

# Considering Medical Education Research: Selection into Medical School

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Medicine as a science and as a profession has made great progress in the last 150 years. The infection epidemic was mastered by the invention of antibiotics, cardiovascular disease became treatable, and our knowledge of cancer advances rapidly. However, at the same time, tens of thousands of people die worldwide every year as a result of medical errors. “To err is human, building a safer healthcare system,” an influential report from the Institute of Medicine, estimates that in the US alone, every year, at least 44,000 and perhaps even 98,000 patients die as a result of medical errors.<sup>[1]</sup> In short, more people die in a given year as a result of medical errors than from motor vehicle accidents, breast cancer, or acquired immunodeficiency syndrome.

These findings imply that an important cause of medical errors is how the physician is trained. Although the training of doctors started about 2000 years ago, times have changed and so did practice, society, healthcare systems, and patient expectations. There are also shifts in how we deliver education and in training linked to changing healthcare practices and systems (e.g. limits on hours of training in many countries). Moreover, our knowledge of what constitutes good clinical practice is constantly evolving.<sup>[2]</sup> Medical education must therefore prepare today’s medical students and doctors in training to work in very different ways from those of the past.<sup>[3]</sup>

To meet these standards and expectations, medical education has to keep up with prevailing standards and look forward, both of which depend on medical education research. Just as the biomedical researcher seeks ways to improve treatments that help patients, the medical education researcher seeks ways to improve education such that the graduate is better prepared to help patients. Both have the same goals albeit use different means.

Meeting the goal of preparing the doctors of tomorrow optimally requires generating and using evidence from well-designed – and well-conducted – medical education research.<sup>[4]</sup> Medical education research is the birthplace of many innovations including the introduction of simulated patients; simulation, in general; the objective structured clinical examination; advanced knowledge testing such as the introduction of the longitudinal “progress test;” and small-group tutorial learning such as problem-based learning. All these innovations emerged from research into medical education and indicate how medical education research has transformed policy, curriculum, teaching, and learning.<sup>[5]</sup>

We look to selection into medical school, a major area of endeavor for health professional educators, as an example of the utility of medical education research. Often described as the first assessment of medical school, more than 20 years of research into medical school selection has identified three broad approaches to medical school selection: individually focused processes, competency-based frameworks, and social accountability/workforce planning.<sup>[6]</sup>

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In individually focused processes, the capacity for academic success is typically the basis for selection and this is assessed via attainment on school-leaving examinations or national-level standardized tests, such as the USA’s Medical College Admission Test. To broaden selection to encompass personal attributes (characteristics desirable in a doctor, such as empathy and communication skills) as well as academic achievement, many countries now use “competency-based” selection frameworks. These use a combination of methods at the point of selection to assess not only for academic ability but also for predetermined behaviors and attitudes that are thought to indicate success as a healthcare practitioner or student.

The third selection philosophy focuses on the interplay between individual competencies and meeting societal needs. This model of selection is holistic, considering applicants in respect not only of their individual capabilities but also taking into account student diversity, physician maldistribution, and community needs in the selection processes and goals. India has long struggled to attract and retain doctors and healthcare

professionals to remote, rural, and deprived, and disadvantaged areas. Not-for-profit Indian medical schools, such as Christian Medical College (CMC), have focused on social accountability mission since long before the World Health Organization suggested that the accreditation criteria of medical schools should better reflect priority health needs.<sup>[7]</sup>

How to evaluate the success of medical school selection processes? A recent systematic review of the research literature shows clear messages about the comparative reliability, validity, and cost-effectiveness of various selection methods commonly used by medical schools [Table 1].<sup>[8]</sup> Note that CMC’s approach would be considered a selection center. There remain relatively few reports of the use of, and outcomes from, this approach in the literature.

The outcome measures used to evaluate medical school selection methods have been criticized for typically focusing on indicators of attainment and performance (e.g. retention, medical school achievements, and performance on licensure examinations). Many studies have compared medical schools in respect of graduate performance on postgraduate

**Table 1: Summary of the evidence and implications for different election methods**

Selection method	Research evidence and implications
Academic achievement	There is a high level of consensus regarding predictive validity but concerns that the discriminatory power is diminishing as increasing numbers of students achieve top high-school grades. Moreover, comparability across different types of schools and school systems is frequently questioned. Academic records can negatively impact widening access if school systems are socially selective
Aptitude tests	Different tests are located on a continuum between pure ability and pure knowledge tests. Reliability tends to be favorable. The knowledge parts, especially in the natural sciences, predict study performance. Evidence is mixed on the fairness of aptitude tests, specifically regarding predictive validity, so each tool requires evaluation in its own right. Knowledge tests are often used for postgraduate selection and demonstrate in this context favorable reliability and validity
Personal statements and CV	Candidate acceptability is high, but susceptibility to coaching and plagiarism is also high. There is very little evidence for predictive validity. For postgraduate recruitment, CVs are often used as part of an interview but usually in a nonstandardized format
References and letters of recommendation	Little research supporting validity or reliability and high costs for scoring. However, use of references remains widespread, and candidate reactions are positive. References might be used to flag problematic applicants
SJTs	Improved validity over other high-volume selection tools for nonacademic characteristics (e.g., personality tests) and can be mapped to organizational values. Although SJTs can be relatively costly to design, they can be machine-marked and delivered online, producing cost savings in high-volume selection. Flexibility in format from text-based to multi-media item presentations. Susceptibility to coaching can be minimized through appropriate design
Personality assessment	Some personality traits have been linked to in-training performance, although depending on the personality tool used, the evidence is mixed. When there is a high risk for susceptibility to faking or coaching, personality assessment might be used to drive more focused questioning at interviews (rather than as a standalone instrument without verification)
Interviews/MMIs	Traditional unstructured interviews perform poorly, whereas structured interviews based on role analysis, with standardized questions, trained interviewers, and appropriate scoring, can be reliable and valid methods. MMIs are the most structured type of interviews. They typically comprise six or more interview stations, which broadens the sampling of performance to enhance reliability. MMIs are relatively expensive to design and implement but can offer favorable validity and positive candidate reactions. All types of interviews create the opportunity for live interaction with applicants, which makes them resource-intensive to deliver but offers other advantages such as enabling a more personal connection between applicant and program. Candidates prefer interviews to other methods
SCs using work samples and simulations	Multi-station SCs are relatively expensive to design and implement as they involve a range of simulations (e.g., group exercises, in-tray tasks, presentations, interactive exercises with role players). They offer a similar multi-sampling approach as MMIs. SCs have been used in postgraduate selection, and further evidence of the predictive validity of SCs in undergraduate medical selection is required

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examinations and fellowships, to assess whether performance on selection is associated with later performance (studies of predictive validity).<sup>[8]</sup> These academic metrics are relatively “easy measures” and certainly of use. However, if individuals are good enough at passing examinations to get into medical school, they likely will remain good at passing examinations. Hence, what then are good outcomes against which to measure admissions process? There is clear evidence, admittedly from a small number of countries, that origin (e.g. rural upbringing) and intentions on graduation (e.g. intention to work rurally) are also related to later working patterns, suggesting that studies must take personal characteristics and preferences into account when trying to assess the relative contribution of individual factors and medical school influences on graduate patterns.<sup>[8-10]</sup>

Should we also look at our graduates’ career outcomes, such as working in direct clinical care, working in underserved regions, and/or working in certain specialties? Using these broader criteria, the indicators of success may include retrospective data on where graduates worked or whether the nature of the populations they served was aligned to the mission of their medical school. These indicators of success may be assessed via cohort studies. These broader indicators of success are essential for schools, particularly schools with a social accountability mission, in respect of selecting applicants who are fit-for-purpose in terms of meeting the healthcare needs of less advantaged populations.<sup>[9]</sup>

Our final point is that the 2018 Ottawa Consensus Statement on Selection noted that the majority of selection research originates from a limited number of global regions. Research from countries including India is lacking in international journals.<sup>[10]</sup> This influential Statement concluded that medical education research generally and selection research specifically “cannot be isolated from the cultural and social structural context in which it takes place” and made a plea for research from “contexts whose voices are currently under-represented” (p. 8). The time is right for a program of medical education research

from India. With this in mind, our intention is that this article opens a short series of *Current Medical Issues* papers which focus broadly on selection practices, processes, and outcomes and will be of interest to a broad audience.

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### REFERENCES

1. Donaldson MS, Corrigan JM, Kohn LT. To Err is Human: Building a Safer Health System. National Academies Press; 01 April, 2000. Available from: <https://pubmed.ncbi.nlm.nih.gov/25077248/>. [Last accessed on 2021 Mar 15].
2. Chin L, Satell G. How Physicians Can Keep Up with the Knowledge Explosion in Medicine. *Harvard Business Review*; 19 December, 2016. Available from: <https://hbr.org/2016/12/how-physicians-can-keep-up-with-the-knowledge-explosion-in-medicine>. [Last accessed on 2021 Apr20].
3. Cooke M, Irby DM, O’Brien B. A Summary of Educating Physicians: A Call for Reform of Medical School and Residency. California: Jossey-Bass; 2010.
4. Cleland JA, Durning SJ, Driessen E. Medical education research: Aligning design and research goals. *Med J Aust* 2018;208:473-5.
5. Sarli CC, Dubinsky EK, Holmes KL. Beyond citation analysis: A model for assessment of research impact. *Med Lib Assoc* 2010;98:17-23.
6. Roberts C, Khanna P, Rigby L, Bartlett E, Llewellyn A, Gustavs J, *et al.* Utility of selection methods for specialist medical training: A BEME (best evidence medical education) systematic review: BEME Guide no. 45. *Med Teach* 2018;40:3-19.
7. Boelen C, Heck, J. World Health Organization. Division of Development of Human Resources for Health. Defining and Measuring the Social Accountability of Medical Schools 1995. Available from: <https://apps.who.int/iris/handle/10665/59441>. [Last accessed on 2021 May 10].
8. Patterson F, Knight A, Dowell J, Nicholson S, Cousans F, Cleland JA. How effective are selection methods in medical education? A systematic review. *Med Educ* 2016;50:36-60.
9. Cleland JA. The medical school admissions process and meeting the public’s health care needs: Never the twain shall meet? *Acad Med* 2018;9:972-4.
10. Patterson F, Roberts C, Hanson M, Hampe W, Ponnampuruma G, Eva KW, *et al.* Ottawa consensus statement: Selection and recruitment in the healthcare professions. *Med Teach* 2018;40:1091-101.