privilege biomedical and individual-behavior-focused interventions while avoiding the deeper social and political conditions that are truly responsible for disease.[27] He argued that this reluctance was not only due to conceptual inertia but also because departing from the field's status quo would disrupt existing hierarchies of professional authority and move "ownership" of these social problems from the hands of a few experts into the realm of collective responsibility, presenting a more daunting and obscure path toward public health solutions than surface-level, "engineered" interventions.[28] Likewise, premedical education continues to operate within a structurally entrenched, biomedical paradigm that treats science as context-free and health as a primarily individual phenomenon. Reconfiguring its curriculum will require a similarly monumental overhaul of long-established pedagogical structures and an ideological shift in the priorities of medical school admissions.

Competitive learning environment and narrow educational focus

Beyond concerns about the premedical requirements' outdated content, many educators have criticized the social environment and unbalanced educational experience that these requirements directly and indirectly promote. Scholars have long acknowledged the existence of "premed syndrome," first identified in a 1984 report by the AAMC-commissioned Panel on the General Professional Education of the Physician and College Preparation for Medicine.[29] The report describes a culture of immense pressure to excel in the required courses, fierce competition, and an obsessive focus on maximizing admissions metrics.[30]

Despite rhetoric from regulatory bodies and individual admissions committees favoring a "holistic" application review process and a liberal arts education, science grade point averages (GPAs) and MCAT scores remain arguably the most important factors in schools' assessment of students. Although these objective metrics are indeed valid and predictive, many critics have noted that they have been used in unintended ways: "as a surrogate for individual academic excellence and a metric for medical school rankings."[31] Further complicating the issue is that colleges and premedical advisors have an unofficial, conflicting interest in maximizing their institution's acceptance yield to medical school, which can lead them to discourage certain hopeful applicants from applying if their metrics are not high enough to comfortably guarantee acceptance.[32]

Lewis Thomas, a prominent physician and author, has described the degree to which medical school admissions policies perpetuate premed syndrome and silo these students into curricular tracks heavily favoring the sciences. According to Thomas, as long as medical schools emphasize exceptional grades in science prerequisites and high MCAT scores, students will naturally "concentrate on the sciences with a fury" and "live for grades."[33] This sentiment has been echoed by Steven Kanter, who notes that premedical students are keenly aware of how their applications are reduced to numerical metrics—down to the hundredth of a decimal point—and directly compared to one another.[34] Such a system not only compels them to prioritize these quantitative measures and thus view one another as competition but also communicates to them an inaccurate and incomplete picture of what true excellence in medicine looks like.

Beyond contributing to a stressful learning environment, these pressures also discourage students from pursuing courses that might challenge them in unfamiliar ways. It is unsurprising that premedical students hesitate to venture outside their academic comfort zones and pursue classes that are not required by admissions committees if doing so might risk lowering their GPA.[35] The ultimate purpose of the premedical years has long been a subject of scholarly discussion, and there is consensus that this time frame should be more than a mad race to maximize one's chances of medical school acceptance. Kanter describes an ideal philosophy for premedical education based on the robust literature about this debate, concluding that the premedical curriculum "must go beyond preparing a student to do well on an admission test and in the courses he or she will take in medical school, and must prepare the student to develop into an independent and creative thinker, with a strong moral compass and a commitment to social justice."[36]

The premedical experience is more than just a series of necessary checkpoints and milestones; it is a crucial stage of identity formation and socialization. Students begin internalizing the values and expectations of the medical profession long before they set foot in medical school. This moral and cultural orientation, shaped by implicit messaging from professors, peers, and admissions committees, is part of what has been described as medicine's "hidden curriculum."[37] Frederic Hafferty, a notable medical education researcher, argues that this hidden curriculum extends into the premedical years and that through exposure to it, students' "moral character basically is established prior to entry to medical school."[38] Thus, subsequent schooling in physician values and ethics comes too late to meaningfully shift their existing beliefs and interpersonal manner.

As long as the premedical system continues to reward superior performance in the basic sciences and a hyper-individualistic mindset, the academic and social experiences shaping premedical students' "moral character" will continue to downplay values such as teamwork, open-mindedness, and altruism. At the heart of an HRBA to medical education are professionals who espouse these humanistic values in every interaction with patients and other care providers—people who have both the humility and generosity to de-center themselves from situations and put others first. The current system arguably sets the stage for future physicians to be less team-oriented, cynical about sacrifices made, and focused on individual rather than collective success. If we want future physicians to truly be prepared to meet modern health care's humanistic demands, efforts to actively shape these qualities and values must begin earlier in students' education.

Complication of extracurricular time management, fairness, and subjectivity

It is important to discuss one final, yet slightly less obvious, critique of the premedical requirements that underscores the need for curricular change. Under the current system, students are expected to earn competitive grades in the required courses while simultaneously crafting a resumé of impressive extracurricular activities, including research projects, leadership positions, and volunteer work. These "soft" requirements often represent the avenues through which students demonstrate many of the non-academic competencies expected for incoming medical students, including service orientation, cultural awareness, empathy and compassion, and teamwork and collaboration. These and other qualities are officially promoted by the AAMC's "Premed Competencies for Entering Medical Students" and echoed in many medical schools' mission statements, indicating widespread recognition of their importance to an applicant's preparation for and future success in this career.[39] This prompts the question of why qualities and skills that are so crucial for aspiring physicians and clearly desired by admissions committees are not formally integrated into applicants' education. Leaving the development of these competencies entirely up to students to do in their free time, without institutional support or structured methods for assessment, introduces several concerns.

First, this system puts academic achievement at odds with extracurricular engagement, forcing students to consistently navigate compromises between the two. Students must learn time management, but the ambiguity surrounding how to balance these official and unofficial requirements unnecessarily burdens students and might even disincentivize their genuine engagement with nonacademic pursuits. When students must spread themselves so thinly under significant time constraints to demonstrate desired physician competencies outside of required coursework, extracurricular activities can often seem like chores—merely another step in "checking all the boxes" required for admission. This is especially true when considering that students are encouraged to prioritize high academic performance first, which often leaves them no choice but to relegate other, possibly more enriching and meaningful pursuits to the periphery. One could consider this yet another negative consequence of the Flexnerian premedical requirements: students are forced to allocate most of their time to GPA optimization at the expense of experiences that might be more intellectually adventurous and spiritually affirming of their decision to pursue medicine. Interestingly, this exact dilemma is cited as part of the justification for Mount Sinai's HuMed Program, which permits, through the elimination of "outdated requirements" and "premed syndrome," the matriculation of students who took more risks academically, pursued independent scholarship, and were overall more "self-directed" than traditional premedical students.[40]

Second, leaving the impetus to acquire these non-academic competencies up to applicants themselves obscures existing inequalities among them. Many of the activities premedical students undertake to demonstrate qualities such as leadership and service orientation require hundreds of hours of unpaid work, and it is grossly unfair to assume all applicants have equivalent time and resources to

do so. For example, students who must work paying jobs or assume caregiving responsibilities outside of school are at a significant disadvantage in their ability to engage in such unpaid ventures. Moreover, applicants who have connections within the medical field or to other prestigious opportunities are clearly at an advantage in securing extracurricular experiences that most aptly demonstrate the desired characteristics of future physicians. Ultimately, this unstructured system favors students with the financial, temporal, and social resources to craft compelling extracurricular narratives—regardless of the actual authenticity, impact, or difficulty of those experiences. The subjectivity this introduces raises serious questions about the soundness and equity of this process. It does not suffice to allow the evaluation of some of the most important qualities, values, and proficiencies for future physicians up to the personal interpretation of admissions committees, especially under a system that favors certain applicants.

It is important to recognize that the AAMC's recent promotion of a competency model for incoming medical students is indeed a step in the right direction. Originally developed in 2011 and updated in 2023 through a joint effort between the AAMC and members of the academic medicine community, these 17 competencies were designed to guide student preparation, provide clarity for admissions committees, and offer flexibility in how students could demonstrate readiness for this career.[41] The UN Special Rapporteur on the right to health even commended this recent pedagogical shift in his 2019 report.[42] Indeed, a growing number of forward-thinking medical schools have adopted this approach and done away with specific curricular requirements. However, the broader implementation of this model has remained inconsistent. As long as most medical schools continue to rely on traditional course prerequisites and the MCAT as key admissions metrics, students will need to follow the conventional prerequisite pathway, regardless of the commendable policies of a few institutions.

Calls for a competency-based approach from medical regulatory bodies and education committees have fallen under broader appeals for premedical education to be more grounded in the liberal arts, encouraging students to take courses in the social sciences, humanities, public health, and ethics. Again, while admirable steps in the right direction, these calls for reform fall short in one crucial way: the mere encouragement of these academic experiences is not enough. The impetus to take these elective classes or engage in relevant experiences still lies with students, and it is not enough to simply hope that they heed these suggestions. In the same way that proficiency in the basic sciences is achieved through structured frameworks, proficiency in the physician qualities demanded by an HRBA to medical education should likewise be integrated into premedical students' formal academic experience.

A potential solution: Service-learning courses

Addressing critiques of the current premedical curriculum and aligning it with an HRBA to medical education will require comprehensive reforms. As detailed in previous sections, these shortcomings are due not only to the exclusion of certain necessary material but also to issues with the content, structure, and social environment fostered by the current curricular system. Therefore, simply adding another requirement on public health, social justice, and human rights without restructuring existing coursework would likely exacerbate student stress and competition.[43] While the ultimate solution is outside the scope of this essay, one promising idea supported by the literature and international guidelines is the creation of new interdisciplinary courses that integrate and highlight the most medically relevant components of traditional basic science coursework (e.g., including the appropriate parts of organic and general chemistry in a new, integrated biochemistry class).[44] This approach would eliminate the burden of learning extraneous information, better accommodate the rapid pace of scientific discovery, and liberate scheduling space for non-science electives by reducing the number of required science courses. While there are barriers

to implementing this model, including strains on institutional resources to devise and implement these courses, it represents a promising step in the right direction and should be further pursued.

Ideally, efforts to revamp the existing science requirements in this way would be complementary to another solution proposed herein—one that would effectively address the current premedical system's general exclusion of public health, human rights, health equity, and social justice education. Service learning is a structured educational approach that combines community service with formal academic instruction and personal reflection, aiming to enrich learning experiences, strengthen communities, and cultivate the values of empathy, cultural competency, and civic responsibility among learners.[45] In the context of medical education, service-learning courses enable students to apply academic knowledge to real-world public health issues, deepening their understanding of the social determinants of health and the unique challenges faced by particularly vulnerable patient populations (for example, those who have experienced direct or systemic violence).[46] Such programs have already been introduced at several medical schools, including the Albert Einstein College of Medicine and Tufts University School of Medicine, with great success. Studies of community-embedded social justice learning programs have shown they enhance learners' interpersonal and leadership skills, augment their commitment to working with marginalized populations, and increase their interest in human rights and social justice work.[47]

The success of these programs at the level of medical school sets a precedent for the extension of this model to the premedical years, offering a promising template for a structured, values-driven student learning experience that aligns with an HRBA to medical education. Premedical service-learning courses would include a curricular regimen of topics such as social justice, the social determinants of health, and human rights taught through formal instruction, combined with university-organized opportunities for students to lead service projects that address the needs of local communities and simultaneously demonstrate competencies such as social responsibility, service orientation, leadership, and cultural awareness. These classes would count as formal academic credits, permitting equal access for all students, and involve assessments, reflective small-group discussions, and presentations of individual projects. Such a multifaceted pedagogical approach would combine elements of the sciences (e.g., quantitative assessment of epidemiological data and population health research) with features of the humanities (e.g., subjective reflection and discourse) to provide a learning experience that enhances rather than limits students' achievement of a liberal arts education. Being encouraged to introspect and discuss service projects with peers would also arguably make these experiences more personally impactful for students, based on the benefits self-reported by learners in studies of similar programs.[48]

The advantages of this proposal are manifold. Foremost, it would enhance continuity between the premedical and medical school phases of physician education, formally enshrining competencies such as service orientation into the premedical curriculum. The promotion of premedical service-learning courses by authorities such as the AAMC would represent tangible action toward ensuring that all students enter medical school with an understanding of health equity, social justice, and human rights. Because proficiency in these topics is increasingly recognized as essential to success as a physician, a more hands-on approach than merely recommending related coursework is needed as students decide whether to pursue this profession.[49] Given the importance of the premedical years in shaping future physicians' identities and values, this period—when students' career goals, social habits, ethical principles, and attitudes toward medicine are actively crystallizing—is the ideal window to introduce such a meaningful intervention. Moreover, ensuring that all premedical students possess a foundational understanding of these topics would improve educational efficiency by reducing the burden on medical schools to teach them from the ground up, much like how introductory biology serves as a springboard for more advanced coursework in medical school.

Premedical service-learning courses would also offer a more equitable and objective alternative to the current way premedical extracurriculars are assessed by admissions committees. Having colleges sponsor and organize opportunities for students to devise and implement service projects would likely reduce the stress of securing extracurricular experiences. It would afford students who possess the leadership, dedication, and enterprise, but lack financial or social resources, an equal opportunity to develop new and impactful community initiatives. Embedding service-learning courses into students' official academic regimen would also mitigate the time conflict between coursework and extracurriculars. This way, students who need to use most of their free time to work a paying job or fulfill family obligations could still demonstrate the nonacademic competencies desired for medical school admission without being at a disadvantage to their peers who have more freedom to pursue such initiatives. Finally, the widespread adoption of comparable service-learning courses across US colleges would permit admissions committees to more objectively evaluate and compare the quality, depth, and personal significance of applicants' service projects and their underlying commitment to community-oriented care.

Although not the complete or final solution, service-learning courses are a promising and feasible step toward realigning the premedical curriculum with the competencies and values espoused by an HRBA to medical education. By integrating student-led community engagement with guided academic instruction and institutional support, service-learning courses offer a more standardized and equitable way for students to cultivate and demonstrate their understanding of the social determinants of health, social justice, and human rights in relation to health care. In addition to reinforcing continuity and efficiency across the medical educational pipeline, service-learning courses' blended educational format would bridge the divide between the abstract understanding of health equity concepts taught in a classroom and their real-world manifestations among vulnerable patient populations. This model thus offers a concrete pathway for finally transforming long-standing recommendations about the premedical curriculum into truly meaningful reform.

Conclusion

In 2009, the AAMC assembled a team of scientists, physicians, and educators, known as the Scientific Foundations for Future Physicians Committee, to reexamine the necessary competencies at every stage of medical training. The committee's report called for "new curricula that would create synergies and exciting new learning experiences."[50] Service-learning courses fulfill that vision, offering an innovative, values-driven model that reimagines premedical education not merely as a gateway to medical school but as the foundation for a more diverse, reflective, and socially responsive generation of physicians.

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