Admission into Canadian family medicine residency training programs is a competitive process for international medical graduates (IMGs). From the perspective of Canadian programs, IMGs are physicians whose medical degree was conferred outside of Canada or the United States. Residency programs are challenged to assess the competence of heterogeneous groups of IMGs and to provide further orientation and education to applicants who are most likely to make the best residents and eventually the best physicians.

IMGs who live in the Canadian province of Alberta may obtain a limited number of government-funded positions for residency education by applying to Alberta’s International Medical Graduate Program (AIMGP). The program assesses the professional competence of IMGs and facilitates training at the University of Alberta, located in the northern city of Edmonton, or at the University of Calgary, located 296 km (185 miles) to the south. The expectation is that these physicians will remain in practice in Alberta after graduation.

Since its inception, the AIMGP program has conducted interviews as part of its pre-residency assessment system. In light of strong support for the new multiple mini interview (MMI) process used in medical school admissions, the AIMGP Program decided to develop and pilot the MMI to measure professionalism potential in IMG applicants to family medicine residencies with the intention of replacing the traditional behavioral descriptive panel interview with the MMI, if the evidence supported this change.

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**Background and Objectives:** This study describes and assesses the acceptability of the multiple mini interview (MMI) to both international medical graduate (IMG) applicants to family medicine residency training in Alberta, Canada, and also interviewers for Alberta’s International Medical Graduate Program (AIMGP), an Alberta Health and Wellness government initiative designed to help integrate IMGs into Canadian residency training. IMGs are physicians who completed undergraduate medical education outside of Canada and the United States. IMGs who live in the Canadian province of Alberta may obtain a limited number of government-funded positions for residency training by applying to AIMGP. Methods: A literature review and faculty and medical community consultation informed the development of a 12-station MMI designed to identify non-cognitive characteristics associated with professionalism potential. Clinical scenarios were developed by family physicians and medical educators. Applicant and interviewer posttest acceptability was assessed using surveys. Quantitative data were analyzed using descriptive statistics, and qualitative data were analyzed using content analysis and thematic description. Results: Our research demonstrates evidence for applicant and interviewer acceptability of the MMI. Interviewers reported high levels of satisfaction with the time-restricted process that addressed multiple situations pertinent to the Canadian family medicine context. Applicants and interviewers were each satisfied that 8 minutes was enough time at each station. Applicants reported that they felt the process was free from gender and cultural bias. Interviewers agreed that this MMI was a fair assessment of potential for family medicine. Conclusions: Standardized residency selection interviews can be adapted to measure professionalism potential characteristics important to family medicine in ways that are acceptable to IMG applicants and interviewers.

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Interviews are a valued part of admissions procedures in medical schools and in residency program selection. Interview format and content varies considerably, as does evidence for reliability and validity. There is a paucity of empirical evidence to support the use of traditional and non-standardized panel interviews for residency selection in family medicine; nevertheless, interviews appear valued as sources of non-cognitive information for evaluating IMG applicants.

**MMI**

The MMI is a multi-station interview with one interviewer rating candidates’ performance at each station. The MMI was developed at the Michael G. DeGroot School of Medicine at McMaster University in Hamilton, Ontario, Canada, and has been validated there, at the University of Calgary, in Australia, and in the UK. This interview instrument has demonstrated evidence for generalizability and validity in relation to future clinical and licensing examination performance as compared to traditional interview methods. Further, the MMI has established acceptability with members of applicant and interviewer stakeholder groups at the admissions level.

The flexibility of the MMI allows programs to select applicants whose behaviors best align with professionalism competency expectations. In this assessment, we developed an assessment in accordance with the College of Family Physicians of Canada’s four principles. The four family medicine principles are: the family physician is a skilled clinician, family medicine is a community-based discipline, the family physician is a resource for a defined practice population, and the patient-physician relationship is central to the role. These principles provide a framework with which competencies, such as those outlined by the Accreditation Council for Graduate Medical Education (ACGME) (ie, professionalism, interpersonal and communication skills, and systems-based practice), can be addressed.

“Professionalism potential” is derived from medical professionalism theory. The attributes associated with medical professionalism and professional behavior are of universal concern. Medical professionalism is conceptualized as developmental. Professional behavior is context specific or situation dependent. This means that evidence of aspects of professional behavior in one challenging situation does not predict different aspects of professional behavior in another. It follows that professionalism potential for family medicine may be examined in multiple situations critical to best family practice using this new interview methodology.

**Objectives**

The acceptability of the MMI in IMG groups and the acceptability of the MMI for professionalism potential measurement in IMG individuals for family medicine residency selection have not been previously investigated. The objective of this research was to investigate the acceptability to family medicine interviewers and to IMG applicants themselves of an MMI designed to measure professionalism potential of IMG applicants.

**Methods**

The process of preparing for the MMI and constructing stations began in March 2006 with the formation of the AIMG MMI Committee. The committee included a family physician chair who oversaw the process and made final decisions relating to what characteristics would be examined in which scenarios. Ethics approval for the study was provided by the University of Calgary Conjoint Health Research Ethics Board.

**MMI Development**

Station construction was guided by a table of specifications based on previously examined characteristics, characteristics important to family medicine, and those associated with medical professionalism. The characteristics examined in previous interviews included relationship-building skills, team skills, recognition of professional limitations, integrity, decision-making skills, problem-solving skills, and communication in caring relationships. The medical education literature pertaining to professionalism and desirable personal traits in medical practitioners was reviewed. A comprehensive list of characteristics that might be assessed using the MMI was constructed and circulated to decision makers. A structured formal inquiry through e-mail correspondence, meetings, and discussion was used to gather input from the family medicine residency program directors at the University of Calgary and the University of Alberta and from other community-based and academic family physicians. This information was used to construct content-specific situations that would enable each characteristic to be assessed. The AIMG MMI Committee ultimately developed station content, question probes, and background information.

**IMG Applicants**

To qualify for the MMI, applicants were required to have completed the AIMGP’s entry requirements. These criteria include a passing score on the Medical
Council of Canada Equivalency Examination, a passing score on the Medical Council of Canada Qualifying Examination Part 1, and proof of successful completion of undergraduate medical education in a medical school listed in the Foundation for Advancement of International Medical Education and Research (FAIMER) directory. In addition, applicants were required to pass all components of the AIMGP objective structured clinical examination (OSCE). Specifically they had to pass the minimum number of stations for the clinical skills component and exceed the benchmark scores on the communication, oral, and written English proficiency tests. Alberta International Medical Graduate applicants for family medicine residency training positions who exceeded the minimal pass level on the clinical skills OSCE were e-mailed an invitation to the family medicine MMI following notification of their success on the OSCE. After each MMI session, applicants were asked to complete the acceptability survey.

Interviewers
Interviewers were family medicine faculty and senior family medicine residents at the University of Alberta and the University of Calgary, community physicians from both urban centers, and stakeholders from other medical community-related groups (ie, medical education, language education, and human resources). All of the interviewers participated in a mandatory 2-hour training session 2 weeks before the MMI. Interviewers then received their station information 48 hours before the interviews took place. All of the interviews took place at the University of Calgary. Because previous research has shown that applicant scores may be related to interviewer characteristics, interviewers were organized in tracks and stations according to their professional status and gender to minimize these effects on applicant scores.14,28

Table 1
Sample Multiple Mini Interview (MMI) Station

Applicant information posted outside of the door:
It is the middle of a busy afternoon clinic. Your next patient is Mrs Jones, an elderly overweight woman with hypertension whom you have been following for her chest pain. You last saw her 4 weeks ago. On reviewing her chart, you realize that her EKG showed acute ischemia and that you had not seen this result until now.

What do you say to Mrs. Jones? Why?

Interviewer information includes the applicant information and the additional information shown below.

Optional Probes:
What is this case about?
What are the issues? How would you deal with each issue?
How would you explain to the patient what has happened?
Given your prior experience and medical training, what information do you need to know about the patient’s current condition? And why?
How would you respond if the patient became angry?
Since this omission has occurred, does it lead you to examine how results are processed in your office?

Primary Objective: honesty
Secondary Objectives: continuity of care, physician-patient relationships

Rationale:
This case is designed to test whether or not the applicant will admit that a mistake has been made. Honesty is consistently reported as one of the most important attributes of physicians in the medical education literature. Honesty is taken for granted by patients, peers, colleagues, provincial licensing agencies, and accreditation authorities. Honesty may be the attribute that instills trust at all levels of medical practice.

The issues that are raised include:
• Admitting result was not seen
• Being able to focus on the current medical condition of patient
• Knowing how to correct situation for patient
• Setting up processes to prevent a recurrence and outlining this to the patient.

Medically, the candidate should be able to probe into current situation for patient by asking the question: have things changed for patient?

This omission may be an indication of a system problem in the physician practice (ie, timing of charting and referral relative to patient visit). The final question encourages the applicant to think about systems-level issues. Their response will provide the interviewer with insights into the applicant’s ability to make inferences from actions from a detached perspective.
Residency Education

Interview Procedure
The MMI uses a multi-station format that is similar to an OSCE. Each applicant moves through the same set of stations and is evaluated by a single interviewer at each station. More than one set of stations can be run at the same time. We used two sets of stations per session and ran three sessions in a single day. At each station, the applicant read the information posted on the door for 2 minutes and discussed his/her response with the interviewer for 8 minutes. After each session, applicants were invited to complete the applicant survey and at the end of interview day, interviewers were invited to complete the interviewer acceptability survey.

Data Analyses
The level of acceptability was measured empirically using applicant and interviewer responses. Anonymous responses and qualitative comments were collected using the standardized questionnaires developed by the MMI Committee. Responses to each of the questions were recorded on a 5-point scale, with 1 indicating strongly disagree and 5 indicating strongly agree. Descriptive statistics were used to analyze quantitative data.

Written comments made by applicants and interviewers were counted and thematically categorized by subject. Content analyses provided information about the relative frequency of comments made by applicants and interviewers regarding their MMI experience.

Results
Seventy-one IMG applicants participated in this study. Participants ranged from 25 to 55 years, with a mean age of 37.2. Fifty-three (75%) IMG applicants were female, and 18 (25%) were male. They listed 24 different first languages and 10 different languages of medical school instruction on their applications. Table 2 shows the country of origin, the United Nations Statistics Division designation for that country, and the number and percent from each country as identified by applicants to the program on their application forms.

Thirty-three interviewers participated in the MMI. There were 12 (36.4%) physicians, 12 (36.4%) residents, and nine (27.3%) medical educators, language educators, or human resource professionals.

Applicant Acceptability
A total of 69 (97.2%) applicants responded to the applicant acceptability survey. Of those who responded, 13 (18.8%) indicated that they had been interviewed for residency training positions before and 26 (37.7%) indicated they had not; 30 (43.5%) did not respond to the question. Table 3 presents the minimum, maximum, mean, and standard deviation of the applicant responses to the post-interview questionnaire by question category.

Applicants made 55 comments in the qualitative portion of the survey, and the majority of the applicants made positive comments. Five themes were identified: expressions of appreciation for the innovation to the interview part of the selection process (n = 16), content (n = 15), format (n = 14), requests for more information on the MMI (n = 5), and miscellaneous (n = 5). Comments written by different applicants varied. For example, one respondent wrote, “Five-minute stations could be okay,” while another wrote, “I felt a bit short of time to express myself.” Six applicants made comments related to the amount of time available at each station, three people asked for a rest station, and two people wanted more freedom to express themselves about topics not raised in the MMI.

Interviewer Acceptability
A total of 31 (93.9%) interviewers responded to the applicant acceptability survey. When asked if they had
interviewed family medicine residency applicants in the past, a total of 13 (41.9%) indicated they had, 13 (41.9%) had not, and five (16.1%) did not answer this question. Each of the interviewers indicated that they would be willing to interview for the family medicine IMG program in the future. Table 4 shows the minimum, maximum, mean, and standard deviation of the results from the interviewer post-MMI survey by question.

A total of 25 interviewers provided 27 comments about their experience with the MMI. Most of the comments addressed the scenario content (n=11) and the rating scales (n=5). The choice of scenarios and the range of situations presented in the MMI were favored for their suitability to measuring professionalism potential necessary for family medicine practice. One interviewer wrote, “Excellent scenarios, particularly 3, which was challenging for candidates.” Another wrote, “Good case—very relative and important to family medicine.” The interviewers also identified ways that the assessment could be improved. For example they commented that the probing questions did not always fit how applicants interpreted professionally challenging situations or understood what was being asked of them. In relation to one particular station, one interviewer wrote, “... overall, well understood by candidates though some focused specifically on how to prepare a case presentation rather than responding to the criticism and how to expand their differential diagnosis.” Two interviewers were not sure how to use the rating scale to evaluate the behaviors they were assessing. With regard to calibrating the rating scale with this group of applicants, one interviewer wrote, “It would be helpful to have an indication on the score sheet regarding where the cut off is for ‘not acceptable’ to the program. It’s hard to be sure what ‘average’ is in relation to the group. In the first session, I would recommend that you consider using pencils for all scores.”

**Table 3**

Post Multiple Mini Interview (MMI) Applicant Acceptability Survey Responses

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Minimum*</th>
<th>Maximum*</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The MMI was free from gender bias.</td>
<td>68</td>
<td>1</td>
<td>5</td>
<td>4.75 (0.72)</td>
</tr>
<tr>
<td>2. The MMI was free from cultural bias.</td>
<td>68</td>
<td>1</td>
<td>5</td>
<td>4.63 (0.81)</td>
</tr>
<tr>
<td>3. I had sufficient time to present my ideas in the MMI stations.</td>
<td>68</td>
<td>2</td>
<td>5</td>
<td>4.71 (0.71)</td>
</tr>
<tr>
<td>4. The MMI allowed me to present my strengths of training for a family medicine training position.</td>
<td>69</td>
<td>2</td>
<td>5</td>
<td>4.54 (0.76)</td>
</tr>
<tr>
<td>5. I prefer the MMI over other interviews for residency.</td>
<td>69</td>
<td>1</td>
<td>5</td>
<td>4.59 (0.77)</td>
</tr>
</tbody>
</table>

* Scores ranged from 1=strongly disagree to 5=strongly agree

**Discussion**

This study investigated the acceptability of the MMI for professionalism potential assessment in IMG applicants to an interviewer from family medicine residency training at two different medical schools within the same province. The high response rates from applicants and interviewers (97.2% and 93.9% respectively) indicate that members of both subgroups were willing to share their opinions about their MMI experience. Their responses suggest they were amenable to using the MMI in the residency application process.

Constructing the MMI, following the method developed and researched by Eva et al, allowed the AIMG Program to meld a professionalism assessment into its family medicine interview process. Station construction was guided by the creation of an examination “blueprint” that fit program directors’ specifications for the qualities that were desirable in candidates for their respective residency training programs. Program directors, practitioners, and residents from both university communities had firsthand experience in identifying the presence or absence of qualities, and evaluating behaviors associated with professionalism potential in this heterogeneous group of IMG physicians.

Interviewers indicated a high level of satisfaction with their training and the material provided to them for their station. Like the applicants, they felt they had enough time to assess the candidates at each station. Interviewers found the day satisfying and not overly tiring. Interviewers agreed that this MMI was a fair assessment of family medicine professionalism potential. The findings are similar to those reported by interviewers in medical school admission MMIs for a single medical school. These findings show that residency programs from two institutions can work together to define the personal qualities important to their programs, construct scenarios to measure each, and conduct the interviews in ways that are acceptable to both applicants and interviewers. Interviewers liked
the MMI because the time for actual interviewing is less than for panel interviews, the interview day is shorter, and there are no post-interview reports to write.16

Our findings that the MMI was seen to be free from gender and cultural biases support the earlier work of Brownell et al.16 As in previous studies, applicants agreed that they had enough time to present their ideas in the 8 minutes allotted per station.5,16 Applicants felt the MMI allowed them to present their strengths and preferred the MMI over other interview methods they had experienced. Applicants expressed their appreciation for the innovation and enthusiastically supported the methodological change.

Our study is limited by the small number of applicants and interviewers included in the study as well as the number of programs collaborating on the project. The study was conducted in one province in Canada, and the acceptability of the MMI may be different elsewhere.

Conclusions
Our study provides evidence for the acceptability of the MMI in IMG applicants to family medicine residency training. The multi-sampling approach was a feasible way for the AIMG Program to measure characteristics and behaviors valued in family medicine residents and practitioners and to standardize the evaluation of each person’s performance, based on the principles of family medicine and medical professionalism.20,21 Our results suggest that women and members of ethnic minority groups may find the MMI less intimidating than nonstandardized, panel interviews.9 These results suggest that the multi-sampling, single interviewer approach used in the MMI is able to overcome some of the concerns with bias in panel interviews while maintaining the benefit of having multiple assessments for each candidate. We have adopted the Multiple Mini Interview method in Alberta’s International Medical Graduate Program.

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REFERENCES

Table 4
Post-MMI Interviewer Acceptability Survey Responses

<table>
<thead>
<tr>
<th>Post-MMI Interviewer Acceptability Survey Responses</th>
<th>n</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The information I received about my station prepared me for the MMI.</td>
<td>28</td>
<td>2</td>
<td>5</td>
<td>4.14 (0.85)</td>
</tr>
<tr>
<td>2. The orientation session held in early October prepared me for the MMI.</td>
<td>31</td>
<td>1</td>
<td>5</td>
<td>4.29 (0.82)</td>
</tr>
<tr>
<td>3. The scoring sheet allowed me to differentiate between candidates.</td>
<td>31</td>
<td>1</td>
<td>5</td>
<td>3.61 (0.96)</td>
</tr>
<tr>
<td>4. The MMI is a fair assessment of family medicine potential.</td>
<td>30</td>
<td>3</td>
<td>5</td>
<td>3.93 (0.69)</td>
</tr>
<tr>
<td>5. I had enough time to assess the applicants at my station.</td>
<td>31</td>
<td>2</td>
<td>5</td>
<td>4.48 (0.72)</td>
</tr>
<tr>
<td>6. The interview day was not overly fatiguing.</td>
<td>31</td>
<td>2</td>
<td>5</td>
<td>4.13 (0.76)</td>
</tr>
<tr>
<td>7. The atmosphere of interview day was satisfying.</td>
<td>31</td>
<td>2</td>
<td>5</td>
<td>4.74 (0.63)</td>
</tr>
</tbody>
</table>
19. Reiter HI, Eva KW. Reflecting the relative values of community, faculty, and students in the admissions tools of medical school. Teach Learn Med 2005;17:4-8.