

Admission criteria for Canadian dental hygiene programs

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ABSTRACT

Objective: The purpose of this project was to understand the variation in admission criteria to Canadian dental hygiene programs and determine whether the criteria are appropriate in predicting a program's success rate on the National Dental Hygiene Certification Exam (NDHCE). **Methods:** Admission criteria were gathered from the websites of English-language dental hygiene programs in Canada. Individual dental hygiene programs were also contacted directly by phone or email if their admission criteria were not outlined on the program website. NDHCE success rates for each program were collected from the National Dental Hygiene Certification Board website. The association between the admission criteria and NDHCE success rates was examined. Pearson's product moment correlations were performed for post-secondary credits required for admission and program length. **Results:** Admission criteria for 29 of 30 dental hygiene programs were examined. Twenty-two programs accepted applicants directly from high school. The average program length was 83.7 weeks. Four programs offered post-diploma baccalaureate degrees in dental hygiene; one program offered a direct entry-to-practice degree program. Twenty-two (22) of the 29 programs utilized academic grades (including overall and/or prerequisite GPA) as admission criteria. Twelve programs included interviews in the admission process. A moderate correlation was observed between the number of postsecondary credits required for admission and NDHCE success rates ($r = 0.6723$). A weak correlation was found between program length and NDHCE success rates ($r = 0.1797$). **Conclusion:** Academic performance as an admission criterion, including overall/prerequisite GPA, was the most common criterion used by dental hygiene programs. Graduates from programs that required more postsecondary credits tended to perform better on the NDHCE. The higher success rate may be attributed to the rigour of the prerequisite courses, which may prepare students for dental hygiene studies and ultimately success on the national examination. In addition, students with more postsecondary coursework may be better adjusted to studies at a postsecondary level and/or be more experienced at taking examinations.

RÉSUMÉ

Objectif : Le présent projet avait pour but de comprendre la variation des critères d'admission aux programmes d'hygiène dentaire canadiens et d'établir la pertinence des critères dans la prédiction des taux de succès d'un programme à l'examen de certification nationale en hygiène dentaire (ECNHD). **Méthodologie :** Les critères d'admission ont été obtenus à partir de sites Web de programmes d'hygiène dentaire anglophones au Canada. On a communiqué directement par téléphone et par courriel avec les programmes d'hygiène dentaire individuels si leurs critères d'admission n'étaient pas présentés sur le site Web du programme. Les taux de succès à l'ECNHD de chaque programme ont été recueillis du site Web du Bureau national de la certification en hygiène dentaire. Le lien entre les critères d'admission et les taux de succès à l'ECNHD ont été examinés. La méthode de corrélation de moment-produit de Pearson a été utilisée pour examiner les crédits postsecondaires requis pour l'admission et la longueur du programme. **Résultats :** Les critères d'admission de 29 des 30 programmes d'hygiène dentaire ont été examinés. Vingt-deux programmes ont admis des étudiants directement de l'école secondaire. La longueur moyenne des programmes était de 83,7 semaines. Quatre programmes offraient des programmes post-diplôme menant au baccalauréat en hygiène dentaire; un programme offrait un programme d'admission directe à la profession. Vingt-deux (22) des 29 programmes utilisaient les notes scolaires (y compris la moyenne pondérée cumulative globale ou de prérequis) comme processus d'admission. Douze programmes avaient un processus d'admission qui comprenait des entrevues. Une corrélation modérée a été observée entre le nombre de crédits postsecondaires requis pour l'admission et les taux de succès à l'ECNHD ($r = 0,6723$). Une faible corrélation a été observée entre la longueur du programme et les taux de succès à l'ECNHD ($r = 0,1797$). **Conclusion :** Les programmes d'hygiène dentaire utilisaient le plus fréquemment la performance scolaire comme critère d'admission, y compris la moyenne pondérée cumulative globale ou de prérequis. Les diplômés de programmes qui exigeaient un plus grand nombre de crédits postsecondaires avaient tendance à mieux réussir à l'ECNHD. Le taux de succès plus élevé peut être attribué à la rigueur des cours prérequis, ce qui pourrait préparer les étudiants aux études d'hygiène dentaire et en fin de compte, à la réussite de l'examen national. De plus, les étudiants ayant un plus grand nombre de cours postsecondaires pourraient être davantage prêts aux études de niveau postsecondaire ou être plus à l'aise à faire des examens.

Keywords: academic performance; academic success; Canada; dental hygiene certification; dental hygienists/education; educational measurement; humans; oral hygiene; school admission criteria; students

CDHA Research Agenda category: capacity building of the profession

PRACTICAL IMPLICATIONS OF THIS RESEARCH

- Canadian dental hygiene programs seek to select applicants who are not only most likely to be successful on the culminating board examination, but also who embody the values and attitudes desired of the profession.
- There is a moderate, positive correlation between a program's performance on the NDHCE and the number of postsecondary credits required for admission.
- Programs that have an increased credit requirement for application may have an applicant pool with higher academic performance than those programs that require fewer prerequisites.

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Manuscript submitted 10 August 2020; revised 16 February 2021; accepted 22 February 2021

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INTRODUCTION

The scope of dental hygiene practice in Canada varies greatly. Some dental hygienists practise independently, with local anesthetic, temporary restoration, and prescribing rights (e.g., Alberta), while others are required to work under the direct supervision of a dentist (e.g., Prince Edward Island).¹ Similarly, the criteria for admission to dental hygiene programs are equally diverse, partly because university-based dental hygiene programs offer pathways where students can graduate with a baccalaureate degree, while colleges and technical schools offer diplomas. The challenge for all dental hygiene programs is to identify and select applicants who not only are most likely to be successful in the program and on the culminating board examination, but also who embody the values and attitudes desired of the profession.

Much of the literature focuses on individual achievement of students admitted into the program. Dental hygiene programs throughout Canada typically consider student academics as a major admission criterion. The majority of programs use overall grade point average (GPA) and/or science GPA as part of their admission criteria. For example, a study found that individual students who have higher marks in prerequisite anatomy and physiology courses also have a higher success rate on board examinations.² Furthermore, entering GPA has been shown to be the strongest predictor of individual success in both dental hygiene programs^{3,4} and the American National Board Dental Hygiene Examination (NBDHE).³

Other work has found that grades in specific courses as part of the dental hygiene programs, including oral pathology,⁵ microbiology,⁶ dental anatomy, head and neck anatomy,⁵ and oral radiology, were found to be a predictor of success on the NBDHE.⁷ A course in human nutrition was found to be correlated with cumulative dental hygiene GPA, which subsequently predicted success on the NBDHE.² The same study also found that prerequisite biology and chemistry courses were somewhat correlated with NBDHE success.² However, because these students had already been admitted into the dental hygiene programs, it is difficult to discern whether the programs' success was a result of appropriate selection of students or of the efficacy of the training program itself. In fact, Sanderson found that none of the 27 examined admission criteria were significantly correlated with NBDHE success rate,⁸ suggesting that student success on the board exam is a product of the training programs, rather than selection for admission.

Some programs in Canada require that the applicants have prior postsecondary experience, while others admit students directly from secondary schools. At the University of Alberta (Edmonton), applicants are required to have at least one year of postsecondary education with specific mandatory prerequisite courses. Qualifying applicants are also required to participate in the multiple mini interview (MMI) to allow for evaluation of attributes that align with

those of the program.⁹ However, admission criteria for other programs in Canada vary widely, likely leading to the selection of applicants with very different characteristics.

While significant work has been done to correlate admission criteria and success on an individual level, there is little that examines a training program's success in selecting the most appropriate applicants. Given the resource-intensive nature of the selection process, an understanding of the variation in admission criteria across the country and how these criteria correlate with a program's success rate on the National Dental Hygiene Certification Exam (NDHCE) is important to ensure that admissions committees are selecting appropriate applicants to become future colleagues.

The purpose of this descriptive study is to examine the variation in admission criteria in Canadian dental hygiene programs. Using this discovery-driven approach will allow for the investigation of the full breadth of criteria used by various programs, while also capturing nuances that may otherwise be overlooked with a directed, hypothesis-driven approach.

MATERIALS AND METHODS

The work in this study was reviewed by and deemed outside the mandate of the University of Alberta Research Ethics Board (REB 2). Consequently, the requirement for ethics approval was waived.

Admission criteria were gathered from the websites of all 30 English-language dental hygiene programs in Canada. Twenty-nine (29) out of 30 programs were used in data analysis, as 1 program had incomplete admission criteria. Admission criteria included interview type, secondary and/or postsecondary prerequisite courses, personal profile, reference letter(s), and entrance GPA. Other information such as the length of program, whether the program is degree granting, class size, number of applicants, accreditation status, and direct entry from secondary schools was also recorded in a spreadsheet. Each program was contacted directly by phone or email to ascertain the specifics of the admission criteria if they were not outlined on the program website.

NDHCE pass rates for each program were collected from the National Dental Hygiene Certification Board (NDHCB) website for 2015–2017. Scores for programs with fewer than 5 candidates at a sitting were excluded from analysis.

The association between the admission criteria and NDHCE success rates was examined. Pearson's product moment correlations were calculated. Strength of the correlations were assigned according to the guidelines established by Evans¹⁰:

- 0.00 to 0.19: very weak
- 0.20 to 0.39: weak
- 0.40 to 0.59: moderate
- 0.60 to 0.79: strong
- 0.80 to 1.00: very strong

RESULTS

One program was excluded from analysis as the admission information was incomplete. Information from 29 accredited English language dental hygiene programs in Canada was collected. The majority were diploma programs; only 2 were degree programs, and another 2 offered a degree-completion option. Program lengths ranged from 64 weeks to 96 weeks, with a median of 90 weeks. NDHCE success rates ranged from 52% to 100% over the course of the 3 years (2015 to 2017, inclusive), with a median of 90%.

Eight schools required that students have postsecondary prerequisites (advanced entry). Eleven programs admitted students directly from high school and 10 schools allowed for both direct and advanced entry into the dental hygiene training programs. Biology, chemistry, and English were the most common prerequisites required, whether they were at the postsecondary or high school levels.

Twelve programs required that candidates participate in an interview process. Two of these schools used the MMI format, one used a candidate questionnaire, and one required interviews only for those students who were under special consideration. All other schools did not have an interview type specified. Eight programs required that candidates submit a personal profile or statement as part of their application package. Standardized tests in the form of the Health Occupation Aptitude Examination (HOAE), program-administered entrance exams or aptitude tests were administered by 12 programs. The most commonly used admission criteria were academically based. Nineteen schools used grade point averages (GPAs), prerequisite GPAs or minimum required grades as part of their admission process.

The NDHCE success rates were omitted in 8 instances where a program had fewer than 5 candidates at that particular examination session. Strong correlations were found in all 3 years that were investigated (2015, $r = 0.6711$; 2016, $r = 0.6782$; 2017, $r = 0.6723$; combined, $r = 0.6982$) between the number of postsecondary prerequisite credits and program success rates on the NDHCE (Figure 1). The correlations between program length and NDHCE success rate were weak or very weak (2015, $r = 0.1666$; 2016, $r = 0.3093$; 2017, $r = 0.0546$; combined, $r = 0.1797$) (Figure 2).

DISCUSSION

There is considerable variation in the student selection process for dental hygiene programs in Canada. Admission criteria generally fall into the following categories: academic criteria, non-cognitive requirements (personal statement, interview, work experience), and standardized testing.

Academic criteria

As expected, the use of grades, both in direct and advanced admission programs, is common among the Canadian dental hygiene programs, similar to results from the United

Figure 1. Moderate correlations between the number of postsecondary credits required for admission and NDHCE success rates (%) were observed

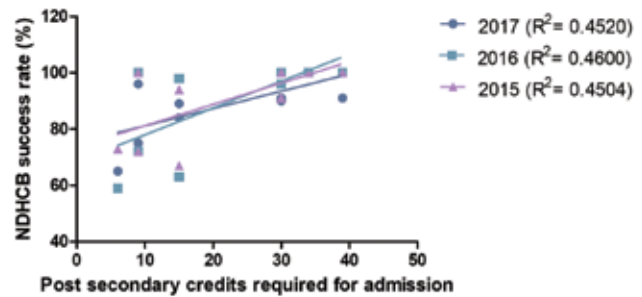
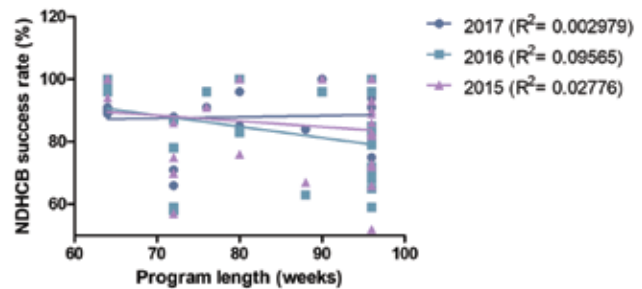


Figure 2. Weak correlations between program length (weeks) and NDHCE success rates (%) were observed



States.⁸ Examinations of dental hygiene programs reveal that grades are consistent predictors of success, not only within the matriculated dental hygiene program,⁴ but also on the culminating board exams.³ A comprehensive study in the United States, however, found that there were no statistically significant correlations between preadmission criteria and board exam success.⁸

Dental hygiene programs in Canada use academic information in a number of different ways. Some schools calculate GPA using only prerequisite courses, whereas others use the entirety of a student's educational history for this calculation. Additionally, schools weigh the importance of the GPA differently, with some using academic grades as the only admission criterion, and others simply using grades as a minimum standard that must be achieved prior to progressing through the admission process.

English, biology, and chemistry, either at the secondary or postsecondary levels, are the most frequently required prerequisites by Canadian dental hygiene programs. Prerequisite biology grades have been found to be a predictor of performance while matriculated in dental

hygiene programs,^{2,11} but they cannot be used to predict NDHCE scores, given that the Canadian board exam is reported as pass/fail, rather than as an indication of level of performance. Additional studies have shown correlations with grades in courses taken while in the program and board exam success.^{2,6} However, the students have already been selected and matriculated in the program making it difficult to draw conclusions about the efficacy of the admission criteria.

Though the calculation of GPAs varies widely among programs and the weighting and composition of the courses used in the GPA calculation differs from program to program, the focus of this work is on the type of criteria that is used, rather than how those criteria are established or evaluated for admissions purposes. Grades, whether in the form of cumulative GPA, science GPA or secondary GPA, are grouped together as “academic criteria.” However, because of the variations in standards found between the prerequisite institutions, as well as how the admission criteria are calculated and/or weighted by the different dental hygiene programs, the use of these academic criteria can be a problematic measure in the admissions process, despite the fact that they are widely used by all programs.

Non-cognitive requirements

The purpose of interviews during the admission process is to examine personal characteristics of the applicant that may not otherwise be apparent from other application materials. Identifying candidates who have desirable attributes that are not easily teachable may ensure that the future health professional will embody the desired characteristics of the profession. However, the purpose of the interviews and how they are utilized in the admissions process was not made clear.

Several different interview formats are used during the admission processes of various health professional programs, with each type of interview capturing different attributes. Of the 12 dental hygiene programs that used some sort of interview processes, it was not clear which attributes each program was trying to evaluate. MMIs are often used to examine a candidate’s soft skills, including professionalism, ethical judgment, interpersonal skills, and emotional intelligence. Studies examining other allied health professions have revealed that students with higher MMI scores tend to have higher clinical but not academic performance.¹² Dental students with higher MMI admission scores also demonstrated higher levels of professional behaviours.¹³ Another study evaluating the outcomes of interviews as admission criteria in an undergraduate medical program found that a selection interview increases the likelihood of selecting candidates with the potential to develop good communication skills with their patients and peers, leading to successful careers.¹⁴ These studies all support the notion that use of non-academic criteria can aid in the selection of successful health professional students.

Using MMI scores as an admission criterion, however, is not without drawbacks. Research has shown that personality characteristics like extroversion¹⁵ are associated with higher MMI scores, which may present a subset of candidates in a more favourable light to interviewers. Another criticism of using MMI scores is that interviewer subjectivity¹⁶ has been shown to affect reliability and validity of the MMI. Taken together, these factors can limit the diversity and inclusion of potential candidates to the profession who are needed to serve a heterogeneous population.

MMIs must be effectively designed according to the non-cognitive attributes desired by the program with attention to the number of stations and interviewer training.¹⁷ Additionally, MMIs may predict success on practical postgraduate performance. Due to the small number of schools that use the MMI, and the diversity of other interview techniques, conclusions regarding the use of interview scores as a predictive factor on the NDHCE exam are limited.

Various non-cognitive measures have been used by a number of health professional training programs in an attempt to improve diversity,¹⁸ with mixed results.^{19,20,21} Because of the differing types of measures that are used by schools to measure non-cognitive variables, it is difficult to assess the value of these measures in determining a candidate’s likelihood of success in the program as well as on the board exam. Non-cognitive measures need to be validated prior to being used as a criterion for admission into health care programs.²²

Standardized testing

This study shows that the majority of dental hygiene programs in Canada place heavy emphasis on academic achievement as a criterion for admission. Because GPA can vary depending on the types of courses taken, rigour of the institution where courses were taken, and the time period during which the courses were taken, some institutions have elected to administer a standardized test as an equalizer.

Standardized tests are used as admission criteria in many other health professions programs, including nursing²³ and medicine²⁴, but research examining their effectiveness in determining the success of students has been primarily on an individual candidate basis, rather than on how impactful they are to the program.²⁵

For both dentistry and medicine, a number of studies have found that the Dentistry Admission Test (DAT)^{26,27} and the Medical College Admissions Test (MCAT)²⁸ are correlated with student performance in their programs, as well as their respective board exams.²⁹⁻³¹ Similarly, performance on the American College Test (ACT) is predictive of dental hygiene student performance on the NBDHE.^{6,32} Unlike other health professions, however, dental hygiene does not have a common standardized admissions test. The present study found that the most commonly used standardized admission test is the HOAE. There do not seem to be any

studies evaluating the efficacy of this test in determining student success.

Academic experience

Perhaps most interestingly, this study found that there is a moderate, positive correlation between a program's performance on the NDHCE and the number of postsecondary credits required for admission, though the reason for this correlation is not clear and requires further study. The most obvious explanation is that the prerequisites selected by the programs better prepare the students for the rigours of the board examination. Other factors may also contribute to this finding.

It is also possible that students who have more postsecondary requirements may be older and/or have more experience with postsecondary education and test taking. However, the literature indicates that there is no difference in ages of those who performed well on the NBDHE,⁶ and age is not predictive of performance on dental board exams.²⁶ In fact, at an undergraduate level, younger students fare better academically than their older peers.³³ Although evidence indicates that age is not a predictor of performance on board examinations, a study found that older students with bachelor's degrees had higher motivation to pursue a medical career than younger students who had recently graduated high school.³⁴

Another possible explanation for why more postsecondary credits at admission is correlated with board examination success is that the applicant pool of programs that have more postsecondary credit requirements may be different. In other words, less academically inclined students may have been removed from the applicant pool based on their performance in the prerequisites. Consequently, programs that have an increased credit requirement for application may have an applicant pool with higher academic performance than those programs that require fewer prerequisites.

Limitations

There are a number of limitations that also must be considered when interpreting these results. The weighting of each admission criterion in the admission process was not always made clear by each program, and this can have an impact on the profile of the admitted students.

This study used the NDHCE as a single marker of program success, even though other markers, such as attrition, diversity, clinical competence, and/or social responsibility, are also indicative of program success. The use of the NDHCE is also a limitation because the Canadian exam is reported as pass/fail, while other board exams such as the National Board Dental Hygiene Examination administered by the Joint Commission on National Dental Examinations (NBDHE) in the United States report discrete percentages, allowing for more precise evaluation of program success.

Importantly, correlation between admission criteria and NDHCE scores may be obscured by the effects of the

training programs themselves. That is, the success rate may not be entirely due to admission criteria but may also likely be due to the nature of the program itself.

Future directions

The information gleaned from this descriptive work allows for the future development of hypothesis-driven studies that can explore the differences between programs with and without preprofessional preparation. This information would be important to determine which factors are most predictive of ultimate success. Additionally, determining whether differences exist between the graduates from programs that do and do not use non-cognitive admissions criteria would be useful to determine the predictive value of using such measures in selecting successful candidates.

CONCLUSION

Varied admission criteria are used by Canadian dental hygiene programs, with each type capturing different attributes. Consequently, the ideal applicant may differ for each program. All programs utilize grades as a component of the admissions process while relatively few programs use criteria that can showcase an applicant's "soft skills," which is what is more obvious to the public that interacts with dental hygienists. This can be particularly challenging for the public opinion and knowledge of a relatively young profession like dental hygiene. The heterogeneity in provincial scopes of practice, coupled with the differences in selection and training of candidates, can further complicate public perception of dental hygienists and their roles.

CONFLICTS OF INTEREST

The authors have declared no conflicts of interest.

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