Medical School Admissions: Defining the Future of Healthcare Delivery in the United States

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Abstract

Issue: Systemic health disparities in the U.S. are unlikely to be successfully addressed without evidence-based, multilevel policy interventions. To date, most research investigations and policy interventions have been focused on incentivizing career choice aimed at ameliorating health disparities and correcting medical bias in practicing doctors. Much less work has been undertaken on utilizing educational policy, practices and data to affect positive change "upstream" of the current practicing healthcare workforce. An underutilized area in educational policy and predictive analytic use is in the medical school admissions process. Admissions policies for selective educational institutions have been tailored in the past to provide for the public good and therefore represent a natural first intervention area.

Evidence: In the past, numerous policies have been enacted to incentivize physician behavior in ways to produce more primary care physicians, increase the physician work force in underserved areas, and in general improve health care equity. Despite these interventions, health disparities because of physician workforce shortcomings persist. With regard to medical school admissions approaches, several current and past standards have demonstrated that the selection process can be modified to alter the incoming cohort of student-doctors.

Implications: We propose that medical education policy has not been sufficiently leveraged to act in concert with existing health service-based interventions. Specifically, we argue the medical school admissions process represents an underutilized opportunity to fundamentally change the physician workforce and address downstream health care system issues. Expanding what may constitute desirable for selection based on societal needs versus academic credentials is one possible remedy to the current approach. An opportunity also lies in leveraging the power of large data methods to provide predictive analytical input into the admissions process. Reconceptualizing the admissions process in these ways could allow for a complementary strengthening of the current programs designed to ease health disparities. In addition to the continuation of current diversity-enrichment programs in health professional education, expansion to more novel and cross-disciplinary solutions, such as those discussed in this article, could be actively encouraged.
Keywords: Admissions; Diversity; Health Disparities; Policy Reform; Predictive Analytics

Viewpoint

Admissions policies are once again at the forefront of public discourse as a result of "Operation: Varsity Blues (Pascus, 2019)." In that sting operation by the FBI, numerous affluent parents allegedly bribed and manipulated admission criteria in order to gain admission for their children to selective undergraduate programs. While the alleged bribery and money laundering were far from simple in nature, two factors that are generalizable to a discussion on admissions policy are the relative value of standardized testing and the adoption of more lenient admission standards in special cases (athletes, legacies, etc.).

Standardized testing, and its relative importance in educational section processes, have been discussed in detail in other works (Phelps, 2005; Donnon, Paolucci and Violato, 2007; Davis et al., 2013). However, "Operation: Varsity Blues" demonstrates how those in power can manipulate admissions policies in order to provide unfair advantages for some (Alon and Tienda, 2007; Alon, 2009; Alon, 2014). It has been alleged that not only did the students involved in the case utilize high-priced tutoring available to wealthy families they also manipulated accommodations for special needs students and in some cases bribed proctors to take the tests on the behalf of their children (Pascus, 2019). Whatever one's opinions on the use of standardized testing in admissions, this level of manipulation calls into question how objective these results might be in certain circumstances.

Similarly, athletics can be seen as a measure of applicant achievement, (Fried, 2007) a potential means for increased campus diversity (Fried, 2007), and both a financial (Brown, 1996) and reputation boon (Clark et al., 2009; Jones, 2009) for the higher educational institution. As such, differential criteria for admission for some applicants (Fried, 2007) can be a rational approach. However, once again, the recent scandal demonstrates how manipulation of admissions criteria can result in "crew recruits" from schools without crew teams (Pascus, 2019). While the evidence presented from "Operation: Varsity Blues" might cause someone to grow cynical about admissions policies it also provides an opportunity to consider how the admissions process could be reformed to act in the service of the public good instead for those most willing to cheat.

To date, similar scandal as seen in "Operation: Varsity Blues" has not touched medical school admissions. Medical school admission is the decisive moment of entrance to the profession in the United States (U.S.) and therefore is arguably the most important selection process in medical education for determining the physician workforce. According to the Association of American Medical Colleges (AAMC) in 2014, 28,125 (57% of applicants) individuals who completed a pre-medical curriculum, took the Medical College Admission Test (MCAT), and applied to at least one medical school had their applications declined (Association of American Colleges, 2015). Given the high financial cost of the application process (Patterson, Baldwin and Olsen, 2009) and other opportunity costs for excluded applicants, as well as the increasing need for physicians (Schefller et al., 2008; Association of American Medical Colleges, 2010), using a selection model that is efficient and optimized is critical. Ongoing large-scale discussions of the fairness of admissions may allow for a reconsideration of which criteria are used in the basis of medical school admissions. We propose that medical school admissions process should be reframed as a major opportunity to define healthcare delivery in the next generation.

Medical students are typically selected after consideration of a number of factors including grade point average (GPA), admissions tests (MCAT in the U.S.), letters of recommendation, volunteer and research experiences, and interviews. Admission decisions are based on the limited information available to the admissions committee, customarily using an applicant’s past performance to predict future success (Eva et al., 2004; Donnon, Paolucci and Violato, 2007). We believe admissions decisions are based on professional norms and established selection factors.
However, how these constructs reflect today's physician workforce needs deserves close evaluation. Previously, studies on the medical school admissions process have primarily focused on examining the ability of typical selection factors to predict short-term educational outcomes such as medical clerkship performance or national licensing examinations (Eva and Reiter, 2004; Eva et al., 2004; Donnon, Paolucci and Violato, 2007). The resultant literature largely informs the predictive validity of commonly collected admissions committee data on some educational outcomes, while the overall importance of admissions decisions in determining health work force capacity has not been explicitly explored (Eva and Reiter, 2004; Eva et al., 2004; Kreiter et al., 2004).

Given the 90-95% likelihood of medical school completion once admitted, the physician population of the health care system becomes largely set at the time of admission. We propose programmatic evaluation of admission decisions beyond completion of medical school, to include consideration of the number of admitted students that fill key health care system needs 5-10 years after their admission. Some of these outcomes we would propose have been considered in the past, such as the production of primary care physicians at medical schools such as Michigan State University College of Human Medicine (Switzer et al., 2018). However we would argue for a much more data-driven approach based on predictive analytics in medical school admissions. Such an approach could move beyond a focus on culture creation and general consideration of applicant career interest toward the use of predicted probability consideration of students most likely to practice primary care in the future. Future practice with underserved populations and those most likely to address persistent health and health care disparities could similarly be selected.

Applicant selection based on socioeconomic class has been explored in the business literature and can be considered in the medical education context. Persistent social stratification along socioeconomic status has been explained in elite firm professional hiring practices through bias in the interview process. Here, non-academic factors associated with higher social status become strong predictors of interview evaluation scores (Rivera, 2011). For example, there can be an increased likelihood of hiring applicants with common experiences in expensive camps, participation in selective social and eating clubs, or sports that are more common amongst the elite (e.g. crew, lacrosse). Bonds created through these common life experiences can result in unconscious bias towards certain applicants and are often expressed unintentionally versus as explicit discrimination. Reassigning admissions interviews so that they are more often completed by those in areas of health care system need, may help to co-opt this form of bias. If we recruit those that are similar to us, utilizing interviewers practicing in areas of need may increase the likelihood of meeting system needs. Whether as a result of one of the above mechanisms, or others, there are persistent systemic issues of under-representation in medicine for some minority groups (The Rationale for Diversity in the Health Professions: A Review of the Evidence, 2006) and that is impacting the ability of the health care system to prepare for the future.

The medical school selection process does not occur in a vacuum and admissions policies have impacts outside equity and single institutional concerns. We believe disproportionately low minority representation disadvantages medically underserved groups. African Americans and other minority groups can have issues of trust with the medical community based on a history of mistreatment and experimentation. Pervasive distrust of the medical profession is an ongoing issue in many minority communities (Corbie-Smith, Thomas and George, 2002). African-Americans have especially been the victims of inhuman experimentation by the medical community including during their period of enslavement in the United States (Gamble, 1993) as well as more recently in the infamous Tuskegee Syphilis trial (Gamble, 1997). Continued mistrust of physicians is multifactorial (Kennedy, Mathis and Woods, 2007) and results in enduring concerns about participation in medical research (Shavers, Lynch and Burmeister, 2002) as well as fears of "being experimented on" or financially "exploited" during routine medical care (Armstrong et al., 2008). This persistent distrust by patients of color is maintained, even when controlling for socioeconomic factors and geographical differences (Corbie-Smith, Thomas and George, 2002), though these effects...
may also have complex intersectional effects (Armstrong et al., 2007). Distrust of medical providers also extends beyond patient-physician interactions and influences the trust felt between pediatric patients’ parents and their child’s physician (Rajakumar et al., 2009). While historical mistreatment is likely an ongoing contributor to feelings of mistrust (Gamble, 1997), a lack of cultural competence (Kennedy, Mathis and Woods, 2007) and implicit bias on the part of medical professionals may perpetuate these issues (Dovidio et al., 2008). Mistrust of this type continues to this day (Saha et al., 1999) and is an important consideration as the population moves toward a majority-minority state (Maxwell, 2014; Colby and Ortman, 2017).

Under-represented Minority (URiM) physicians treating medically underserved populations has been shown to correlate with increased trust in the provider and improved clinical outcomes (The Rationale for Diversity in the Health Professions: A Review of the Evidence, 2006) Additionally, URiM physicians choose primary care practice in underserved populations at a higher rate than other students (The Rationale for Diversity in the Health Professions: A Review of the Evidence, 2006). “Traditional majority” students who study with URiM students have been shown to also practice in medically underserved populations at higher rates, report increased capability to care for minority patients, and a heightened interest in equitable health access (The Rationale for Diversity in the Health Professions: A Review of the Evidence, 2006). A continued lack of equal representation in the medical profession from URiM groups can thus be seen as sub-optimally serving members of those communities. Similarly, efforts have been made to predict students most likely to address persistent physician shortages for underserved rural populations (Puddey et al., 2015). Once again, students who have similar experiences as the underserved population, in this case growing up in small rural communities, are more likely to choose to serve in those same communities (Puddey et al., 2015).

Several proposed mechanisms have been explored in the medical literature to explain biases and disparities in health care delivery (Caterinicchio, 1979; Thom and Campbell, 1997; Thom et al., 1999; Thom, 2001; Nelson, 2002; Thom et al., 2002; Smedley, Stith and Nelson, 2003b; Smedley, Stith and Nelson, 2003a; Staff, 2004; Egede, 2006; Traylor et al., 2010). One major reported mechanism resulting in care disparities are underlying biases of caregivers and their application of stereotypes in treating patients of color (Smedley, Stith and Nelson, 2003b; Staff, 2004). A related mechanism is greater levels of provider uncertainty in the delivering of care to underserved minority patients (Smedley, Stith and Nelson, 2003b; Staff, 2004). Of equal importance is the role of systemic inequality that results from the administration of health systems as a whole, including health care plan managers and other economic considerations in health care delivery (Smedley, Stith and Nelson, 2003a; Staff, 2004). Of specific interest with regard to how admissions decisions may impact these issues is through consideration of patient-physician concordance (Saha et al., 1999; Cooper and Powe, 2004; Street et al., 2008; Traylor et al., 2010; Greenwood, Carnahan and Huang, 2018; Shen et al., 2018) and issues of patient-physician trust (Caterinicchio, 1979; Anderson and Dedrick, 1990; Gamble, 1993; Kao et al., 1998; Doescher et al., 2000; Corbie-Smith, Thomas and George, 2002; DeVille and Kopelman, 2003; Piette et al., 2005; Armstrong et al., 2007; Kennedy, Mathis and Woods, 2007; Armstrong et al., 2008; Dovidio et al., 2008; Rajakumar et al., 2009). As such, we focus on this aspect of the multifactorial origin of health disparities for patients from historically underserved populations.

Physician-Patient trust can be affected by physician behavior and the level of this trust impacts medical outcomes: Physician-patient trust has been studied for decade (Caterinicchio, 1979) and with increasing focus with the expansion of managed care in the United States (Thom and Campbell, 1997). Researchers have attempted to quantify (Anderson and Dedrick, 1990; Thom et al., 1999; Epstein et al., 2005) physician-patient trust in order to study its effects. Within these studies, physician attributes (Weng, 2008), behaviors (Thom, 2001; Thom et al., 2002; Kim, Kaplowitz and Johnston, 2004), and even the insurance mechanisms of payment (Kao et al., 1998) impact patient-physician trust. Of specific importance to the consideration of admission decisions is the demonstrated benefit of shared personal and ethnic backgrounds between physician and patient (Saha et al., 1999; Doescher et al., 2000; Street et al., 2008). Patient behavior, especially compliance with physician recommendations,
can be influenced by their level of trust in their health care provider (Piette et al., 2005). Physician-patient trust and rapport has even been correlated with decreased hospitalizations and emergency room utilization in the elderly population (Parchman and Burge, 2004). As such patients, who have less access to care and those who receive worse care even when access is equal might have both forms of disparity ameliorated through a data-driven, societal need-based admissions process.

While the intervening time in training between admissions and practice may weaken the associations between applicant characteristics and eventual career behavior, medical school admission is an essential and decisive moment for determining the physician pipeline and thus one of the final points where meaningful intercession is most likely to be possible. What we propose is a frameshift from research focused on explaining behavior to include one that incorporates the ideas of machine learning and predictive analytics focused on precise prediction without specific or clear causation (Yarkoni and Westfall, 2017). In this way we would add to the current research approach, one that is decisively outcome focused over one that is explanatory focused. Machine learning can come in many forms (Mair et al., 2000), however for the purposes of our discussion we believe it most important to utilize this new technology to make connections between existing data not immediately apparent to human researchers (Kouro et al., 2015). Utilization of predictive analytics in medical school admissions policies are not unknown (J. C. Burkhardt et al., 2016; J. Burkhardt et al., 2018), but are generally limited in scope and application. We believe that research focused on data mining (Witten et al., 2016) of associations on a national scale may yield the types of information that could be implemented to address current disparities. This is exploratory work by nature. However not being able to fully predict these results must not preclude us from expanding what might be of possible in reforming our health education and health care systems.

The problems of health care inequality that are related to a lack of physician background diversity are unlikely to change without intervention. Current medical school selection policies may therefore result in intensification of health disparities, having a major impact on the future of healthcare delivery in the United States. Further, a substantial physician shortage is projected in the U.S. by the Department of Health and Human Services (U.S. Department of Health and Human Services, 2008). This shortage is due to both supply (e.g. freeze on governmental Graduate Medical Education funding, aging physician population) and demand (e.g. increased per-patient health care utilization) shortfalls (U.S. Department of Health and Human Services, 2008). If the medical profession wants to meet the needs of the health care system with physicians, and not mid-level providers, educators need to rapidly expand the number of medical students while maintaining or improving the level of competence in the profession. While the physician shortage is likely to affect the larger U.S. population, minority and low SES patients are likely to be most impacted with increased wait times to get care and poorer clinical outcomes (U.S. Department of Health and Human Services, 2008). Therefore, we believe that medical school admissions policy in the future must be cognizant of their potential role in mitigating future health disparities through thoughtful integration of workforce development needs into their selection goals.

Given the potential connections between student selection and projected health care workforce needs, new research to guide reevaluation of medical school admission policies and practices is critical. We propose focusing selection criteria research on additional outcomes. Selection criteria that can demonstrate a positive predictive value for placing graduates into areas of physician shortage (specialty and location-based), better addressing health disparities, and/or other explicit policy needs should be considered in addition to commonly collected data. Medical school admissions rely on a belief in a meritocratic process; whereas fairness, equity, and societal benefit also deserve close consideration. Medical school admissions reform should guide selection of candidates with the highest likelihood of future success and responsiveness to the needs of society to include various previously underserved communities. This is a matter of social justice and equity and can likely be accomplished without a decrease in practicing physician ability.
How we select applicants for entry to the medical field is a critical societal issue that extends beyond professional boundaries and must be considered in the larger context of the societal contract between physicians and the general population. As a profession, we need to commit to studying the medical school selection process using robust research practices. Establishing the benefits of the current selection factors and exploring novel considerations should be a policy and arguably is a research priority. By creation of an expanded medical education literature on admissions, which has a foundation in theory and uses large-scale data to draw its conclusions, medical educators can redefine the evidentiary basis for our admissions policies and shape the future of healthcare delivery. As medical educators we must embrace our potentially hidden additional responsibility for determining the quality of care for our fellow citizens and be more active in advocating for change through our selection policy choices.

Take Home Messages

- Systemic health disparities in the U.S. are unlikely to be successfully addressed without evidence-based, multilevel policy interventions
- An underutilized area in educational policy and predictive analytic use is in the medical school admissions process
- The medical school admissions process represents an underutilized opportunity to fundamentally change the physician workforce and address downstream health care system issues
- An opportunity also lies in leveraging the power of large data methods to provide predictive analytical input into the admissions process
- Admissions policy changes could complement the current health services programs designed to ease health disparities

Notes On Contributors

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### Appendices

None.

### Declarations

*The author has declared that there are no conflicts of interest.*

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### Ethics Statement

Formal ethical approval was not sought as this work is an opinion paper that expresses the authors' viewpoint. While it is based on the current literature, no additional human subject research was performed in the creating of this manuscript. As such there were no research subjects that could be put at risk and was outside of the purview of IRB review.

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