ORIGINAL RESEARCH

Current state of otolaryngology head and neck surgery teaching in Canadian medical schools

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ABSTRACT

Background: Ear, nose, and throat diseases can account for nearly 50% of primary care physician visits. This study aimed to evaluate the current state of Otolaryngology – Head and Neck Surgery (OtoHNS) teaching within Canadian medical schools.

Method: Undergraduate OtoHNS course directors from all 17 Canadian medical schools were invited to participate in this cross-sectional study. The survey contained 41 questions, and evaluated both qualitative and quantitative aspects of the undergraduate OtoHNS curriculum.

Results: Ten schools completed the survey; 59% response rate. Ninety percent of schools reported a dedicated pre-clerkship OtoHNS curriculum, with an average of 24.2 hours spent (SD 16.8, range 6–50 hours). During clerkship, a rotation in OtoHNS was offered across all the schools, but only mandated in two. Teaching modalities, such as simulation and web-based modules, were frequently used. One of the major barriers to achieving the ideal curriculum was identified as lack of dedicated time for OtoHNS.

Conclusion: There appears to be a discrepancy in dedicated OtoHNS curricular time, especially during clerkship as reflected by mandatory rotations in only 20% of schools. The usage of simulation and web-based modules may serve to reduce this discrepancy, and enhance the learning experience for all undergraduate medical students.

Introduction

Ear, nose, and throat diseases account for a significant portion of visits in primary care. In the community primary care setting, between 20% and 50% of patient complaints involve the field of Otolaryngology—Head and Neck Surgery (OtoHNS) [1,2]. As the majority of medical students in Canada pursue a primary care residency, there is an important need to effectively teach OtoHNS disease presentations in the undergraduate medical curriculum [3]. Despite this, studies have demonstrated that there is still inadequate exposure to OtoHNS in the undergraduate setting, creating important learning gaps in the curriculum [4,5]. Glicksman et al. [6] surveying family medicine residents across Canada

found that the majority of residents felt insufficient classroom-based and clinical experience in the field of OtoHNS. Accordingly, the residents reported that they felt uncomfortable in managing patients presenting with OtoHNS conditions.

With this discrepancy in the learning requirement and demonstration of inadequate OtoHNS education, a thorough analysis of undergraduate curriculum in OtoHNS was needed [7,8]. Campisi et al. [4] assessed undergraduate OtoHNS curriculum across all Canadian medical schools and found that only a minority of curriculums mandated a rotation in OtoHNS. The duration of rotations was generally brief, with an average length of less than 5 days. This study also

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highlighted significant variability in type and time commitment to OtoHNS among the various medical schools [4]. With changes in the Canadian medical education framework and improved integration of CanMEDS roles (abilities physicians require to effectively meet the health care needs of the people they serve), a subsequent survey study in 2013 focused on the OtoHNS clerkship curriculum in Canada [9]. This study underscored the increasing impact of online learning as well as the importance of dedicating time and infrastructure to adequately provide teaching in OtoHNS content to all clerkship students.

Over the last decade, undergraduate medical curriculums in general have focused on integrating evidence-based education modalities to further improve student learning. This has included increasing the use of problem-based education and web-based modules, which have been shown to significantly enhance medical education [10–13]. With the increasing use of social media, medical schools have begun to incorporate this web-based tool to increase student engagement and collaborative learning [14] Last, over t he last few years, simulation-based education has gained significant interest as a teaching modality [15,16].

Since the previous assessments, the undergraduate OtoHNS education has undergone major changes with integration of new teaching and assessment modalities, aimed to better match the expectations of the curriculum as well as reduce variability in exposure and understanding to OtoHNS among Canadian medical schools. This cross-sectional study aimed to assess and compare the current state of undergraduate OtoHNS curriculum to previous studies as well as evaluate the integration of new education modalities within the field. In addition, this study sought to identify barriers in achieving the "ideal" OtoHNS curriculum across Canadian medical schools.

Methods

Participants

Undergraduate OtoHNS course directors from all 17 medical schools across Canada were invited to participate in the study. In instances where the OtoHNS undergraduate course director was unable to complete the survey, or if a dedicated course director was not identified for the OtoHNS curriculum, the Dean of Education of that medical school was invited to participate in the study.

Figure 1. Home screen of survey (English and French version).

Survey

An online survey was sent to all participants via the Qualtrics Software (Qualtrics LLC, Seattle, WA) (Fig. 1). Two versions of the survey were created, one in English and one in French, and were distributed to the OtoHNS undergraduate program directors via email. Two follow-up reminder emails were sent. The survey contained 41 questions, and evaluated both qualitative and quantitative aspects of the undergraduate OtoHNS curriculum, including the pre-clerkship and clerkship experiences.

Outcome measures

Quantitative data captured the time spent on OtoHNS in pre-clerkship and clerkship, time dedicated to OtoHNS topics, and subspecialty disciplines, as well as teaching and assessment methods used. Qualitative data was gathered from the survey focusing on themes surrounding barriers in establishing the "ideal" OtoHNS curriculum—a curriculum that is comprehensive to the learning needs of medical students, with adequate dedicated times, and resources. Moreover, we sought to identify the integration of technology (i.e., simulation, web-based module, social medical platforms) within different medical schools.

Statistical analysis

Prism (V7.0, GraphPad Software Inc, La Jolla, CA) was used for all the statistical analyses, with
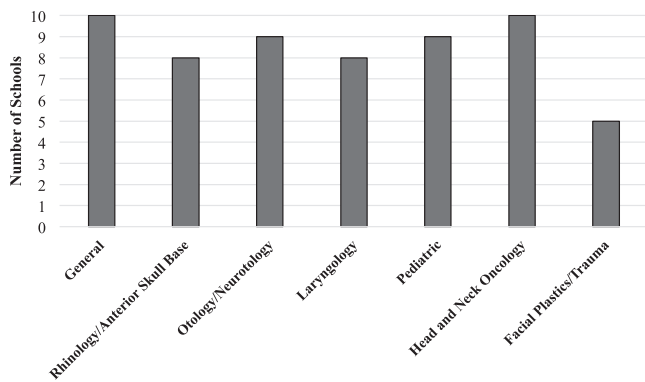
Figure 2. Topics covered during pre-clerkship curriculum.

Figure 3. Topics covered during clerkship rotation.

statistical significance set to $p < 0.05$. The results were obtained and formatted into dedicated spreadsheets designed for this study. Descriptive statistics were used to summarize quantitative data. Non-parametric testing with Mann–Whitney U test was used to evaluate time spent on OtoHNS curriculum based on faculty size. Non-parametric data were reported as median and interquartile range (IQR). Qualitative data was summarized.

Results

Of the 17 medical schools that were surveyed, responses were obtained from 10 schools, with a response rate of 59%. Nine of the responses were from OtoHNS undergraduate course directors, and one response was from the Dean of Education. Responses were made up of small faculty (<10 members)—40% and large faculty (>20 members)—60%.

Pre-clerkship

Nine of the ten surveyed schools reported a dedicated OtoHNS pre-clerkship curriculum. There were no plans to introduce a formal curriculum in the school that currently lacked an OtoHNS curriculum. The average time dedicated to OtoHNS during pre-clerkship was 24.2 hours (SD 16.8 hours), and ranged from 6 to 50 hours. The size of the faculty did not statistically impact the number of hours dedicated to OtoHNS in pre-clerkship ($p = 0.058$), although small faculties tended to have less hours spent on pre-clerkship curriculum as compared to large faculties (median 8, IQR 6–22 hours *vs.* median 30, IQR 20–40 hours) . General OtoHNS and head and neck oncology were topics that were covered by all schools in pre-clerkship (Fig. 2). Both symptom-based and disease-based approaches
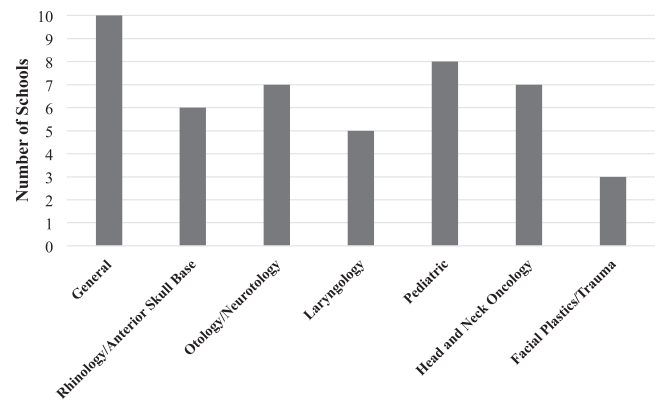
were utilized for teaching the majority (70%) of the topics. A combination of lectures (100%), clinical skills (100%), problem-based learning (100%), and online modules (70%) were used across all schools for delivering information in the OtoHNS pre-clerkship courses.

Clerkship

For the clerkship curriculum, it was noted that all 10 schools offered an OtoHNS rotation, but only two (20%) schools required a mandatory OtoHNS rotation. The average rotation length was 2 weeks. For those schools in which an OtoHNS rotation was optional, the approximated percentage of students who enrolled was 32% (SD 13.5%). Topics covered while on an OtoHNS clerkship rotation included general OtoHNS (100%), followed by pediatric OtoHNS (80%), head and neck oncology (70%), and otology/neurotology (70%) (Fig. 3). All rotations contained a component of participation in an out-patient clinic (100%), while the majority had the opportunity for students to participate in the operating room (90%). In-patient experience was available in only 60% of the surveyed schools. Being on-call was mandatory in 20% of schools and optional in 60%.

Teaching modalities

It was noted that simulation-based education in OtoHNS was utilized by only three (30%) of surveyed schools. Within the schools that used simulation, models included otoscopy simulators, cricoid/airway simulators, virtual scopes, and mannequins. Another three schools had plans of incorporating simulation-based teaching into their curriculum in the future. Web-modules were utilized by a majority (70%) of schools, while the use of social media, such as Facebook and Twitter, in the organization
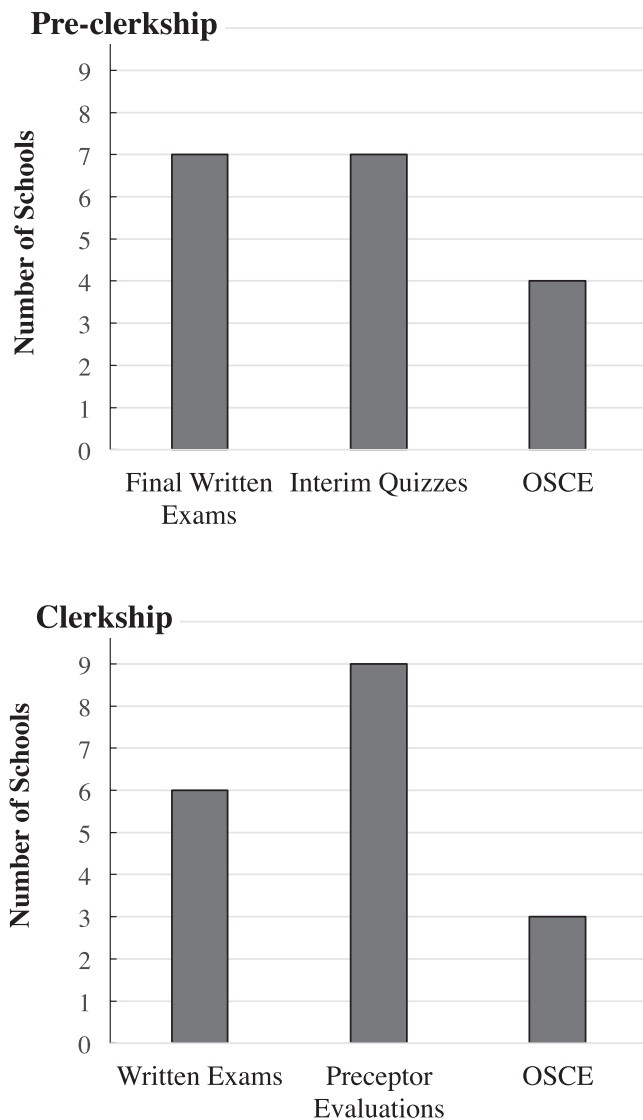
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Pre-clerkship

Clerkship

Figure 4. Types of evaluations used during pre-clerkship and clerkship OtoHNS curriculum.

and delivery of the undergraduate OtoHNS curriculum was low (20%). Furthermore, there was no plan to integrate social media into the curriculum among the other eight schools which are currently not using this web-based based tool.

Student evaluation

Pre-clerkship evaluation included written final exams, interim quizzes, and objective structured clinical evaluations (OSCEs). Common clerkship evaluations included final written exams, preceptor evaluations, and OSCEs. Figure 4 outlines the frequency by which different types of evaluations were utilized across OtoHNS curriculums. Evaluation during pre-clerkship primarily consists of written examination, while the majority of clerkship

assessment of performance in OtoHNS consists of evaluation by preceptor.

Opportunities

All of the surveyed schools offer research opportunities to students. These include basic science (70%), case reports (100%), clinical research (100%), review articles (60%), quality assurance/improvement (70%), and medical education research (90%). Only 3 of the 10 schools noted that they had the "ideal curriculum". When asked what the programs would like to change in their undergraduate curriculum, many replied with the addition of more time and exposure to the discipline of OtoHNS, specifically with a mandatory OtoHNS clerkship rotation. In identifying potential barriers for achieving the "ideal" curriculum, all of the respondents noted limited curricular time as a major barrier, along with lack of OtoHNS integration into other courses and disciplines.

Discussion

Medical school graduates are expected to have a broad amount of knowledge and skills. This creates many competing educational priorities during medical school. This study reveals a mismatch between the high proportion of OtoHNS presentations in primary care (i.e., otitis media, pharyngitis, and nasal obstruction), and the limited time devoted to OtoHNS education in medical school. This point is highlighted by our results that one of the major barriers to achieving an "ideal" curriculum in OtoHNS according to undergraduate program directors was secondary to lack of curricular time. Given the prominence of OtoHNS presentations in primary care, education during pre-clerkship along with clinical exposure during clerkship to common presentations in OtoHNS are vitally important for students' learning and ability to consolidate information, optimizing primary care delivery [17]. When evaluating time dedicated to OtoHNS during pre-clerkship, there appeared to be a wide range in the allocated time available, with one curriculum noting only 6 hours. Confirming prior studies, and literature from the United States and United Kingdom, there still appears to be a persistent disparity between the exposure and time dedicated to OtoHNS during medical school, as compared to the level relevance in primary care [7,8].

Comparing our results to the survey of undergraduate OtoHNS programs by Campisi et al. [4],

which reported only a minority of schools (37.5%) with a mandatory rotation in OtoHNS and only 19.5% of students participating in the optional rotations, it appears that there have not been any major changes to the OtoHNS clerkship curriculum across Canadian medical schools during the last decade. Moreover, Campisi et al. [4] reported 75% of schools provided OtoHNS related lectures, comparable to our findings of 90% schools providing a dedicated OtoHNS curriculum, all utilizing lecture based teaching in pre-clerkship.

With regards to novel technologies and teaching modalities, the majority of the surveyed schools had adopted web-based modules as part of the educational curriculum, along with some utilizing simulators. Current evidence points to the superiority of simulators and web-based modules not only as teaching modalities in OtoHNS, but are broadly accepted and desirable by medical students [17–21]. Several devices have been developed for the various skills within Otolaryngology subspecialties. This has included devices intended for undergraduate medical trainees, including the web-based OtoTrain and the OtoSim Ear Training and Simulation System device as well as ones appropriate for advanced training such as the Endoscopic Sinus Surgery Simulator (ES3) [18,19]. Specifically, with respect to otology and otoscopy skills, the use of simulation or web-based modules are superior to standard classroom lectures in terms of knowledge and skills development, retention, and transfer to real patients [20–21]. In the domain of online learning, Kandasamy et al. [22] found that Internet-based cases allowed for enhanced self-directed learning amongst undergraduate students. While we found the use of social media platforms in the teaching of undergraduate OtoHNS to be minimal, studies have shown that there is potential for increased learner engagement and improved knowledge, merting further investigation in the future. The continued incorporation of simulation along with web-based teaching into the OtoHNS curricula across Canadian medical schools may serve to improve and standardize the educational experience of medical students, given the current heterogeneity noted in the use of these studies across different medical schools.

Written examinations and interim quizzes still account for the majority of evaluation of medical student performance within the Canadian OtoHNS pre-clerkship curriculum. Unfortunately, questions which test facts or recall do not provide students with an effective ability to apply their knowledge, and create concerns of not developing competency in these subjects [24,25]. Within the OtoHNS clerkship curriculums, preceptor-based evaluations represented the majority of student evaluation. Well-structured preceptor-based evaluations have been shown to significantly improve medical student performance as well as enable preceptors to follow students' performance longitudinally [26]. Similarly, it is well established that OSCEs represent the gold standard in evaluating clinical performance [27–29]. Unfortunately, our results suggest that OSCEs were not frequently utilized in the OtoHNS curriculum across many of the medical schools surveyed.

There were potential limitations to the study. The response rate was acceptable at 59%, but a higher response rate may have provided additional information. Although a French version of the survey was produced, French-speaking medical schools did not respond to the survey. The authors attempted to contact medical schools several times, but were unsuccessful. As such, there may exist the possibility of selection bias in our results. Future directions with regards to increasing the sample size can aim to approach Undergraduate course directors of OtoHNS at the annual Canadian Otolaryngology—Head and Neck Surgery society meeting. Furthermore, with any survey research, the quality of the data relies on the accuracy of the responses provided by the participants.

Conclusion

Given the prominence of OtoHNS presentations in primary care, there still appears to be a discrepancy with regards to curricular time dedicated to OtoHNS across Canadian medical schools. We noted a wide range of hours available for an OtoHNS curriculum during pre-clerkship classroom learning, as well as during clerkship, as reflected by mandatory rotations in only 20% of schools. Although there is heterogeneity in the usage of technologies across Canadian medical schools for OtoHNS teaching, the authors believe that the continued usage of simulation and web-based modules may serve to enhance the OtoHNS learning experience for all undergraduate medical students.

Declaration

None.

Acknowledgments

Not applicable.

Ethics approval and consent to participate

This study was approved by the Queen's University Health Sciences & Affiliated Teaching Hospitals Research Ethics Board (HSREB), project #6021853.

Consent for publication

Not applicable.

Availability of data and material

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of interest

There are no competing interests to declare for any of the authors.

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Authors' contributions

All authors were involved with the conception and design of the study, analysis and interpretation of data, revision of the manuscript, and have approved the final manuscript.

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