
APPLIED RESEARCH

Reflecting the Relative Values of Community, Faculty, and Students in the Admissions Tools of Medical School

Harold I. Reiter

Kevin W. Eva

McMaster University

Department of Clinical Epidemiology and Biostatistics

Hamilton, Ontario, Canada

Background: *In defining the characteristics of medical students that society and the medical profession find desirable, little effort has been spent assessing the relative value of the dozens of characteristics that have been identified. Furthermore, many institutions go to great lengths to ensure equal representation across stakeholder groups in an effort to maximize the heterogeneity of the pool of students accepted to study medicine; however, the extent to which different stakeholders value different characteristics has yet to be determined.*

Purpose: *This study was an attempt to assess the relative value of the characteristics of medical students that society and the medical profession find desirable.*

Methods: *Using documents created internationally to identify the core competencies of medical personnel, a series of 7 characteristics were generated for inclusion in a study that adopted the paired comparison technique. Of 347 surveyed, 292 respondents indicated the rank ordering they would assign to each characteristic by circling the more important characteristic in all possible pairings.*

Results: *Overwhelmingly, “ethical” was deemed to be the most important characteristic on which selection tools should be based. Surprisingly, the pattern of responses was highly consistent regardless of stakeholder group and degree of affiliation with the undergraduate medical program.*

Conclusions: *The generalizable features of this study not only include the empirical findings but also demonstrate useful survey protocol that can be adapted by any admission committee to guide the generation of an institution-specific admissions blueprint. A novel protocol that provides the necessary flexibility is discussed.*

Teaching and Learning in Medicine, 17(1), 4–8

Copyright © 2005 by Lawrence Erlbaum Associates, Inc.

In the concluding years of the second millennium, efforts were under way in both the United States and Canada not only to define the attributes desirable in our physicians but also to foster curricular and evaluative processes to enhance those attributes at the postgraduate and practice levels. In the United States, efforts by the American Board of Medical Specialties and by the Accreditation Council for Graduate Medical Education produced a document describing the six competencies expected of physicians.¹ A parallel movement in Canada, arising from the project “Educating Future

Physicians of Ontario,”² led to the creation of CanMEDS 2000 and its seven roles of the physician.³ From a global perspective, the Core Committee of the Institute for International Medical Education has grouped the essentials that physicians must have under seven competence domains.⁴ Not surprisingly, there is considerable overlap between the three approaches (Table 1). These competencies, roles, and competence domains provide a distillation of the far greater number of cognitive and personal qualities cited in the literature as desirable in choosing medical students. In their

Correspondence may be sent to Kevin W. Eva, Ph.D., Program for Educational Research and Development, Department of Clinical Epidemiology and Biostatistics, MDCL 3522, McMaster University, Hamilton, Ontario L8N 3Z5 Canada. E-mail: evakw@mcmaster.ca

Table 1. *Overlap in Core Competencies/Roles of Physicians, as Identified by Various International Agencies*

ACGME Competencies	CanMEDS 2000 Roles	IIME Competence Domains
Patient care	Manager	Clinical skills
Medical knowledge	Medical expert	Scientific foundation of medicine
Practice-based learning	Scholar	Management of information / Critical thinking and research
Interpersonal and communication skills	Communicator	Communication skills
Professionalism	Professional	Professional values, attitudes, behaviour, ethics
Systems-based practice	Health care advocate	Population health and health systems
	Collaborator	

Note: ACGMC = Accreditation Council for Graduate Medical Education; CanMEDS 2000 = The Royal College of Physicians on Surgeons of Canada's Canadian Medical Education Directions for Specialists 2000 Project; IIME = Institute for International Medical Education.

review of the use of personal qualities as a domain to be measured by admissions offices, Albanese et al.⁵ recommended taking the next step—implementation of Accreditation Council for Graduate Medical Education competencies as the domains for evaluating medical school applicants.

The emphasis on personal, as opposed to cognitive, qualities in that review is no accident. As clearly demonstrated in an earlier, separate literature review⁶ of admissions tools to health professional schools, traditional tools for the evaluation of cognitive qualities have largely succeeded, although those evaluating personal qualities, with rare exception, have failed to demonstrate reliability and validity. Thus, although we may be able to agree on the personal qualities we desire in medical students, we lack the tools by which to choose those individuals.

A significant step in the development of those tools was taken with the advent of the Multiple Mini-Interview (MMI).⁷ Adopting the same psychometric principles used by Harden and Gleeson in the development of an objective structured clinical examination a quarter century earlier,⁸ the MMI is a performance-based assessment tool in which candidates are required to participate in a series of short interview stations, each with a different examiner. The opportunity to aggregate a series of data for each candidate, collected from independent raters, has been demonstrated to yield reliable assessments^{7,9} that appear to predict performance on noncognitive exercises better than traditional interviews do¹⁰ without losses in terms of feasibility or acceptability. In three studies completed to date, the noncognitive domains that became the focus of the MMI (communication skills, ethical decision making, critical thinking, collaboration, and knowledge of the health care system) were selected entirely based on the intuition of the research team. On the basis of the results, it was decided that the MMI would be incorporated into the formal admissions process for the undergraduate MD program at McMaster University in spring 2004, thereby making it necessary to more systematically determine the most appropriate balance between the competencies outlined in Table 1.

This article reports the outcome of a study performed for this purpose. Because each of the domains outlined in Table 1 are undoubtedly important, it was decided that direct estimates of the importance of each domain would likely yield very little variability, thereby preventing an adequate delineation of their relative ranking. As a result, a paired comparison approach was adopted.

In addition to being interested in the relative value placed on each of these domains, the question of variability in the opinions of different stakeholders—medical students, faculty members, and community members—was deemed important. Incorporation of the opinions of these various groups has long been considered an optimal strategy to ensure the heterogeneity of the student population.¹¹ We believe this study provides evidence of the validity of this belief as well as guidance to admissions committees worldwide regarding (a) the relative merit of each of the desired qualities and (b) an outline of a procedure that can be used to perform analogous assessments for the local context within which the reader is working.

Methods

The Undergraduate MD Program at McMaster University routinely admits 138 medical school applicants annually. Approximately 400 candidates of a pool of more than 4,000 are invited to interview based on an equal weighting of grade point average and scores received on an autobiographical submission. In the spring of 2004, the interview procedure consisted of a 12-station MMI. In advance of its first full-scale implementation, opinions were sought regarding the relative importance of different cognitive and personal quality domains in assessing applicants.

Adapting the roles, competencies, and competence domains outlined in Table 1 in conjunction with the literature on admissions and local discussion, we created a list of seven personal characteristics that could be conceived to be relevant in an undergraduate admissions context. These characteristics, along with the definitions provided to participants, are illustrated in

Table 2. *Characteristics Included in the Paired Comparison Exercise Along with Their Assigned Definitions*

Characteristic	Definition
Communicative	Eloquent, strong verbal reasoning abilities, good interpersonal skills
Collaborative	Able to work effectively in a group, co-operative
Critical	Able to reason logically, considers multiple view points
Ethical	Patient oriented, honest, shows integrity and respect, able to resolve conflicts
Gives of oneself	Involved in community, empathetic, compassionate, motivated
Intelligent	Smart, can access and apply relevant information to problems
Knowledgeable	Knowledgeable of the health care system specifically, appreciates the environment in which physicians practice and related issues, appreciates the learning environment specific to McMaster's MD Program

Table 2. Participants were told that these definitions were not comprehensive but that they should serve as a guide.

Following the paired comparison approach,¹² a questionnaire was created by listing all pairs of these 7 characteristics (e.g., collaborative versus ethical) and randomizing the order in which the items were presented. Participants were given the following instruction.

For each pair of characteristics outlined below, please circle the characteristic that you consider more important in determining who should be admitted to the Undergraduate MD Program at McMaster University. You must choose one characteristic from each pair, or your responses will not be analyzed. Definitions for each characteristic are provided on the preceding page.

Participants responded to 21 pairings; the task required approximately 10 min to complete. From these data, the probability of each item being selected was determined and converted to z scores to determine the relative importance of each of the seven characteristics on an interval level scale. Negative z scores do not indicate that the characteristic is viewed as unimportant—undoubtedly each of the items included are valued to some extent. Rather, negative z scores simply indicate that the characteristic is less important relative to the other options provided. For example, imagine only two items, A and B, were included in the study, both of which are considered important characteristics. If item A was selected as more important than item B 60% of the time, the probability of selecting item A (0.6) would convert to a z score of 0.26 for item A and the probability of selecting item B (0.4) would convert to a z score of -0.26 for item B (see Streiner & Norman¹³ for an accessible description of the analyses).

To address the question of variability in values as a function of respondent background, three groups of stakeholders were identified: community members, faculty members, and undergraduate medical students. For the purposes of this study, medical residents were

considered to be faculty members. In addition, two separate layers of the stakeholder triumvirates were considered: one layer intimately involved in the administration of the undergraduate medical program, the other less intimately involved but nevertheless demonstrating a significant interest in the admissions process. The first layer consisted of the admissions committee and medical education committee; the medical education committee is responsible for providing oversight for the entire undergraduate medical program. Intentionally, these two committees had representation from community, faculty, and the student body. Similar representation was present in the second layer, which consisted of volunteers who agreed to read and rate applicants' autobiographical submissions. Anonymity was maintained by requesting respondents to self-identify their background on completion of the questionnaire. Analyses were performed separately for each of the stakeholder groups and each of the two layers of administrative involvement independently as well as on the data set as a whole.

Results

Response rate for the paired comparison survey was better for the second layer of representatives (i.e., those at a less intimate administrative level) with 275 respondents of 308 individuals (89.3%) compared with the first layer of representatives (i.e., those in administrative roles) with 17 respondents of 39 individuals (43.6%). Eight of the surveys were returned incomplete and were excluded from the analyses. Complete surveys were received from 59 community members, 96 faculty members, and 103 medical students; 26 respondents did not indicate their affiliation.

The resultant z score comparisons were remarkably uniform regardless of whether the group under consideration was from community, faculty, or the student body. Similarly, homogeneity was observed on comparing those with more or less intimate administrative level of involvement. Table 3 illustrates the overall mean z scores as well as the z scores assigned by each

Table 3. Mean z-Scores Assigned to Each Characteristic for All Respondents and as a Function of Background

Characteristic	Overall Mean z-Score	Group		
		Faculty (n = 96)	Students (n = 103)	Community (n = 59)
Ethical	0.62	0.65	0.65	0.55
Communicative	0.11	0.06	0.17	0.15
Intelligent	0.08	0.11	0.00	0.15
Critical thinking	-0.11	-0.04	-0.13	-0.16
Collaborative	-0.14	-0.15	-0.06	-0.21
Giving of oneself to others	-0.19	-0.37	-0.07	-0.19
Knowledge of the health care system	-0.37	-0.26	-0.56	-0.28

Table 4. Mean z-Scores Assigned to Each Characteristic for All Respondents and as a Function of Administrative Level

Characteristic	Overall Mean z-Score	Group	
		ABS Raters (n = 275)	Administrative Committee (n = 17)
Ethical	0.62	0.62	0.75
Communicative	0.11	0.12	0.05
Intelligent	0.08	0.07	0.13
Critical thinking	-0.11	-0.13	0.22
Collaborative	-0.14	-0.15	-0.10
Giving of oneself to others	-0.19	-0.18	-0.36
Knowledge of the health care system	-0.37	-0.30	-0.68

Note: ABS = autobiographical submission; administrative committee = admissions committee plus medical education committee.

group of independent stakeholders. The correlation between pairs of groups was very high in all cases (students versus faculty, $r = .85$; students relative to community, $r = .91$; faculty relative to community, $r = .95$). Similarly, there was a high correlation between the z scores that resulted from responses of those who were administratively involved in the admissions process and those who served as raters of the autobiographical submissions ($r = .90$). These results are illustrated in Table 4.

Discussion

When it comes to decision making in medical school admissions, McMaster University's Undergraduate MD Program remains a vendor in a sellers' market. For the class of 2007, 4,150 applicants vied for the 138 positions available (3.3% chance overall). Successful entry of superb candidates to all available positions, therefore, should be a reasonable expectation. This assumes, however, the use of a methodology that reliably evaluates applicants in domains identified as compatible with McMaster precepts. The cost of a misstep in admissions is dramatic. Aside from the potential damage unleashed on society, the financial cost of undergraduate medical education approximates \$90,000 (US) annually per student.^{14,15} Given the reasonable expectation of uniformly successful decision making and the high cost of education, any further significant expenditure of time, money, and effort to

remediate errors of judgment by the admissions office is unacceptable. Application of an instrument that reliably measures personal qualities is a significant step toward minimizing additional expenditure. Nevertheless, success in this regard remains dependent on applying the reliable measure to domains of greatest import to the institution involved. An accurate reflection of the domains of greatest interest is required. The paired comparison analysis allows this critical step to be accomplished simply and with few resources.

In this study, the results of a paired compared analysis were somewhat surprising. Broadly speaking, the characteristics spread into four clusters. The characteristic identified by all groups as by far the most important was ethical. The next most important set included communicative and intelligent. Slightly less important relative to other domains was a set of three, including collaborative, giving of oneself to others, and critical thinking. The final, and least important, domain was knowledge of the health care system. This pattern of results was highly stable and largely independent of the identity of the rater group.

Over the last 50 years, the expectation of significant differences in perspective between community, faculty, and students has promulgated a seismic shift in representation on admissions committees. Between 1957 and 1971, the presence of students on admissions committees of schools affiliated with the Association of American Medical Colleges swung sharply upward, from near nonexistence to 56% (41/73) of committees responding

to the survey indicating a student presence.¹⁶ This presence continued to rise to 74% (64/86) by the time a similar survey was conducted in 1982.¹⁷ The rise of community influence was more delayed, but nevertheless forthcoming. Even by the time of the 1971 survey, only 3% (2/73) of committees reported a community stakeholder presence, although this appears to have risen by the 1982 survey (27% of responding committee memberships arose from nonmedical–nonprofessional backgrounds in that survey).

The existence of differences in perspective to warrant these shifts is less clear. A comparison of rank order of the relative importance of particular defined domains was conducted between community members versus members of the Admissions Committee of the University of Massachusetts Medical School (UMMS).¹⁸ The study reported that the “results of the rank-ordering of criteria indicate commonalities in outlook and approach between the [community member] conferees and the UMMS Admissions Committee despite the fact that the ranking of the characteristics was done independently” (p. 640). The methodology used by UMMS was, in contrast to the paired comparison analysis described here, far more resource intensive and included a much smaller sample size of stakeholders ($n = 20$).

Consistent with this result was our finding of a high degree of consistency of opinion regarding the relative importance of all characteristics, regardless of the background of the assessors. These results run counter to the expectations that significant differences exist between stakeholder groups that have led many medical school admissions offices, including that of McMaster University, to take great pains to ensure that all stakeholder groups’ voices are heard. Given the results of this study, this tendency appears to be needed more for political than pragmatic reasons.

These results can now be used to guide the development of admissions protocols, particularly the MMI, ensuring that the stations are designed to preferentially emphasize ethical decision-making and communication skills. Although the pattern of results was highly stable in our study, we do not guarantee that the relative values assigned in different contexts (e.g., other institutions, other professions) will be identical. Rather, we offer these findings to illustrate one technique that could be used to assess local needs. It is, perhaps, the application of this technique to the admissions context that is the most generalizable lesson. The ease with which the paired comparison technique can be carried out, the inherent value in terms of consensus building, and the ability to ground discussion about admissions issues leads us to believe that every admissions committee should carry out a similar exercise to guide the evolution of their admissions process, thereby avoiding the potential perils of relying on intuition or on the opinions of what may be a vocal minority.

References

1. Outcome Project & General Competencies. Chicago, IL: Accreditation Council for Graduate Medical Education (ACGME), 1999.
2. Neufeld VR, Maudsley RF, Pickering RJ, et al. Educating future physicians of Ontario. *Academic Medicine* 1998;73: 1133–48.
3. CanMEDS 2000. *Project Skills for the New Millennium: Report of the Societal Needs Working Group*. The Royal College of Physicians and Surgeons of Canada’s Canadian Medical Education Directions for Specialists 2000 Project. Ottawa, Ontario, Canada: The Royal College of Physicians and Surgeons of Canada’s Canadian Medical Education Directions for Specialists, 1996.
4. Global minimum essential requirements in medical education. Report of the Core Committee, Institute for International Medical Education. *Medical Teacher* 2002;24:130–5.
5. Albanese MA, Snow MH, Skochelak SE, Huggett KN, Farrell PM. Assessing personal qualities in medical school admissions. *Academic Medicine* 2003;78:313–21.
6. Salvatori P. Reliability and validity of admissions tools used to select students for the health professions. *Advances in Health Sciences Education* 2001;6:159–75.
7. Eva KW, Rosenfeld J, Reiter HI, Norman GR. An admissions OSCE: The Multiple Mini-Interview. *Medical Education*, 2004; 38:314–26.
8. Harden RM, Gleeson FA. Assessment of clinical competence using an objective structured clinical examination. *Medical Education* 1979;13:41–54.
9. Eva KW, Reiter HI, Rosenfeld J, Norman GR. The relationship between interviewer characteristics and ratings assigned during a Multiple Mini-Interview. *Academic Medicine* 2004;79: 602–9.
10. Eva KW, Reiter HI, Rosenfeld J, Norman GR. The ability of the Multiple Mini-Interview to predict pre-clerkship performance in medical school. *Academic Medicine*, 2004;79:S40–S427.
11. Ferrier BM, McAuley RG, Roberts RS. Selection of medical students at McMaster University. *Journal of the Royal College of Physicians of London* 1978;12:365–78.
12. David HA. *The Method of Paired Comparisons* (2nd ed.). London: Griffin, 1988.
13. Streiner DL, Norman GR. *Health Measurement Scales: A Practical Guide to Their Development and Use* (3rd ed.). New York: Oxford University Press, 2003.
14. Rein MF, Randolph WJ, Short JG, Coolidge KG, Coates ML, Carey RM. Defining the cost of educating undergraduate medical students at the University of Virginia. *Academic Medicine* 1997;72:218–27.
15. Franzini L, Low MD, Proll MA. Using a cost-construction model to assess the cost of educating undergraduate medical students at the University of Texas-Houston Medical School. *Academic Medicine* 1997;72:228–237.
16. Oetgen WJ, Pepper MP. Medical school admissions committee members: A descriptive study. *Journal of Medical Education* 1972;47:966–8.
17. Arnold DM, Coe RM, Pepper M. Structure and function of medical school admissions committees. *Journal of Medical Education* 1984;59:131–2.
18. Eckhart NL, Cronin EJ. Diversity in membership of medical school admissions committees. *Journal of Medical Education* 1984;59:634–42.

Received 17 March 2004

Final revision received 15 June 2004