ABSTRACT:

Many medical schools are interested in the location that their graduates pursue postgraduate residency training, and where they practice after leaving their school. Decreased access to healthcare services in rural and remote areas, which is provided largely by family physicians, has lead to a focus on the geographic distribution of physicians in Canada. The combined focus on social accountability in medical education and graduate tracking has led many schools to develop, or employ, systems to monitor their medical students after graduation. Using the Canadian Post-MD Education Registry (CAPER), a national medical education registry, this article seeks to present the proportions of McMaster undergraduate medical learners that may help to address the identified gaps in primary medical care and service to rural areas through two questions: 1) What proportion of graduates choose family medicine vs. medical/surgical residency training and 2) In what size community do graduates who pursue family reside in after residency?

It was found that McMaster, between 2013-2015, has produced a relatively stable proportion of family medicine residents versus other medical/surgical, and that the proportion of learners pursuing family medicine is in line with the proportion of residency seats available in family medicine compared to other medical/surgical specialties across Canada. It was also found, that a relatively large proportion (~70% - 80%) of students who pursue family medicine training eventually practice in larger urban centers (population greater than 100,000), compared to other geographic locations. Further work should focus on exploring physician distribution issues from a McMaster context, utilizing registries such as CAPER to ascertain more specific and detailed information regarding practice locations and physician distribution.
**INTRODUCTION**

Social accountability in medical education has been defined as the obligation of medical schools to direct education, research, and service activities towards addressing the priority health concerns of the community they serve.1 Social accountability has been of great interest to medical schools, with many schools adopting mandates to address the health needs of communities or populations they are situated within.1-6 Emerging focus in recent years has been on the supply of generalist or family physicians, as well as the supply and access of medical services to rural and remote populations.2-7-10 This increased focus is due primarily to the lack of access to adequate primary care services across Canada, especially in rural or remote locations, often adversely affecting residents of these areas.1,3-6,11 Rural communities are on average sicker and have worse access to healthcare than urban areas, which may partially be addressed through increased physician resources in these areas.12,13 Social accountability and medical education have been closely linked, looking at the supply of physicians, types of physicians being trained, and the distribution of physicians, alongside the responsibility of the medical community to train the physicians needed to serve the population.2-7,10,14-15 Undergraduate medical programs can help promote this relationship by assessing and understanding where their learners go, and what they pursue, when they move onto residency.2,7,9

The tracking of medical learners out into practice has been of increasing interest to medical schools.2-7,9 Whether to assess a school’s commitment to social accountability goals, effectiveness of educational structure or programs to promote community and rural medicine, or simply gain a better understanding of where their students eventually practice, this information can be of interest to a medical school.7 While some schools have established formal mechanisms for tracking graduates, other schools must rely on databases or other sources of collected information to gain insight into their graduates.2,7,9

McMaster’s Michael G. DeGroote School of Medicine was founded in 1966 with its medical education centered in the Academic Health Sciences Centre in Hamilton, Ontario.16 Since 2000, undergraduate and postgraduate medical education program enrolment has more than doubled, necessitating a network of distributed medical education (DME) opportunities in regions outside of Hamilton.16 DME at McMaster at the undergraduate level is organized primarily in two Medical Education Campuses (MECs), providing comprehensive medical education in the Waterloo Regional Campus (WRC) and Niagara Regional Campus (NRC).16 Clinical rotations also occur in three Clinical Education Campuses (CECs) in the Grand Erie Six Nations, Burlington and Halton regions. This network of DME sites is known collectively as Mac-CARE, McMaster Community and Rural Education.

Using a national database maintained by the Association of Faculties of Medicine of Canada, this paper explores tracking of medical graduates from the Michael G. DeGroote School of Medicine at McMaster University, herein known as McMaster MD graduates, to explore two questions related to McMaster MD graduates: 1) What proportion of graduates choose family medicine vs. medical/surgical residency training and 2) In what size community do graduates who pursue family reside in after residency?

**METHODS**

Information regarding the expansion of class sizes and campuses at McMaster’s medical school since 1999 was first gathered from the Undergraduate Medical Education Admissions Office. In order to look at the profiles of student’s post-undergraduate education,
the Canadian Post-MD Education Registry (CAPER) was utilized to report the measurements of interest. CAPER is operated by the Association of the Faculties of Medicine of Canada, and has been gathering postgraduate information for medical learners and practicing physicians since 1989. CAPER amalgamates information from a variety of organizations and reports, including the faculties of medicine across Canada. We asked CAPER to report the proportions of McMaster students entering either a family medicine residency in a College of Family Physicians of Canada certified program, or a medical/surgical residency in a Royal College of Physicians and Surgeons of Canada certified program, for McMaster MD graduates who completed their training between 1999 and 2015. We also requested this same stratification of chosen postgraduate training amalgamated for all medical schools in Ontario, as well as in Canada.

A request was also made for practice locations of McMaster MD graduates who chose to pursue a family medicine residency 2 years after the graduates completed their residency training. We decided to focus on family medicine graduates, as family physicians are responsible for the majority of primary care in communities, in keeping with the focus on social accountability to communities. Practice locations from 1999 to 2012 were therefore analyzed for McMaster MD graduates who went on to complete a family medicine residency. Practice location is defined by CAPER, using the definition of Statistics Canada Postal Code Conversion File Reference Guide, as Large Urban (population >100,000 people), Small Cities / Town (population 99,999 – 10,000 people), and Rural / Territories (population <10,000 people or a Territory). The two-year practice location is calculated using the physicians’ practice postal code and the population of the community that their primary practice is located in. The raw aggregate data was provided by CAPER, and Microsoft Excel was used to generate graphics and depictions.

RESULTS

Figure 1 depicts the class size upon admission for McMaster’s medical school by the graduation year, displaying total students as well as students by campus of study. The total number of students for each year has also been steadily rising, from 100 students receiving their MD in 1999 to a peak of 203 students beginning in 2013. The first class graduated from the Waterloo Regional Campus in 2010, and the Niagara Regional Campus in 2011. The class size for Hamilton has remained at 147 since 2010, with the WRC and NRC each progressing from 15 to 20 to 28 over three years, beginning with the year of their inception.

As shown in Figure 2, the proportion of students who entered a family medicine residency versus medical/surgical residencies was quite varied between 1999 and 2005, with one year (2002), in which a majority of students went into a family medicine residency. Between 2006 and 2011, the ratio of residency programs in family medicine to medical/surgical narrowed progressively each year from 40.0%:60.0% to 47.8%:52.2%, with more McMaster MD graduates going into family medicine training over time. This narrowing trend was broken in 2012, when the gap between residency types widened to approximately 24%. For the most recent 3 years, the proportion of graduates admitted to family medicine versus medical/surgical residencies have remained relatively stable at approximately 44% and 56% respectively.

The percentage of graduates who pursued family medicine can also be compared to the proportions of all of the Ontario Medical Schools combined, as well as Nationwide, as shown in Figure 3. With the exception of one year (2012), McMaster has always been on par with, or above, the total proportion of students pursuing family medicine, both provincially and nationally.
Figure 4 depicts the two-year practice location of McMaster MD graduates who chose to pursue a family medicine residency. As can be seen, a large majority of students primarily practice in the large urban setting, and proportions in the small city/town and rural/territory settings tend to fluctuate but remain relatively similar to one another.

**DISCUSSION**

When examining the proportion of student who chose to pursue family medicine training versus other medical/surgical specialties, several trends can be seen. While a student's decision to pursue family medicine versus another medical/surgical specialty could be influenced by any number of factors, it is nonetheless interesting to observe how these ratios have changed over the years. Between 1999 and 2005, there was wide variability in the ratio of family medicine to other medical/surgical specialties, with no discernible pattern, yet in the years from 2006 to 2011, and from 2012 to 2015, there are clear trends with proportions between family medicine and other residencies narrowing, leveling off, and appearing more stable. Speculating on the more recent stability of the trends, the known shortage of family physicians in Canada as well as enhanced practice models for practicing family physicians (such as Family Health Teams in Ontario) may have contributed to both medical schools and medical students’ interest in producing or becoming family physicians. Reliability in the proportion of students pursuing family medicine residencies will ensure greater numbers of family physicians produced as the time progresses and medical school admission numbers increase.

Analyzing the proportion of students who choose to pursue family medicine residency training from McMaster, Ontario, and Canada, it can be seen that McMaster produces, on average, similar or slightly higher percentages of family physicians compared to provincial and national averages. Looking at this data through a social accountability lens, this is promising in helping to address physician workforce demands in terms of raw family physician numbers. Looking at the percentage of residency positions across the country, the proportion of McMaster MD graduates pursuing family medicine residency is approximately equal to the proportion of all residency positions allocated to family medicine in Canada. Considering how the number and proportion of residency positions is partially determined based off projected future need by the Ontario Ministry of Health, it is promising to see that McMaster produces roughly the same proportion of family physicians to other medical/surgical specialists as the proportion of number of seats in family medicine residencies to medical/surgical residencies in Canada.

When examining the practice locations of McMaster graduates, it is interesting to consider the relatively constant large proportion that end up practicing in a large urban community. In 2011, Statistics Canada found that approximately 19% of the population lived in communities of less than 1,000 people, and less dense than 400 people per square kilometer. This definition of rural is smaller than the CAPER definition of rural/territory, meaning likely an even smaller proportion of CAPER rural practitioners practice in these Statistics Canada defined rural regions. In the literature, it can be seen that Canadians in rural areas may tend to have poorer access to primary and specialist care. Future work could focus on...
gathering more specific training and practice location information, to determine more accurately where students are practicing and training, as well as geographic distribution across Canada, relative to physician workforce demand.

It is important to note that data from some graduate years in Figure 4 have somewhat large numbers of unknown practice locations. This may be due to a resident who had not completed training, moved or practiced outside of Canada, taken time off for personal or family reasons such as parental leave, or pursued PGY3 training. Unknown data for the 2012 graduates is particularly large, as residents who chose to pursue further training would not have a two-year practice location available at the time of print.

CONCLUSION

Social accountability is becoming more prevalent and influential with regards to the future direction of medical education. One important metric in social accountability is addressing the issue of physician distribution across Canada and in rural / remote regions. The first step in assessing this is to understand what field undergraduate medical students choose to pursue, and where they end up practicing geographically. In recent years, McMaster has produced relatively equal proportions of family physicians relative to Ontario as a whole, and nationwide. Future work should aim to assess the social accountability mandates of McMaster, and what meaningful metrics might to assess their ability to meet these mandates.

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References

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