

# Evaluation of perceived and actual competency in a family medicine objective structured clinical examination

Lisa Graves MD CCFP FCFP Leonora Lalla MD CM CCFP FCFP Meredith Young PhD

## Abstract

**Objective** To examine the relationship between objective assessment of performance and self-rated competence immediately before and after participation in a required summative family medicine clerkship objective structured clinical examination (OSCE).

**Design** Learners rated their competence (on a 7-point Likert scale) before and after an OSCE along 3 dimensions: general, specific, and professional competencies relevant to family medicine.

**Setting** McGill University in Montreal, Que.

**Participants** All 168 third-year clinical clerks completing their mandatory family medicine rotation in 2010 to 2011 were invited to participate.

**Main outcome measures** Self-ratings of competence and objective performance scores were compared, and were examined to determine if OSCEs could be a “corrective” tool for self-rating perceived competence (ie, if the experience of undergoing an assessment might assist learners in recalibrating their understanding of their own performance).

**Results** A total of 140 (83%) of the third-year clinical clerks participated. Participating in an OSCE decreased learners' ratings of perceived competence (pre-OSCE score = 4.9, post-OSCE score = 4.7;  $F_{1,3192} = 4.2$ ;  $P < .05$ ). Learners' mean self-rated competence for all categories of behaviour (before and after) showed no relationship to OSCE performance ( $r < 0.12$  and  $P > .08$  for all), nor did ratings of station-relevant competence (before and after) ( $r < 0.19$  and  $P > .09$  for all). Ratings of competence before and after the OSCE were correlated for individual students ( $r > 0.40$  and  $P < .001$  for all).

**Conclusion** After the OSCE, students' self-ratings of perceived competence had decreased, and these ratings had little relationship to actual performance, regardless of the specificity of the rated competency. Discordance between perceived and actual competence is neither novel nor unique to family medicine. However, this discordance is an important consideration for the development of competency-based curricula.

## EDITOR'S KEY POINTS

- With the implementation of competency-based frameworks, medical education is becoming achievement based rather than time based, and learners' capacity for self-assessment is increasingly important. The literature suggests that self-assessment of competence is often inaccurate.
- Formal assessments, like objective structured clinical examinations (OSCEs), might provide an opportunity for students to arrive at a more accurate perception of their competence. This study sought to examine the relationship between students' self-rated competence before and after the OSCE and their objective performance on the examination.
- Students' self-ratings of competence tended to decrease after completing the OSCE, and their perceived competence correlated poorly with their actual performance. Students were not able to predict their level of competence before the OSCE and their self-ratings did not become more accurate after the examination. This inaccuracy of self-assessment presents challenges for the self-paced learning in competency-based family medicine education.

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# Évaluation des compétences perçues et réelles dans un examen clinique objectif structuré en médecine familiale

Lisa Graves MD CCFP FCFP Leonora Lalla MD CM CCFP FCFP Meredith Young PhD

## Résumé

**Objectif** Examiner la relation entre l'évaluation objective du rendement et l'auto-évaluation des compétences, immédiatement avant et après qu'un étudiant en stage obligatoire en médecine familiale eût répondu à un examen clinique objectif structuré (ECOS) récapitulatif.

**Type d'étude** Les étudiants ont évalué leurs compétences (sur une échelle de Likert en 7 points) avant et après un ECOS, et ce, relativement aux 3 aspects suivants: les compétences générales, spécifiques et professionnelles nécessaires au médecin de famille.

**Contexte** L'Université McGill à Montréal, au Québec.

### POINTS DE REPÈRE DU RÉDACTEUR

- Avec la mise en œuvre des cadres axés sur les compétences, la formation des médecins est de plus en plus axée sur le rendement plutôt que sur des critères temporels, et la capacité de l'étudiant de s'auto-évaluer prend de plus en plus d'importance. La documentation donne à croire que l'auto-évaluation est souvent inexacte.
- Les évaluations formelles, comme les examens cliniques objectifs structurés (ECOS), pourraient fournir aux étudiants une occasion d'avoir une meilleure idée de leurs compétences. Cette étude avait pour but de vérifier la relation entre l'évaluation faite par l'étudiant de ses compétences avant et après un ECOS et son rendement objectif à l'examen.
- Les niveaux de compétence que les étudiants s'attribuaient avaient tendance à diminuer après avoir répondu à l'ECOS, et il y avait peu de corrélation entre leur auto-évaluation et leurs résultats réels. Ils étaient incapables de prédire leur niveau de compétence avant l'ECOS, et leur auto-évaluation ne s'était pas améliorée après l'examen. Cette inexactitude de l'auto-évaluation pose des difficultés dans le contexte de l'auto-apprentissage dans la formation en médecine familiale axée sur les compétences et adaptée au rythme personnel.

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**Participants** Les 168 étudiants de troisième année terminant leurs stages cliniques obligatoires en médecine familiale en 2010 et 2011 ont été invités à participer.

**Principaux paramètres à l'étude** On a comparé les scores obtenus aux auto-évaluations des compétences à ceux obtenus de façon objective, et on les a examinés pour savoir si les ECOS pourraient servir d'outil pour corriger l'auto-évaluation des compétences (c.-à-d. si le fait de subir une évaluation pouvait aider un étudiant à réviser son opinion sur ses propres compétences).

**Résultats** Un total de 140 étudiants de troisième année (83%) effectuant leurs stages cliniques ont participé. La cote attribuée par les étudiants à leurs compétences était plus basse après avoir participé à un ECOS (avant: 4,9; après: 4,7;  $F_{1,3102} = 4,2$ ;  $P < ,05$ ). Il n'y avait pas de relation entre la cote moyenne attribuée par les étudiants à leurs compétences pour toutes les catégories de comportement (avant et après) et leurs résultats à l'ECOS ( $r < 0,12$  et  $P > ,08$  pour toutes les catégories), et c'était la même chose pour les cotes de compétences relatives à une station donnée attribuées avant et après l'ECOS ( $r < 0,19$  et  $P > ,09$  pour toutes les catégories). Pour chacun des étudiants, on a calculé les corrélations entre les cotes attribuées avant et après les ECOS ( $r > 0,42$  et  $P < ,001$  pour tous les étudiants).

**Conclusion** Après un ECOS, le classement attribué par l'étudiant à ses compétences avait diminué, et cette évaluation avait peu de rapport avec son rendement réel, et ce, quelle que soit la spécificité des compétences évaluées. Une telle discordance entre les compétences perçues et réelles n'est ni nouvelle ni unique à la médecine familiale. Il s'agit toutefois d'une observation qui mérite d'être prise en considération pour le développement des programmes d'études axés sur les compétences.

As curricula implement competency-based frameworks and medical education becomes achievement dependent rather than time dependent,<sup>1,2</sup> a learner's capacity to self-assess would be expected to become more important. Specifically, the move toward a competency-based educational framework decouples achievement of competency from a time-based educational approach.<sup>1</sup> This decoupling of time from achievement of competency suggests the evolution of a self-paced curriculum, in which a learner could self-select when they are "prepared enough" to undergo formal assessment of a given competency.<sup>3</sup> This self-selection requires learners to appropriately evaluate their preparedness to undergo assessment, potentially including their self-assessed level of competence. Further, the Triple C curriculum specifically refers to the shared responsibility of faculty and learners to seek out formal and informal feedback and assessment opportunities.<sup>4</sup> Therefore, it is timely to explore the strength of learners' self-assessment abilities through the comparison of self-rated perceived competence with more objective performance measures, such as faculty-assessed level of performance.<sup>5</sup>

The concept of a learner potentially self-selecting their assessment time is complicated by research investigating the relationship between self-assessment and objective measures of performance. An extensive literature suggests that self-assessment is not only unreliable, but that it is quite frequently inaccurate across the spectrum from novice to expert learner.<sup>6-13</sup> Further, objective measures of competence might not relate to perceived competence, as clinical performance has been shown to correlate with confidence<sup>6</sup> rather than objective "ability." However, some research<sup>14</sup> has suggested that while learners might be poor assessors of their general performance and knowledge, they might have a more accurate perception of their abilities for specific skills, particularly during skill performance.<sup>15</sup> Further, perceptions of self-efficacy (here defined as confidence in performance within an individual skill domain<sup>16</sup>) do appear to correlate well with performance.<sup>17</sup> Therefore, students might be able to self-assess competence in the context of well-defined curricular objectives and individual skills in preparation for a formalized assessment. It might also be possible that the experience of undergoing an assessment could function as a "corrective" tool for self-ratings of perceived competence (ie, an examination could assist learners in recalibrating their understanding of their own performance). However, evidence supporting this idea is mixed.<sup>18,19</sup>

Explicit examination of the relationships among self-rated competence, objective performance, and the corrective potential of assessment depends on defensible assessment of performance. Faculty observe and assess the performance of medical learners within the

context of objective structured clinical examinations (OSCEs), in which they can evaluate clinical skills of individual learners under controlled circumstances (eg, standardized patients, encounters, examiners, and durations).<sup>20</sup> The reliability of assessment using OSCEs is well documented, and OSCEs are commonly used in several medical education settings.<sup>20-22</sup> Here we examine the relationship between objective assessment of performance and self-rated competency immediately before and after participation in a required summative family medicine clerkship OSCE in an undergraduate medical education context.

## METHODS

### Participants

All third-year clinical clerks at McGill University in Montreal, Que, completing their mandatory family medicine core clerkship rotation (N=168) were invited to participate. The McGill University Research Ethics Board approved all components of this study.

### Study context

All students must participate in a third-year, core, 8-week clerkship rotation in family medicine. Upon completing this rotation, students complete a mandatory OSCE, which comprises 30% of their rotation grade. The family medicine OSCE used the objectives of the McGill University family medicine clerkship and the CanMEDS-Family Medicine competencies as blueprints.<sup>23</sup> The family medicine clerkship OSCE content was developed by experts in family medicine in collaboration with the undergraduate education committee. The OSCE comprised 8 stations, each lasting 10 minutes. Six of the stations involved interactions with standardized patients, and station content included history taking, physical examinations, patient counseling, and diagnostic tasks. The other 2 stations contained written or question-based components, such as interpreting an imaging study or providing written answers to questions related to guidelines for care. These 2 stations were not used for the correlational analyses, as they did not include observations of performance. Scoring tools for the OSCE are described below, but station-specific checklists and global rating scales were developed by family medicine content experts and peer reviewed.

### Procedure

Before the OSCE, students were approached by a research assistant who had no role in student assessment and no affiliation with the undergraduate family medicine program. The research assistant described the study to potential participants and asked them to review a consent form. If they chose to participate in the study, students were

agreeing to complete self-ratings of perceived competence immediately before and after the OSCE, and consenting to releasing their OSCE station-specific performance scores to be analyzed for the purposes of this research project. Participation was completely voluntary and no penalty was incurred for non-participation. No examiner was aware of who chose to participate in the study, and all data were rendered anonymous before analysis.

## Tools

**Pre-OSCE competency questionnaire.** Participants were asked to rate their perceived competence on a 7-point Likert scale (where 1=not at all competent and 7=perfectly competent) for each of the identified family medicine clerkship objectives' general family medicine skills (eg, performing periodic health examinations). They were also asked to rate their perceived competence in general family medicine skills (eg, periodic health examinations), specific skills based on curricular objectives (eg, discussion of smoking cessation), and professionalism behaviour.<sup>24,25</sup>

**Performance on the OSCE.** All students in the family medicine OSCE were assessed using station-specific checklists and global rating scales. Global ratings have been shown to be more reliable<sup>21,26</sup> and to better capture overall student performance, but modified checklists were also used to support assessors in terms of outlining the objectives of the station and facilitating later OSCE station improvements (ie, identifying areas of assessment or student difficulty).<sup>27</sup> For the purposes of this study, total station scores were used, which were based on the station-specific modified checklists. Performance at each station was scored out of 15 (a total of 15 items assessed as done=1 or not done=0) and each modified checklist was station specific. Students were given no feedback regarding their performances at the stations to preserve examination security.

**Post-OSCE competency questionnaire.** Immediately following the OSCE, participants were asked to complete the same questionnaire they completed before the examination.

## Analysis

Pre-OSCE and post-OSCE perceived competency ratings were compared using ANOVA (analysis of variance), with time (before or after) and item (specific competency) functioning as the repeated measures of interest. Individual ANOVAs were conducted for ratings of family medicine general competencies (6 items), specific skills (21 items), and professional behaviour (2 items). To examine the relationship between perceived competence and performance on the OSCE, mean ratings for general, specific, and professionalism self-ratings of competence were correlated with overall examination performance. To examine the relationships among station-specific

competencies (as determined by the underlying examination blueprint and station-specific modified checklists), station-specific performance scores (from the OSCE as rated by the expert evaluators) were correlated with perceived competence. Station-specific performance scores were correlated with both pre-OSCE and post-OSCE specific competency ratings. This was done to determine whether students could predict their own station-specific performance (ie, could accurately judge competence before the examination) on the OSCE and whether the OSCE could function to recalibrate students' judgment of performance (ie, determine if a student could become a better judge of his or her competence following the completion of an OSCE).

## RESULTS

### Participants

Of 168 students who completed the family medicine OSCE in the 2010 to 2011 academic year, 140 students (83%) consented to participate in this study. There were 8 cohorts of students invited to participate across 1 academic year.

### Pre-OSCE and post-OSCE self-assessments of competence

Learners' self-rated competence decreased following the OSCE (pre-OSCE score=4.9, post-OSCE score=4.7,  $F_{1,3192}=4.2$ ,  $P<.05$ ). However, this was most pronounced in ratings of general (pre-OSCE score=4.9, post-OSCE score=4.7,  $F_{1,695}=12.7$ ,  $P<.001$ ) and professionalism (pre-OSCE score=5.9, post-OSCE score=5.7,  $F_{1,137}=6.0$ ,  $P<.05$ ) competencies. No significant difference between pre-OSCE and post-OSCE ratings was found for specific family medicine competencies (pre-OSCE score=4.5, post-OSCE score=4.5,  $F_{1,2660}=2.01$ ,  $P=.16$ ). Mean pre-OSCE ratings of competence correlated well with mean post-OSCE ratings of competence for individual students ( $r=0.70$ ,  $P<.001$ ). Further, station-specific ratings of competence (family medicine-specific competencies) correlated well before and after the OSCE within individuals ( $r=0.40$  to  $0.68$ , all  $P<.001$ ).

### Pre-OSCE perceived competence and OSCE performance

Station-specific checklist scores were correlated with pre-OSCE ratings of competence for the station-specific blueprinted skills (eg, counseling for alcohol cessation). Correlations between pre-OSCE self-rated competence and objective measures of performance ranged from  $-0.07$  to  $0.38$  (Table 1) and only 2 correlations reached statistical significance ( $r=0.38$  and  $r=0.23$ ;  $P<.05$  for both). This provides little evidence for the ability of students to predict and assess skill-specific competence.

### Post-OSCE perceived competence and OSCE performance

Station-specific checklist scores were correlated with post-OSCE ratings of competency (as described above for the correlation between pre-OSCE ratings of competency and OSCE performance). Correlations between post-OSCE self-rated competence and objective measures of performance ranged from -0.02 to 0.32, and only 1 correlation reached statistical significance ( $r=0.32$ ;  $P<.05$ ) (Table 1). This provides little evidence that students can adjust self-ratings of competence after an objective examination.

**Table 1. Correlations between OSCE performance and student self-ratings of competence before and after the OSCE for station-specific skills**

STATION	CORRELATION WITH PRE-OSCE RATING	CORRELATION WITH POST-OSCE RATING
1	0.38*	0.32*
2	0.23*	0.12
3	0.07	0.12
4	0.09	0.15
5	-0.07	0.17
6	0.02	-0.02

OSCE—objective structured clinical examination.

\* $P<.05$ .

## DISCUSSION

This study examined the relationship between students' self-rated competence and students' objective performance as rated by faculty examiners in the context of a required summative family medicine clerkship OSCE. Students appear to decrease their self-ratings of competence after an objective examination, particularly in judgments of general family medicine and professionalism competencies. No significant decrease was found for family medicine-specific skills. However, students' pre-OSCE ratings of station-specific competencies show little relationship to objective measures of performance. Further, post-OSCE ratings of station-specific perceived competence show little relationship to objective performance, suggesting little adjustment of perceived competency occurs after an objective examination. It appears that students were not able to predict their level of competency before the examination, nor could they recalibrate personal competency ratings after the examination.

Although the literature suggests student self-assessment is unreliable,<sup>6,11,13,28</sup> we had postulated that family medicine general skills, performance skills, and professionalism skills were sufficiently specific to allow a more accurate self-rating of competence.<sup>14</sup> Family medicine skills might still be too general at the medical

student level to demonstrate a skill-specific effect to support more accurate self-assessment.

### Limitations

This study had some limitations. Specifically, the study represents only 1 clerkship rotation at a single institution. Despite the single site, we believe that our number of participants was sufficient to detect a relationship between ratings of perceived competence and assessed performance. Compared with other studies of self-assessment, our study sample was large, and this might have mitigated the limitation of having a single-institution cohort.<sup>6,10,15</sup> Participants took the OSCE at the end of each 8-week clerkship rotation; however, we were unable to investigate the role of rotation order. It is possible that students develop stronger self-assessment skills as they complete various clinical rotations. However, as each rotation cohort is small, stable estimates of this relationship are difficult to make, and doing so was therefore beyond the scope of this study. Further study is needed to understand the effect of rotation cohort and whether longitudinal integrated clerkships have any influence on the accuracy of student self-assessment.

### Conclusion

This study investigated whether an individually timed, self-selected, competency-based approach to student assessment is possible and appropriate.<sup>5,9,19</sup> There is little evidence of students being able to accurately self-assess for general, professional, and skill-specific competency in the context of a family medicine OSCE. As curricula move to competency-based education and assessment, the issues related to the inaccuracy of student self-assessment of competency, and the potential dependence on self-selection of assessment time, will continue to present challenges for self-paced learning in family medicine and in health professions training more generally. 

**Dr Graves** is Professor in the Department of Family and Community Medicine in the Homer Stryker MD School of Medicine at Western Michigan University in Kalamazoo. **Dr Lalla** is Assistant Professor and Director of Undergraduate Education in the Department of Family Medicine at McGill University in Montreal, Que. **Dr Young** is Assistant Professor in the Department of Medicine and Research Scientist in the Centre for Medical Education at McGill University.

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#### Contributors

All authors contributed to the concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

#### Competing interests

None declared

#### Correspondence

**Dr Lisa Graves**; e-mail [lisa.graves@med.wmich.edu](mailto:lisa.graves@med.wmich.edu)

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