

## Bridging the gap: improving CASPer test confidence and competency for underrepresented minorities in medicine through interactive peer-assisted learning

Comblent l'écart : amélioration de la confiance et des compétences des candidats issus de minorités sous-représentées en médecine à l'examen CASPer au moyen de l'apprentissage interactif entre pairs

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### Abstract

**Background:** The Computer-based Assessment for Sampling Personal Characteristics (CASPer) is a situational judgement test (SJT) adopted by medical schools to assess applicants' interpersonal skills. CASPer applicants must compose their responses to ethical dilemmas, thereby highlighting the applicant's rationale for ethical decision-making. Minority applicants usually lack access to a network of individuals who can offer guidance and expertise on ethical decision-making. As such, this study investigated the impact of a CASPer coaching program designed for minority applicants.

**Methods:** A free online intervention was designed to help minority applicants prepare for the CASPer test. The program consisted of 35 learners and three medical student tutors. Important attributes of the 4-week program included free access to a medical ethics book, feedback provision to in-class and homework student responses, and facilitation of a mock CASPer. Course feedback was collected. Additionally, a pre and post-program survey was administered to assess learners' competence and confidence surrounding CASPer test-taking.

**Results:** Our pre and post-program survey showed significant student improvement in familiarity with the test, increased competence, confidence and preparedness, as well as reduced anxiety ( $p < 0.05$ ).

**Conclusions:** Through peer-to-peer teaching and access to medical student mentors, our program addresses socioeconomic barriers that several minority applicants face when applying to medical school.

### Résumé

**Contexte :** L'évaluation informatisée des caractéristiques personnelles (CASPer) est un test de jugement situationnel (TJS) adopté par les facultés de médecine pour évaluer les compétences interpersonnelles des candidats à l'admission. Les candidats à l'examen CASPer sont invités à répondre à des dilemmes éthiques pour montrer leur raisonnement dans la prise de décisions éthiques. Les candidats issus de minorités n'ont souvent pas accès à des personnes qui peuvent leur offrir des conseils et une expertise en matière de prise de décision éthique. La présente étude examine l'impact d'un programme de soutien du CASPer conçu pour les candidats issus des minorités.

**Méthodes :** Un programme d'assistance gratuite en ligne d'une durée de quatre semaines a été conçu pour aider les candidats issus de minorités à se préparer à l'examen CASPer. L'encadrement était offert à 35 apprenants par trois tuteurs étudiants en médecine. Les principales caractéristiques du programme comprenaient l'accès sans frais à un manuel d'éthique médicale, un retour sur les réponses en classe et sur les devoirs, et l'animation d'un examen CASPer simulé. Nous avons recueilli les réactions des apprenants au programme et nous avons réalisé un sondage avant et après le programme pour évaluer les compétences et la confiance des étudiants en ce qui concerne l'examen CASPer.

**Résultats :** Le sondage a montré qu'après le programme, les candidats avaient une bien meilleure connaissance du test, que leurs compétences, leur confiance et leur préparation s'étaient améliorées, et que leur niveau d'anxiété avait baissé ( $p < 0,05$ ).

**Conclusions :** Grâce au recours à l'apprentissage entre pairs et au mentorat par des étudiants en médecine, notre programme s'attaque aux obstacles socio-économiques que les candidats qui sont issus de minorités rencontrent dans le processus d'admission dans les facultés de médecine.

## Introduction

Medical students and physicians should Canada's diverse population.<sup>1-4</sup> In examining the demographics of first-year Canadian medical students, Dhalla and colleagues found that underrepresented minorities in medicine (URMM) included students who were Black, Indigenous, from rural backgrounds, and students of low socioeconomic status (SES).<sup>4</sup>

The medical school admissions process provides an opportunity to increase diversity.<sup>5</sup> The process involves academic (e.g., grade-point average, Medical College Admission Test) and non-academic screening (e.g., personal statements, reference letters).<sup>6</sup> Academic screening predicts scholastic performance, but inadequately predict interpersonal skills.<sup>7</sup> Non-academic screening assesses interpersonal characteristics, but are resource-intensive and lack construct validity.<sup>6,7</sup> URMMs face inequities in the admissions process; they underperform on academic measures,<sup>7,8</sup> face financial barriers, and lack the social capital to augment their non-academic applications.<sup>10</sup> Situational judgement tests (SJTs) offer an alternative.<sup>11</sup> SJTs challenge applicants to showcase their approach to real-world scenarios,<sup>12,13</sup> mitigate differences among demographic groups,<sup>7,14</sup> and demonstrate high reliability and validity in assessing interpersonal qualities.<sup>15</sup>

The Computer-based Assessment for Sampling Personal Characteristics (CASPer) is one SJT used by medical schools.<sup>16</sup> CASPer is a 12-section online test, with video and text-based scenarios, whereby applicants have five minutes to respond to three questions per section.<sup>17</sup> While conventional SJTs provide multiple-choice options to ethical dilemmas,<sup>16</sup> CASPer requires written responses, thus showcasing the applicant's rationale for ethical decision-making.<sup>14</sup> Juster and colleagues examined academic and non-academic scores of medical school applicants across demographic groups and found that URMMs underperformed across all measures,<sup>7</sup> with academic scores having the greatest disparity. CASPer reduced but did not eliminate demographic inequities in the application process.<sup>7,18</sup> Stronger CASPer performance may be attributed to a coaching effect, as SJTs may be amenable to coaching.<sup>19-21</sup> However, URMMs with low SES face financial challenges when applying to medical schools,<sup>22</sup> including affording preparation programs for admissions prerequisites, which may result in lower scores.

To promote diversity in medicine, the University of Ottawa Black Medical Students' Association collaborated with University of Toronto's Community of Support (COS) – an initiative that supports URMMs' journey to medical school – to design a peer-assisted CASPer coaching program for URMMs in August 2019. A pre and post-program survey was administered to evaluate CASPer test competence and confidence. The purpose of this study was to describe the program's curriculum and implementation, and its impact by reporting the survey results.

## Methods

### Population

COS students are URMMs who self-identify as Black, Indigenous, Persons of Colour, of low SES and/or with a disability.<sup>23</sup> Thirty-five URMMs from COS, enrolled in the CASPer coaching program. Students were taught by three URMM medical students who successfully completed the CASPer test and matriculated into CASPer-requiring medical schools.

### Summary of innovation

The free four-week online program consisted of sessions once per week for two hours. We designed this program independently of Altus Assessment Incorporation, which creates and administers CASPer.<sup>17</sup> In session one, we discussed test structure, taught ethical principles, and provided guidance on structuring responses. Sessions two and three included timed practice scenarios designed by tutors or obtained from online resources.<sup>24-28</sup> Homework following each session included readings,<sup>29</sup> timed self-reflection exercises and bioethical case studies.<sup>30</sup> The mock CASPer exam was administered during session four. Key aspects of the curriculum included free access to an ethics book<sup>29</sup> and detailed feedback following in-class, homework and mock exam responses.

Our program was delivered using Daily.co<sup>31</sup> (video broadcasting) and Slack<sup>32</sup> (written communication). We streamed presentations and provided oral feedback using Daily.co, and recorded the sessions for students. Students asked questions and provided responses to practice scenarios for tutor feedback over Slack. The final mock exam was live-streamed on YouTube, simulating a realistic testing environment.

### Outcome measures

Students anonymously completed surveys before the first class (pre-course) and following the final class (post-course). Survey parameters included demographics, prep-

course history, class attendance, and questionnaires for self-evaluation and course assessment via 5-point Likert scale. Below are sample questions pertaining to self-evaluation and course assessment, respectively.

Please rate the following on a scale of 1 (strongly disagree) to 5 (strongly agree):

'I am familiar with the structure of the CASPer test'

'The learning environment was positive and supportive'

Gostelow et al. validated the self-assessment questionnaire for their peer-assisted SJT coaching program.<sup>33</sup> The COS database provided data on participants' medical school interview invites. We did not obtain students' CASPer scores as Altus releases scores directly to medical schools.

**Data analysis and ethics**

Data were presented as the mean of responses with standard deviation. Paired pre- and post-course survey responses were compared with the Wilcoxon signed-rank test. P-value < 0.05 was considered significant. Analyses were performed on GraphPad Prism 6. Institutional REB was waived for this quality assurance study evaluating a medical education innovation.

**Results**

Among 35 URMM learners, 26 resided in Ontario, and others resided in Alberta (n = 4), New Brunswick (n = 2), Quebec (n = 1) and internationally (n = 2). Twenty-five students (71.4%) completed the pre-course survey and 27 (77.1%) completed the post-course survey. Nine participants (33.3%) had previously completed CASPer, and three (11.1%) had taken a previous prep course.

The course's impact on self-perceptions is reported (Figure 1). There was statistically significant improvement across all measures, with improvement in familiarity with the CASPer test structure (2.54±1.22 vs 4.50±0.51, p < 0.0001), perceived competence (2.83±0.96 vs 4.21±0.59, p < 0.0001), confidence (2.21±0.88 vs 3.71±0.69, p = 0.0004), and preparedness (2.08±1.02 vs 3.88±0.68, p = 0.0004). Students' anxiety levels significantly reduced (2.54±1.10 vs 3.63±0.88, p = 0.0048), with more students reporting, "I do not feel anxious about taking the CASPer test" following course completion.

Student demographics and medical school interview invitations are detailed in Table 1. Thirty-four students applied to medical school during the 2020-2021 cycle, with 15 (44.1%) students receiving ≥1 interview invite. Seven

students (20.6%) received interview invites to CASPer-requiring medical schools.

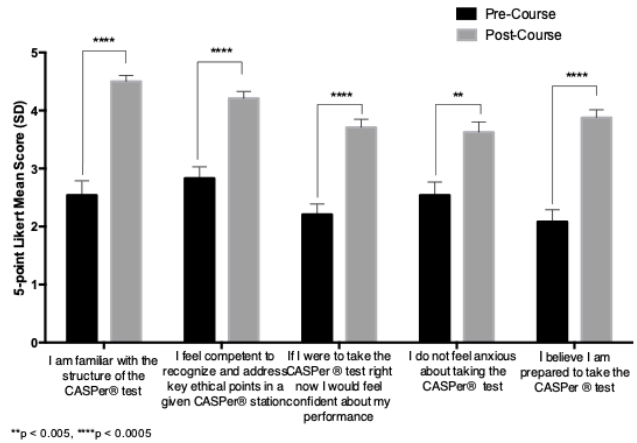


Figure 1. Impact of the COS CASPer coaching program on perceived confidence and competence of program participants

Table 1. Participant demographics and census of resulting medical school interview invites within CASPer Coaching Program (n = 35)

	Demographics	n (%)
Place of residence	Ontario	26 (74.3)
	Alberta	4 (11.4)
	New Brunswick	2 (5.7)
	Quebec	1 (2.9)
	International	2 (5.7)
Prior CASPer exposure	Candidate took CASPer test before (n = 27)	
	No	18 (66.7)
	Yes, once	3 (11.1)
	Yes, twice	3 (11.1)
	Yes, 3 times or more	3 (11.1)
	Candidate enrolled in a CASPer prep course before (n=27)	3 (11.1)
Post-course census of interview invites	<b>Outcomes</b>	<b>n (%)</b>
	Candidate applied to medical school this 2020-2021 cycle	34 (97.2)
	Candidate received interview(s)	15 (42.9)
	Candidate received interview(s) for a medical school requiring CASPer in admission	7 (20.6)

**Narrative feedback**

Program strengths included course structure and interactivity. Students thought lectures were "well structured," "interactive" and "helped put knowledge into practice." Students appreciated having "easy access to tutors," receiving feedback, and found the technology beneficial.

Areas of improvement included personalized tutorship, increasing class time and diversifying content. Recommendations included "one-to-one [learning] on occasion" and "more original content" for those who had written the test before.

## Discussion

This free CASPer coaching program was offered exclusively online and free. There were significant improvements in students' competence and confidence by course completion, and 20.6% received interview invites from CASPer-requiring medical schools.

Sharma found that medical school applicants were anxious about the time pressures for completing SJTs and its weighting on their application.<sup>34</sup> Students in our course received iterative feedback for timed practice scenarios, which may have reduced anxiety levels. Another near-peer-led teaching program for the objective structured clinical examination (OSCE) taught by recent graduates to medical students similarly reported an increase in students' confidence and preparedness.<sup>35</sup> Such improvements are likely attributed to unique teaching styles, familiarity with the examination's structure, and encouragement from enthusiastic instructors.<sup>35,36</sup>

Peer-assisted learning (PAL) in medical education is associated with significant improvements in OSCE and test performances.<sup>37</sup> As an added metric of interest, we analyzed interview invites from CASPer-requiring medical schools. As students' academic and non-academic screening collectively impact students' application scores,<sup>6,14,38-41</sup> we believe our coaching program improved the non-academic component of URMM applications.

Upstream interventions in the admissions process are valuable in enhancing medical student diversity.<sup>5,7,42,43</sup> Reiter and colleagues recommend upstream interventions like pipeline programs,<sup>5</sup> which support high-achieving students from marginalized backgrounds with mentorship and education. We essentially designed a pipeline program using the PAL model, allowing for cost-effective and sustainable programming.<sup>37</sup> Leveraging technology and mentorship to alleviate socioeconomic barriers, our CASPer coaching program fulfilled COS's mission to support URMMs' journey to medical school. Nonetheless, the diversity among URMMs in our program may have influenced the study results. We did not collect information on student's unique URMM identities, thus doing so opens an avenue for future directions. Further research is required to contextualize the program's impact in identifying the URMM populations that benefit most.

Notably, 18 years following Dhalla et al.'s 2002 study, Khan et al.<sup>43</sup> reiterates that Black, Indigenous, rural and students of low SES remain underrepresented in Canadian medical schools. As such, we encourage national diversity data

collection of medical school applicants and matriculants. This information may better equip Canadian medical schools to implement targeted pipeline programs that foster diversity.

## Limitations

Students' self-perceived improvement in confidence and competence cannot be correlated to CASPer exam performance. Although comparing students' CASPer scores to the mean scores of other test participants is appealing, limitations exist. Tests are completed on different days, with variable scenarios, are scored by different evaluators and can be taken in French or English. These variables affect the utility of using test scores as a standalone parameter in measuring our program's efficacy.

## Conclusion

Our CASPer coaching program is an upstream effort in medical school admissions to foster diversity within Canadian medical schools. Our program has expanded to accommodate seven tutors with three parallel courses supporting 100+ URMMs. Moreover, following course feedback, we have introduced innovative practice scenarios and embedded small group sessions for personalized feedback. Overall, our near-peer-led CASPer coaching program successfully improved test confidence and competence among URMM participants. Such pipeline programs, targeting marginalized populations are necessary to increase diversity in medicine.

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