

# The Relationship Between Accreditation Cycle and Licensing Examination Scores: A National Look

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## Abstract

### Purpose

Accreditation aims to ensure all training programs meet agreed-upon standards of quality. The process is complex, resource intensive, and costly. Its benefits are difficult to assess because contextual confounds obscure comparisons between systems that do and do not include accreditation. This study explores accreditation's influence "within system" by investigating the relationship between accreditation cycle and performance on a national licensing examination.

### Method

Scores on the computer-based portion of the Medical Council of Canada Qualifying Examination Part I, from 1993 to 2017,

were examined for all 17 Canadian medical schools. Typically completed upon graduation from medical school, results within each year were transformed for comparability across administrations and linked to timing within each school's accreditation cycle. ANOVAs were used to assess the relationship between accreditation timing and examination scores. Secondary analyses isolated 4-year from 3-year training programs and separated data generated before versus after implementation of a national midcycle informal review program.

### Results

Performance on the licensing exam was highest during and shortly after an

accreditation site visit, falling significantly until the midpoint in the accreditation cycle ( $d = 0.47$ ) before rising again. This pattern disappeared after introduction of informal interim review, but too little data have accumulated post implementation to determine if interim review is sufficient to break the influence of accreditation cycle.

### Conclusions

Formal, externally driven, accreditation cycles appear associated with educational processes in ways that translated into student outcomes on a national licensing examination. Whether informal, internal, interim reviews can mediate this effect remains to be seen.

Accreditation is a means of recognizing that a person, activity, or institution meets a suitable standard. In medical education, the term is most commonly applied to a process designed to attest to the quality of new and established training programs.<sup>1</sup> Such systems exist in efforts to ensure all programs operate at a sufficient level to graduate/certify individuals who are well prepared for the next stage of training or practice,<sup>2</sup> to enable mobility across jurisdictions,<sup>3</sup> and to encourage a culture of continuous quality improvement that will extend beyond the formal accreditation processes themselves.<sup>4,5</sup>

Despite these laudable goals, it must be recognized that accreditation processes

are costly, requiring (among other things) hundreds of hours of faculty and staff time to gather relevant data and produce the reports necessary to satisfy local needs and enable external reviewers.<sup>6,7</sup> Researchers have noted negative impacts on staff and faculty members' morale with concern similarly expressed about suboptimal consequences for reputation and for fulfilling the spirit of the standards themselves.<sup>5</sup> All such issues have rightly led many to question whether or not accreditation processes are linked to positive outcomes, including whether or not accreditation has a meaningful impact on students.<sup>8</sup> Unfortunately, strong evidence that would support or refute these claims is hard to come by and the value of accreditation remains unclear.<sup>1</sup>

In notable exceptions to this rule, van Zanten<sup>9</sup> and van Zanten and colleagues<sup>10</sup> have investigated pass rates of international medical graduates on the national licensing examinations used in the United States. Those who graduated from accredited universities in both studies were significantly more likely to pass the exams on their first attempt than those who obtained their degrees from nonaccredited medical education

programs. Although informative, the authors acknowledge limitations including the potential for bias in participants who self-selected to take the examinations and the wide array of accreditation processes used across jurisdictions. It is not possible to overcome these methodological constraints with U.S. or Canadian trained students because all schools in those countries undergo the same accreditation processes. In other words, the scientific ideal for questions of causation, comparing the performance of representative students who are randomly assigned to study in similarly accredited programs with a group that are randomly assigned to study elsewhere, is unachievable. In such situations, methodological triangulation is particularly important.

To that end, we sought to further explore the issue of how accreditation influences educational outcomes by investigating the potential for there to be differences in student achievement within a system. In Canada, accreditation of undergraduate medical programs now takes place on a cycle that results in external review every 8 years (historically, site visits occurred every 7 years). The activity level within a

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medical school (including data collection, reflection on educational activities, and effort at improving system weaknesses) is not, however, evenly spread throughout those years, generally ramping up as deadlines loom. As such, if educational outcomes are related to accreditation, they may similarly rise or fall in an uneven manner across the cycle. There are many reasons why this could happen. For the sake of argument, consider 3 possibilities: (1) If an accreditation review leads to improvement of educational practices, one might see better student achievement shortly after a fresh review; (2) If preparing for an accreditation review redirects faculty attention and other resources toward administration at the cost of education, students could conceivably suffer during peak periods in the accreditation process; (3) If accreditation causes faculty and staff burnout, outcomes might dip in the years immediately following review. One need not make strong predictions about which pattern will exist to recognize that there are enough sufficiently plausible mechanisms of action that it is important to examine the relationship between accreditation cycle and educational outcome.

As an outcome, we examined student performance on the Medical Council of Canada Qualifying Examination (MCCQE) Part I. This national exam is typically sat at the end of medical school before beginning residency. Students' scores on this assessment are not a sufficient metric of curriculum success but are an important metric given they are a prerequisite to licensure in Canada and because MCCQE scores have been shown to predict later clinical performance.<sup>11-13</sup> The primary purpose of this study, therefore, was to examine if there is a relationship between the timing of medical schools' accreditation cycle and students' performance on a national licensing examination.

## Method

Ethics approval for this study was provided by the Ottawa Health Science Network Research Ethics Board (OHSN-REB). Because all data were anonymized and, hence, individual student and individual programs are not identifiable, they deemed it unnecessary to consent each individual training program.

## Context

Canadian medical education programs are accredited jointly by the Liaison

Committee on Medical Education (LCME) and the Committee on Accreditation of Canadian Medical Schools (CACMS) using a process that is effectively the same as that used for U.S. schools. The process builds toward a site visit by a team of trained surveyors typically consisting of senior leaders, educators, students, and an LCME representative. Over the 1 to 2 years immediately preceding the site visit, the school gathers extensive factual and outcome data about its program and engages in an intensive self-study exercise, with both the data and self-study report then provided to the accreditors.<sup>14</sup> Currently, 12 standards (covering 96 separate elements listed on the CACMS website) must be met to achieve accreditation.<sup>15</sup>

In 2011, the Association of Faculties of Medicine of Canada (AFMC) established a parallel and mandatory interim review of the full set of accreditation standards because the interval between reviews was deemed too long to ensure schools remain in full compliance.<sup>16</sup> This formative review is expected to occur 4 years following an accreditation judgment. It involves structured monitoring aimed at enabling individual schools to detect emerging problems with standards, identify critical issues requiring more immediate attention, increase local accreditation expertise, and further develop a culture of continuous quality improvement. This change created a natural experiment whereby we could test the AFMC's hypothesis that the review interval was too long by examining student outcomes in relation to the accreditation cycle before and after the cycle was effectively halved.

Finally, it is important to note that 2 of Canada's 17 medical schools offer 3-year training programs, whereas 4 years are required to complete one's MD in the other 15 schools.

## Data

MCCQE Part I is a computer-based examination of medical knowledge that uses clinical vignettes in both multiple-choice and short-answer question formats.<sup>17</sup> A key feature approach is used in that questions are predominantly built to test whether or not candidates are aware of the most critical aspect of the scenario presented. The exam is blueprinted based upon what every medical school graduate in Canada, regardless of specialty entered

for postgraduate training, is expected to know. We collected de-identified total scores for each student at each medical school for each Spring administration of the exam from 1993 to 2017. We excluded (1) international medical graduates, (2) repeat attempts, and (3) candidates whose graduation year differed from their examination year. The Fall administration was not used because so few Canadian graduates sit the MCCQE Part I for the first time in the Fall. This resulted in a database of  $N = 46,255$  Canadian trained first-time test takers.

Because scores have been reported on different scales across the years and one cannot guarantee equivalence from one administration to the next, individual candidate test scores within each administration were converted to z scores and rescaled to have a mean of 500 and standard deviation of 100. These transformed scores were then averaged across candidates for each school and each year to create the dependent variable used in this study.

To assess the relationship between MCCQE Part I scores and accreditation cycle, we acquired information regarding when each of the 17 Canadian medical schools underwent accreditation and estimated the timing of their participation in the interim review process. We then coded each year in terms of "Years since accreditation" for individual schools for use as an independent variable. Given the historical norm of accreditation visits taking place every 7 years, few of the data points within our study window corresponded with 8-year accreditation cycles, so we included only accreditation events that occurred within 7 years of the school's previous accreditation. Although the interim review process was implemented in 2011, before versus after coding was determined for this study based upon whether or not individual schools are expected to have undertaken an interim review during Year 4 of any given accreditation cycle.

## Analysis

A 7 (Years since accreditation)  $\times$  17 (School) ANOVA was performed on the average MCCQE Part I scores for each school to examine how performance varied with years since accreditation. Tukey's honestly significant difference and 95% confidence intervals are used to explore and illustrate, respectively,

where statistically significant differences were observed. This analysis was then performed separately for accreditation cycles that were completed before the introduction of the interim reporting process and accreditation cycles that were completed after introduction of the interim reporting process. To further explore the observed relationships, 4-year schools were subsequently considered separately from 3-year schools.

## Results

From the  $N = 46,255$  candidates who met all inclusion/exclusion criteria, we were able to generate  $N = 409$  MCCQE Part I average scores across the 17 medical schools. Eighteen (4.4%) corresponded with the 7th-year post accreditation and were excluded from analyses. The remaining records were evenly distributed across “Years since accreditation” with  $N = 52$  observations being drawn from “Year 0” (i.e., the year in which the school was accredited) and  $N = 55-59$  being drawn from each of years 1 through 6. Schools’ average MCCQE scores had a mean of 497.6 and standard deviation of 21.5.

### The relationship between accreditation cycle and average MCCQE Part I scores

ANOVA revealed a significant main effect of school ( $F = 12.2, P < .001$ ). As a result, post hoc tests were performed on the estimated marginal means to examine the relationship between MCCQE Part I scores and accreditation

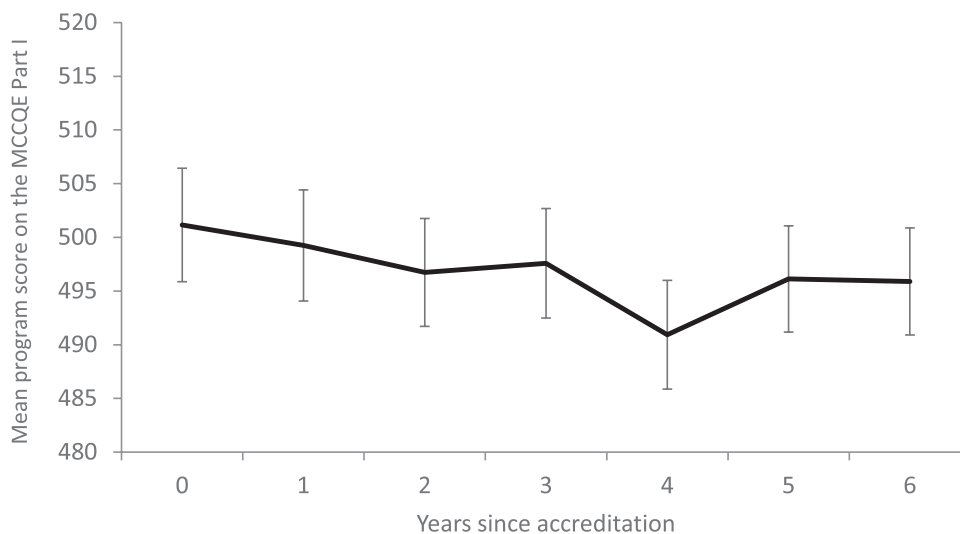
cycle independent of differences between schools.<sup>18</sup> Mean scores with 95% confidence intervals are illustrated in Figure 1, revealing a pattern in which scores steadily descended post accreditation to a low point at Year 4, the midpoint of the cycle, before they started to rise again. Although the differences may appear small in absolute terms (10.2 points from peak to trough), these scores are based on program performance and, hence, are averages of averages based on a large number of individuals. They are, therefore, quite stable estimates with the difference observed from Year 0 to Year 4 equating to an effect size of  $d = 0.47$  ( $P < .01$ ). Relative to Year 1 post accreditation, Year 4 declined 8.3 points equating to an effect size of  $d = 0.39$  ( $P < .05$ ). That is, medical schools’ average performance on the licensing exam dropped almost half a standard deviation at the midpoint of their accreditation cycle relative to their accreditation year. With only 2 schools having 3-year training programs, analysis of those schools independently is underpowered, but the pattern remained the same with the low point being Year 4 post accreditation for both 4-year schools and 3-year schools. In fact, looking at schools individually, not once did any of the 17 medical schools experience their lowest performance during the year of an accreditation; rather, 16 out of 17 times the schools’ low point occurred between Year 2 and Year 6. In contrast, 9 out of 17 schools achieved their highest performance during the year of an accreditation

visit or the year immediately following and 0 did so in Years 4 or 5 post-visit. These patterns are just another way of describing the data illustrated in Figure 1, but they provide reassurance that the pattern is not simply driven by anomalous outliers.

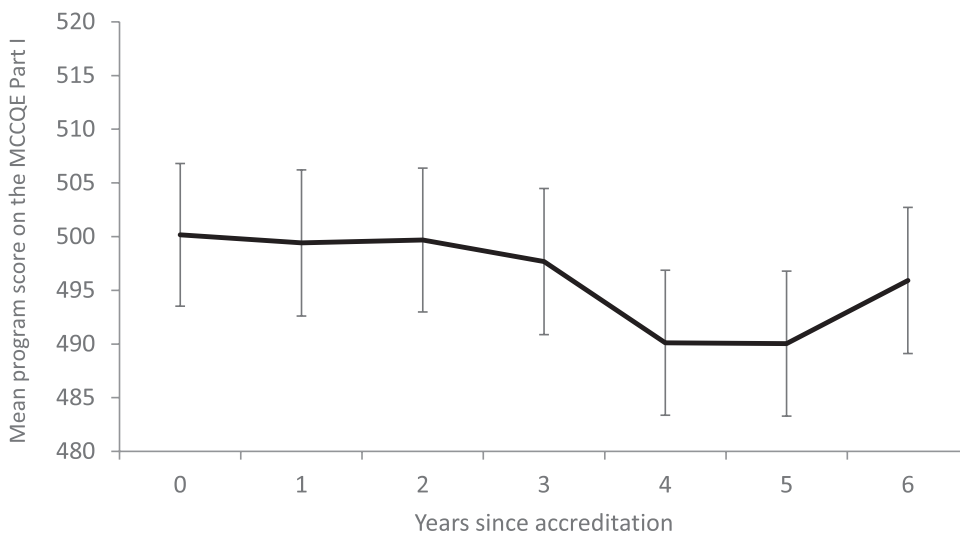
### The mitigating effect of interim review

To explore the impact of the introduction of interim reviews on the relationship between the accreditation cycle and MCCQE Part I scores, we performed the same analyses separately on the data generated before and after schools began participation in the interim review process. Figure 2, reflecting the preinterim review data, illustrates a pattern very similar to the overall pattern illustrated in Figure 1. In this case, however, both Year 4 and Year 5 were statistically lower than Year 0 ( $d > 0.45, P < .05$  in both instances).

In contrast, Figure 3, which isolates post-interim review implementation data, shows a very different pattern. This analysis is much less stable because only 7–9 observations are available for each “year since accreditation.” No significant effects were found and the dip that occurred previously at Year 4 post accreditation was no longer observed. However, drops of equivalent magnitude to those seen midcycle preinterim review implementation occurred midway through both periods from accreditation to interim review (Years 1 and 2) and from interim review to next accreditation (Year 6).



**Figure 1** Total MCCQE Part I score averaged across schools by years since accreditation. Abbreviation: MCCQE, Medical Council of Canada Qualifying Examination.



**Figure 2** Total MCCQE Part I score averaged across schools by years since accreditation before the introduction of an interim report. Abbreviation: MCCQE, Medical Council of Canada Qualifying Examination.

**Discussion**

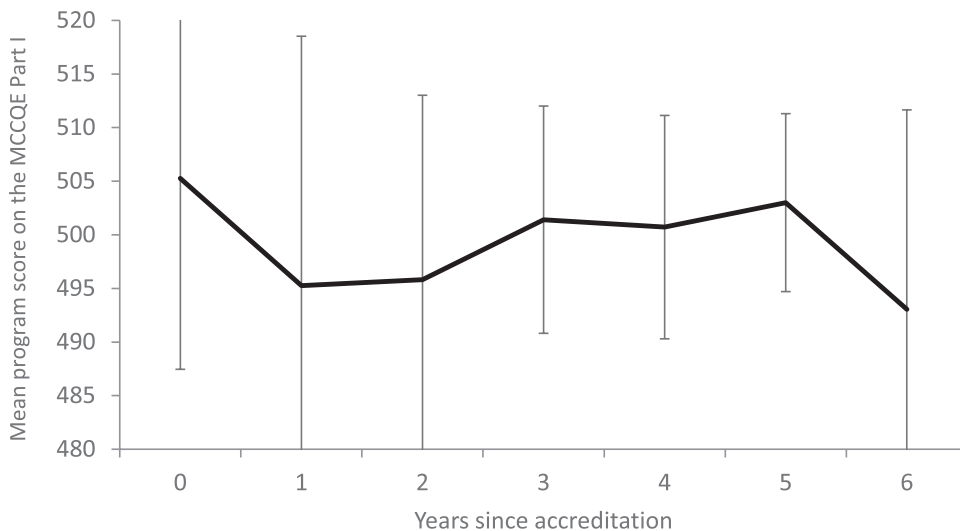
There are many facets of medical training that should be taken into account when defining the quality of an educational program.<sup>7</sup> One important marker is the amount of knowledge learners gain.<sup>10</sup> There are similarly many things that are likely to influence success on this particular outcome. In this study, we were able to observe that timing within an accreditation cycle needs to be considered as one such factor by using a national database of licensing examination results. In general, average scores for medical programs appeared to be at their highest in years close to when accreditation took place followed by a gradual descent of almost half a standard deviation to the

midpoint between accreditation and the school’s next review (Figure 1). This finding suggests that accreditation is doing something to impact upon student performance. But what? Answers at this point can only be speculative, but it is possible to use these data to rule out some possibilities.

If the dip arose from resources being taken up by accreditation processes causing long-term detriment to students who entered medical training during the year of a review (e.g., by not laying as solid a foundation on which they could build incoming students’ subsequent training), then one would expect the low point in the accreditation cycle to differ for 3-year and 4-year medical programs.

That did not occur, suggesting either that the additional attention paid to educational practice during accreditation (by engaging more actively in explicit consideration of the school’s performance data and self-study regarding their implications) brought performance up for students who graduated in temporal proximity to accreditation visits or that lessening of attention to educational practice when time between visits is maximal worked to the detriment of trainees who graduate midcycle.

Blouin et al, upon exploring Canadian medical school leaders’ perceptions of how accreditation impacts educational processes, argued that review leads to many relevant activities including



**Figure 3** Total MCCQE Part I score averaged across schools by years since accreditation following the introduction of an interim report. Abbreviation: MCCQE, Medical Council of Canada Qualifying Examination.

curricular monitoring, academic accountability, and educational reform.<sup>6</sup> Their participants also indicated the potential for negative impacts including cost and reduction in morale. Our data suggest the benefits might outweigh the costs in that accreditation-driven improvements in educational processes appear to translate into better educational outcomes. That, or, the negative influences on educational processes lag behind accreditation review, becoming observable as faculty and staff enter a refractory period when not required to outwardly monitor their practice and respond to challenges in the same way as during accreditation. We do not believe it likely that faculty deliberately reduce their effort toward education mid-accreditation cycle, but concerns about morale may indicate that the commitment and prioritization required during accreditation review is not easily sustainable. This supports the AFMC's implementation of an interim, less formal, review because a longer cycle appears insufficient to enable achievement of the goal of instilling a culture of truly *continuous* quality improvement.<sup>19,20</sup>

Determining whether or not such an interim review offers sufficient intervention to overcome the decline observed at midcycle will require more time. Nine of 17 Canadian medical schools have now undergone a single accreditation cycle that included an AFMC mandated interim review. As such, those data should be deemed highly preliminary. When we looked at them, however, an intriguing pattern emerged. Since 2011, accreditation reviews are expected to occur at Year 0 (formally) and Year 4 (informally). The length of a cycle, as a result, has been halved with 2 midpoints falling around Year 2 and Years 5–6. Observing that the pre-2011 decline in Year 4 relative to Years 0–2 was absent post-interim review implementation suggests that it is not just external evaluation activity that can be beneficial. Rather, informal *self*-evaluation against agreed-upon education standards appears to also positively impact important educational processes and student outcomes. However, in the post-2011 data, declines in performance were observed at the 2 newly created midpoints, raising questions again of whether accreditation reviews, formal or otherwise, draw energy and resources in a way that heightens educational outcome

but is not easy to maintain in a constant (i.e., truly continuous) manner.<sup>19,20</sup> We would encourage replication in other settings or patience as data accumulate in the Canadian context, however, before drawing conclusions regarding the mitigating role informal internal review might play.

As alluded to previously, limitations of this study include the fact that only one marker of educational outcome was available. The MCCQE Part I is insufficient to define the quality of education expected to be provided to medical students as it primarily examines only one's medical knowledge (as opposed to the many other roles and competencies expected of modern health care providers<sup>21</sup>). It is an important measure given its demonstrated relationship with clinical care measures,<sup>11–13</sup> but broader exploration of if and how accreditation practices influence educational outcomes for other types of competencies would be valuable. In addition, more deliberate and systematic prospective tracking of how educational processes ebb and flow during the accreditation cycle at various schools could have offered greater clarity regarding the mechanism underlying the patterns observed. For now, we can only speculate in a way that is informed by prior research. Finally, while it was worth examining the data collected separately for accreditation cycles that took place before and after the AFMC implemented its interim review processes, the latter set of data have not yet accumulated to the point of allowing sufficient statistical power to enable confidence in whether or not this change has overcome the problem of declines in MCCQE Part I performance as opposed to simply spreading the problem out.

For now, we conclude that there does appear to be a relationship between accreditation cycle and a school's performance on a national licensing examination and that this relationship is disrupted by informal institutional self-evaluation against the education standards used formally by the accrediting bodies. This implies that if we are to pursue the goal of truly establishing a culture of continuous quality improvement, we need to continue striving toward ongoing monitoring of and reform toward best educational practices in a manner that

is sustainable without inducing the unintended consequences of creating negative strain on our faculty and staff.

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