Speed Dating for Medical School Admissions

The Multiple Mini Interview

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Summary: Although medical schools take every precaution in selecting benevolent individuals to be trained as physicians, an international study has revealed that 5% of doctors worldwide have recurrent issues that warrant disciplinary action by medical boards. These issues include violations of professionalism, unethical behavior, negligence, and in some cases criminal intent, reflective of deficiencies in non-cognitive skills. Medical schools largely rely on the interview process for selecting candidates that possess the critical non-cognitive skills of interpersonal ability, maintenance of integrity, ethical behavior, and professionalism. Most utilize the traditional personal interview, which despite its popularity, has little evidence supporting its efficacy and a growing body of evidence supporting the contrary. Recognizing this dilemma, some schools have adopted the Multiple Mini Interview format, which addresses several issues inherent in the traditional interview. Akin to speed dating, candidates are interviewed by multiple isolated interviewers in order to establish more reliable assessments of their non-cognitive skills.

Video Link: https://youtu.be/gZFTGX8FEGg

Professionalism and its importance to practicing physicians

Although medical schools take every precaution in selecting benevolent individuals to be trained as physicians, reports have revealed the existence of a dangerous minority of health care practitioners that may be negligent, lack compassion, or in some cases even demonstrate criminal intent. For this reason, medical boards discipline physicians that are found to violate laws or regulations (1). Depending on the severity of the violation, consequences can include probation, public reprimand, practice suspension, or even license revocation (1). In 2001, 4,000 disciplinary actions were carried out by various state medical boards among 800,000 licensed physicians practicing in the United States. In the specific state of California, approximately 350 physicians are disciplined yearly by the Medical Board of California. An international study identified 5% of doctors have recurrent problems identified by medical boards, and over a 10-month period, 5% of applicants for clinical privileges in an ambulatory care program had falsified their credentials (1).

A 2004 study published in Academic medicine evaluated a sample of 68 doctors that graduated between 1943 and 1989 from the University of California, San Francisco School of Medicine that were disciplined by the Medical Board of California between 1990 and 2000. Of the disciplinary actions imposed upon the graduates, 95% were for violations of professionalism; 1% were cases of unlicensed activity, 4% fraud, 4% criminal conviction, 10% sexual misconduct, 12% inappropriate prescribing, 12% unprofessional conduct, 13% drug or alcohol abuse, and 38% were for negligence, indicating a small proportion of doctors impose a serious risk to patient safety (2). Professionalism, as it is defined by the American Board of Internal Medicine, requires “the physician to serve the inherent interests of the patient above his or her self-interest.
Professionalism aspires to altruism, accountability, excellence, duty, service, honor, integrity, and respect for others” (2). Doctors who faced disciplinary action were over twice as likely as control groups to have received concern/problem/extreme remarks that were noted in their medical school files. Concern excerpts were defined as the receipt of negative comments in one course of a serious nature, such as persistent difficulty fulfilling ward responsibilities. Problem remarks indicated seriously negative comments in at least two courses. Extreme excerpts were the result of severely negative comments and/or actions, such as dismissal from one portion of a dual degree program due to persistent failures (2). Medical school performance, MCAT score, and undergraduate GPA were relatively poor predictors of future disciplinary action (2).

If medical school performance, undergraduate GPA, and MCAT scores are poor predictors of professionalism, how do medical schools prevent unprofessional candidates from becoming doctors?

Although research has demonstrated that the undergraduate GPA of a student is the best predictor of academic performance and cognitive skills, interpersonal skills and professionalism are critical traits of a competent and compassionate doctor. The very low acceptance rates of medical schools present the admissions process as arguably the most critical evaluation a medical school carries out. Most admissions committees consider undergraduate GPA as the supreme predictor of academic performance, but they also regard non-cognitive skills such as interpersonal ability, maintenance of integrity, and professionalism as highly important. Assessment for these skills centers on the interview process (3).

**The traditional interview**
The majority of medical schools implement the traditional, personal interview, in which a candidate is evaluated in a single session by a team of interviewers or a single individual. The popularity of this type of examination strengthens the perception of its value in assessing non-cognitive skills, yet empirical evidence has revealed this evaluation format to be extremely unreliable, with interrater reliability estimates varying from .14 to an alarming .95. Reliability is influenced by the interviewers having access to the academic history of the candidates and their non-verbal communication among one another during the interview session. Because of this, a candidate’s interview score may largely be attributed to chance: being interviewed by an “easy”, compatible interviewer who affects the rest of the interview team positively may result in a higher score as opposed to a “hard” interviewer who does not see eye-to-eye with the candidate. Biases such as the interviewers’ backgrounds and their expectations have been shown to impede the interview as well; one study demonstrated that interviewer variability is responsible for 56% of the disparity in candidate ratings, indicating the personal interview is influenced to a greater extent by the interviewers themselves than the candidate under evaluation (2).

Not only is interviewer bias an impediment to the generalizability of interview scores, but context specificity is a significant factor. Because many cognitive skills are dependent on context, stable characteristics/traits are heavily influenced by a particular setting. Demonstrating difficulty in communicating one topic does not necessarily mean a person lacks communication skills - they may simply lack an ability to communicate that particular topic. Generalizability among different interviews was low, indicating poor test reliability. Furthermore, interview questions in a single interview are not considered independently as they are all asked in the
context of a single session. Initial responses color the interview team’s perceptions of all following answers, a phenomenon known as the halo effect. Such enormous biases should be considered unethical and unacceptable within an assessment tool designed to evaluate the candidate’s characteristics rather than those of the interviewer(s) (2).

In addition to the poor reliability and large degree of bias, personal interview performance does not correlate well with success on the Objective Structured Clinical Examinations (OSCE), neither during medical school nor after licensure, even though the OSCEs are partly intended to assess the non-cognitive skills personal interviews are supposed to evaluate (4).

**Developing a superior alternative: the Multiple Mini-Interview**

Realizing the limitations of single-sample evaluations of students’ competencies, McMaster University launched the development of a superior alternative to the personal interview: the Multiple Mini Interview (MMI). Development of this interview format was guided by the same principles used in the Objective Structured Clinical Examination that evaluates medical students’ clinical capabilities, that a student’s competencies must be broadly sampled in a variety of settings to ascertain an understanding of that individual’s particular strengths and weaknesses. Rather than relying on a single evaluation session with a candidate to assess cognitive and non-cognitive skills, the MMI utilizes multiple, short interviews at various stations maintained by one interviewer and one examiner each. Each interview is given in a separate room to ensure each interviewer provides a rating independently of the others, and the multiple interview concept helps eliminate the chance-based aspect that plagues the personal interview as well as the halo effect and situational biases (3).

**Parameters of the MMI**

Each of the many MMI stations is assigned a primary category of assessment, such as critical thinking, ethical behavior, communication skills, or general health care system comprehension. A communication skills station might present a candidate with the task of interacting with a friend at an airport who has admitted a fear of flying. The interviewer would serve as the friend while the examiner considers the empathy and communication skills demonstrated by the candidate throughout the interaction. Two minutes are provided for reading the prompt and preparation, and eight minutes are provided for addressing the prompt before the interviewer. The short preparation time combined with a large prompt pool means participants will not be able to use rehearsed responses. Stations are developed in a manner such that specialized knowledge such as understanding the clinical presentations of myocardial infarction is not necessary, and are instead designed to assess a candidate’s ability to demonstrate logical reasoning and effective communication of their ideas and/or solutions. Because of the flexibility inherent in the prompts, interviewers do not search for specific components or “correct” elements to be present in the candidate’s response, and instead evaluate critical thinking and communication (3).

**Reliability of ratings from different interviewers**

Interviewers receive a single page of information that describes the prompt, a description of the issues presented in the station, and potential points of discussion such as arguments for or against a particular action that can be taken. No background information on the applicant is provided to bias the interviewer and candidates were assessed using a standardized evaluation form that rated
communication skills, strengths of the arguments presented, suitability for a career in health care, and overall interview performance on a 7-point scale. 12 interviewers mounted the stations and the reliability results were excellent. The reliability of the mean score of the 12 ratings provided for each candidate, otherwise known as the generalizability, was an outstanding 0.81 (3).

Critical factors necessary for implementation of the MMI

117 McMaster University School of Medicine candidates that had already completed the admissions process participated in the study. Reliability, validity, feasibility, and acceptability among the interviewers and candidates are all important aspects to developing a superior interview, and the MMI has proven to be more reliable, reducing the effects of interviewer bias, the halo effect, and context specificity. Establishing the validity will require tracking students who scored well on the MMI and observing their future performance as medical students and physicians (3). The feasibility of the MMI must be considered in light that although it requires actors, specialized training for the interviewers, and more interviewers per session, several candidates can be evaluated during the session and each interview is short compared to the 1-hour duration personal interviews typically take. Interviewers reported that the MMI was more tiring than the typical interview, but was also more enjoyable, a sentiment shared by the candidates as a testament to its acceptability (3).

How effective is the MMI at assessing non-cognitive skills compared to other admissions metrics?

45 students who participated in the MMI development at McMaster University were admitted into the MD program. Each year, they participated in OSCEs with the rest of their classmates, where ten stations (similarly to the MMI) evaluated students’ clinical skills, critical thinking, and communication skills. In addition, they participated in tutorials where students discussed group dynamics issues (including professionalism) in a group. Performance in these two examinations serves as a determinant of non-cognitive skills (4).

Various metrics are utilized by admissions committees to select the most suitable medical students for their programs. A standard application consists of a student’s transcript with corresponding GPA and an autobiographical submission (ABS) in which the student answers 15 questions that evaluate his or her life experiences and motivations for seeking a career as a physician. In addition to the application, candidates were evaluated in an interview weekend in which they participated in multiple assessments. In the first, three examiners interview a candidate for 30 minutes, after which each interviewer has 30 minutes to independently rate the applicant. In the second, candidates are assembled into groups of 6 and provided problems that must be resolved as a team while under observation by another group of three examiners. This activity is referred to as the simulated tutorial (4). Independently of the admissions process, these candidates also participated in the MMI trial.

After the admitted students completed their OSCEs, standard coefficients were calculated to assess each of these metrics’ abilities to predict success in these examinations. The standardized coefficients for the simulated tutorial, autobiographical submission, GPA, personal interview, and MMI were -0.23, -0.12, 0.05, 0.06, and 0.44 respectively. The MMI was, by a wide margin, the supreme predictor of positive OSCE performance among all the admissions tools. Compared to the personal interview, the MMI was a better predictor of success on the Personal Progress
Inventory, a multiple choice examination that evaluates cognitive skills specifically in medical knowledge, with standard coefficients of 0.26 and 0.01 respectively (4).

**A case study of the MMI’s validity**

Of the forty-five students who were admitted into the medical school and participated in the MMI, one earned an unsatisfactory score on tutorial performance due to unprofessional behavior. This extreme judgement is taken very seriously, as it indicates a severe deficiency in the key non-cognitive skill of professionalism. Although MMI score was not used as an admissions criterion in this student’s cohort, this individual scored in the lowest 15th percentile, indicating he or she would most likely have been denied admission into the medical school on this basis. The MMI would have been the only viable detection method of this deficiency in non-cognitive skills, as the student had a high simulated tutorial rating (76th percentile), a high GPA (76th percentile), and a decent personal interview score (48th percentile) (4). Based on the MMI’s excellent evaluation of non-cognitive skills related to this case and the OSCE scores of the other students of the cohort, its high degree of validity is clear.

**Feasibility of the MMI: preparation**

As effective as the MMI is over the traditional interview, it must be feasible to implement given the time and resource limitations of medical schools. In terms of preparation, the MMI is more resource-intensive, as 12 stations must be established with unique scenarios, necessitating the creation of a prompt that tests the desired non-cognitive skill, evaluation instructions for the interviewer, instructions for the examiner, background information on the prompt’s issue for the interviewer, and a rating scale. For a weekend MMI, about 72 person hours are required to design 36 stations, resulting in a 9% cost increase for the preparation process over preparing traditional interviews for the same quantity of candidates. Once a station is established, however, it can be added to a database to be used again (5).

**Feasibility of the MMI: the interview process**

A session of an MMI consists of a candidate’s rotation through 12 stations totaling to approximately 2 hours per session, but during this session 12 students are evaluated. In comparison, a session of a traditional interview requires an hour per candidate. The MMI is substantially more efficient in the temporal regard, able to evaluate 400 candidates using 67% of the person hours per applicant and 16% of the total amount of time compared to the traditional interview. In order to evaluate 400 applicants, the traditional interview process required four 9-hour days, whereas the MMI requires two 7-hour days (5).

**Feasibility of the MMI: time and cost-effectiveness**

The MMI allows more students to be observed by more evaluators, increasing the validity of the examination. This is a great advantage given that reliability increases through expanding the amount of interviews rather than the quantity of interviewers per session. Although the MMI necessitates greater resources and time dedicated to preparation, considerably less time is required of interviewers to assess the same amount of candidates as the personal interview, a factor that incurs the greatest cost in the interview process. In addition, the MMI has been proven to be far more effective than the traditional interview in evaluating non-cognitive skills, so it is ultimately more cost-effective (5).
Community Action: Advocating Implementation of the MMI

The majority of medical schools do not use the Multiple Mini Interview in their admissions processes. Among the Rutgers medical schools, Robert Wood Johnson Medical School uses the MMI but New Jersey Medical School does not. Many Rutgers students matriculate into NJMS, and I may one day be among them. A large amount of its graduates practice medicine in our state, so encouraging the implementation of the MMI would potentially improve the quality of health care in our communities.

The letter below was sent to the Rutgers New Jersey Medical School Admissions Committee.

Dear Rutgers New Jersey Medical School Admissions Committee,

An interview format rapidly gaining acceptance, the Multiple Mini Interview (MMI) has proven to be an effective alternative to the personal interview in evaluating the critical non-cognitive skills of interpersonal ability, maintenance of integrity, ethical behavior, and professionalism. The MMI was developed at the Michael G. DeGroote School of Medicine at McMaster University. They tracked 45 students admitted into the MD program who participated in both the personal interview and the MMI. Medical students at this school take the Objective Structured Clinical Examinations (OSCEs) each year, which partially test for non-cognitive skills. OSCE scores were correlated with MMI and personal interview scores at 0.44 and 0.05, respectively, indicating the MMI was a superior metric for these skills.

Not only is the MMI effective at evaluating non-cognitive skills, it may also reduce interview costs. A typical session of an MMI consists of a candidate’s rotation through 12 stations, totaling to approximately 2 hours per session. Although the traditional interview typically requires only an hour per candidate, the MMI evaluates 12 candidates in a single session. The MMI is substantially more efficient in the temporal regard, able to evaluate 400 candidates using 67% of the person hours per applicant and 16% of the total amount of time compared to the traditional interview. Person hours are among the greatest costs of the interview process, so implementation of the MMI can significantly minimize costs while maintaining interview efficacy.

A video has been prepared which summarizes how the MMI addresses some of the issues inherent in the traditional interview: link https://youtu.be/gZFTGX8FEGg

Please take time to consider adopting the multiple mini interview format at your medical school.

Sincerely,

Tim Ganapolsky

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Several other medical school admissions committees that have not yet instituted the MMI (below) were also sent the letter above.
University of Alabama School of Medicine
University of Arkansas for Medical Sciences College of Medicine
California Northstate University College of Medicine
Charles R. Drew University of Medicine and Science
Loma Linda University School of Medicine
University of California, Irvine School of Medicine
University of California Riverside School of Medicine
University of California, San Diego School of Medicine
Howard University College of Medicine
Rosalind Franklin University - Chicago Medical School
University of Louisville School of Medicine

References


Letter to the Editor of the Breeze
Many students that graduate Bridgewater-Raritan High School pursue careers in the health professions, myself among them. We aspire to one day satisfy the public and moral expectation that physicians be competent and compassionate, willing to practice medicine with integrity and a strong ethical code. Yet although medical schools take every precaution in selecting benevolent individuals to be trained as physicians, there exists a dangerous minority of health care practitioners that may be negligent, lack compassion, or in some cases even demonstrate criminal intent. These doctors are disciplined by state medical boards with consequences ranging from probation to license revocation, most often due to violations of professionalism. The Archive of Internal Medicine reported in an international study that 5% of doctors have recurrent issues in their medical practices that warrants such action.
With their very low rates of applicant acceptances, the admissions process is arguably the most critical evaluation medical schools can provide. Thus, this process is integral to ensuring benevolent individuals are accepted that hold the non-cognitive skills of interpersonal ability, maintenance of integrity, ethical behavior, and professionalism. Admissions committees largely rely on the interview for this purpose. Most medical schools use a traditional format much like that used in job interviews; a candidate sits in a room with either a single or a panel of interviewers and is typically evaluated for twenty to fifty minutes. Candidates are asked to answer questions or to elaborate on experiences described in their applications, after which the interviewers rate the students based on their responses. While this interview format is quite popular, its validity in assessing non-cognitive skills is questionable.

According to the journal Academic Medicine, ratings of candidates’ performances in personal interviews often depend more on the interviewers than the candidates themselves, with interviewer variability accounting for 56% of the variance in candidate ratings. A candidate’s score may largely be attributed to chance: being interviewed by an “easy”, compatible interviewer who influences the rest of the team positively will result in a higher score as opposed to a “hard” interviewer who does not see eye-to-eye with the candidate. Because these teams often receive a candidate’s background information beforehand, bias can be difficult to avoid. Furthermore, this interview format suffers from the halo effect, where a bad start to an interview can negatively color the interviewers’ perceptions throughout its entirety as responses cannot truly be considered independently in a single session. Such enormous biases and inter-rater variance should be considered unethical and unacceptable in an assessment tool designed to evaluate a candidate’s characteristics and not the interviewers’.

Recognizing this dilemma, McMaster University launched an alternative interview format: the Multiple Mini Interview. Rather than relying on a single evaluation session to assess a candidate’s non-cognitive skills, multiple stations are established in separate rooms operated by one interviewer and one examiner each. Every station presents a unique scenario which a student must address in less than ten minutes. After addressing a station’s scenario, the candidate rotates to the next one until all stations have been visited. This interview format dilutes the effects of inter-rater variance, reduces the halo effect and context specificity, and largely eliminates bias as interviewers do not receive background information on the candidates. Compared to the personal interview, the MMI correlates far better with scores on medical school Objective Structured Clinical Examinations, which largely evaluate non-cognitive skills.

For those planning to attend medical school, preparation for the MMI can include familiarization with medical ethics and contemporary issues in medicine, developing communication skills, and obtaining experience helping others. Considering the great efficacy with which the MMI is able to test for critical non-cognitive skills such as professionalism, perhaps the expansion of its implementation can prevent the aforementioned 5% of problem medical school graduates from becoming practicing physicians.