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Independent-Academic vs. University-Based Surgical Residency. Does Rural Medical Training Impact Residency Match?

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Abstract

Purpose: Rural general surgery experiences during medical school appear to have influenced the decision of prospective general and orthopedic surgery applicants to pursue residency programs that provide rural surgery opportunities. This is an analysis of a single cohort, rural-focused, longitudinal integrated clerkship to determine if there is an association between type of residency program applicants match with and completion of a rural-focused longitudinal integrated clerkships, as well as how rural clerkships affect practice size and location.

Methods: An institutional database of de-identified, self-reported data was reviewed to identify rural-focused longitudinal integrated clerkship alumni who matched into a surgical residency program.

Findings: Of the 75 alumni who chose a surgical residency program, forty (53.3%) matched into a university-affiliated residency program, and 32 (42.6%) matched into an independent-academic program. There was no association between type of residency program and completion of a rural-focused longitudinal integrated clerkship.

Conclusions: A rural-focused longitudinal integrated clerkship can help increase the rural physician workforce within both the state and region of the sponsoring institution. To facilitate heightened interest in rural general surgery, these types of programs should continue to be promoted.

Introduction:

At the national level, it is anticipated that there will be a substantial shortage of rural general surgeons by the year 2025.¹⁻³ Recruitment of general surgeons to these communities can be challenging due to a number of factors such as limited opportunities for spouses, fewer amenities and a heavy workload. Factors such as having a rural background and interests, as well as completing rural clerkships have been described as influencing the choice to practice rural general surgery.⁴⁻⁸ Previous exploration of the Rural Physician Associate Program (RPAP) cohort from the University of Minnesota has found that practicing surgeons who had rural training in a Longitudinal Integrated Clerkship (LIC) during medical school were

more likely to practice in a rural community, validating this assumption within Minnesota.^{4,8}

Surgical clerkships on longitudinal rotations, such as RPAP, have developed a variety of experiences, mimicking the medical student rural experience, as a way of introducing and nurturing interest in rural general surgery practice.^{4,5,8} RPAP is a 9-month, community-based LIC founded in 1971 at the University of Minnesota. The first program of its kind, it was developed to encourage students to practice primary care in rural areas across the state of Minnesota. Since the program's inception over 1 500 students have participated of which 40% practice rural areas, 65% practice in Minnesota, and 69% are in primary care.¹ RPAP students spend 9 months of

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the Year 3 of medical school located in rural communities throughout Minnesota supervised by a local primary care preceptor. All core clerkship experiences take place in the community in a longitudinal fashion. Students live and work side-by-side with community members. Rural communities in Minnesota have benefited from this shared experience by inspiring students to return to practice in a rural setting after having been immersed in the experience as a student. The University of Minnesota Medical School's strong rural curriculum fortified through both the regional campus in Duluth and the RPAP program increases the likelihood that its graduates will practice in rural communities.^{4,9-10}

Rural communities can be thought of as areas with lower population densities and population. Important characteristics of rural areas include lower cost of living, aging population, and proximity to natural resources. For this paper, we defined rural cities as those with a population of less than 50 000. We further designated small rural as < 20 000 residents, large rural as >20 000 and <50 000 residents, and metropolitan as >50 000 residents.

As more students have rural experiences in medical school, it appears that they have started to seek rural general surgery experiences in residency. Residency programs that promote rural surgery vary in type and location. There are currently limited studies of how LICs, such as RPAP or other rural-focused medical school programs, may impact students' interest and decision in choosing a residency program. Given the challenges of recruiting general surgeons and surgical subspecialists to rural areas, we sought to examine how the RPAP LIC affected surgeons' match in general surgery and orthopedic residency programs, as well as type and location of permanent practice.

Methods:

Institutional review board exemption was granted for this study. Retrospective, de-identified, self-reported data from the RPAP office regarding alumni who matched into a surgical residency (general surgery and orthopedics, n = 75) from 1971 through 2014. Data from 2014-2020 has not been added to this deidentified data pool since some of these graduates are still in training. The type of residency (independent-academic vs. university-affiliated), as

well as the last known area of practice, was reviewed for possible associations with completion of the RPAP longitudinal integrated clerkship. Independent-academic is defined as a community program without university ties, whereas university-affiliated encompasses all programs that are part of a university residency or have ties to it.

Results:

Of the 75 RPAP alumni who chose a surgical residency, including both general surgery and orthopedic surgery, 40 (53.3%) matched into a university-affiliated residency program, 32 (42.6%) matched into an independent-academic program, and 3 (4%) matched into a military program. When looking specifically at general surgeon alumni (n=60), 26 (43%) matched into a university-affiliated residency program, 31 (51%) matched into an independent-academic program, and 3 (5%) matched into a military program. A comparison of proportions utilizing chi-squared testing revealed no statistical difference when looking at general surgery and orthopedic surgery versus general surgery alone in the domains of university-affiliated and independent-academic residency programs ($p = 0.35$ and $p = 0.25$, respectively). This suggests that there is no correlation between RPAP and type of surgical residency.

Using the self-reported data, a breakdown of general surgery and orthopedic alumni by last known practicing states (Figure 1), as well as distribution of last known practice community sizes (Tables 1, 2).

For general surgeons, 27 were practicing in MN, 9 were practicing in the neighboring states of Iowa, North Dakota, South Dakota, and Wisconsin (Figure 1). The distribution of alumni who matched into general surgery (n=60) shows that 21 (35%) were practicing in a rural setting, 21 (35%) were practicing in a metropolitan setting, and 18 (30%) did not identify what size community they were practicing in (Table 1). There is an equal distribution of alumni who were practicing general surgery in either a rural or metropolitan setting. As previously mentioned, of the nearly 1 500 students who have completed the RPAP LIC nearly 40% practiced in rural areas. Of those who matched into general surgery and reported where they were practicing, half (50%) were practicing in a

rural setting; 10 percentage points greater than the collective group of all RPAP alumni. Of note, there is an appreciable number of alumni who did not identify their community's population size, which could affect the distribution between rural and metropolitan practice.

For orthopedic surgeons, 8 were practicing in MN (Figure 1). The distribution of alumni who matched into orthopedic surgery (n=15) shows that 7 (47%) were practicing in a rural setting, 5 (33%) were practicing in a metropolitan setting, and 3 (20%) did not identify where they were practicing (Table 2). There is a higher distribution of alumni who were practicing orthopedic surgery in a rural than metropolitan setting. It is worth noting that this group is considerably smaller when compared to general surgery.

Collectively, the data highlights a higher proportion of the aggregate RPAP alumni, who matched into either general or orthopedic surgery, were practicing in a rural setting (48%) than a metropolitan setting (37%). Furthermore, nearly three-quarters were practicing in Minnesota (71%). This data seems to suggest that those individuals who completed the RPAP LIC are more likely to practice in Minnesota, and in rural settings. However, it is also important to note that 21 (28%) individuals of the aggregate did not identify what size community they were practicing in. This missing data could have a significant impact on the distribution of practice locations if it were skewed towards either rural or metropolitan settings.

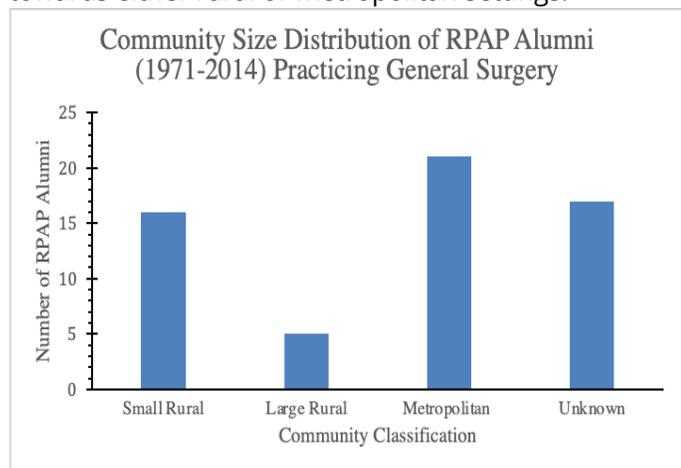


Table 1: Community Size Distribution of RPAP Alumni (1971-2014) Practicing General Surgery. Populations of each community are defined as Small Rural = < 20

000; Large Rural = 20 000 - 50 000; Metropolitan = > 50 000. Unknown alumni did not have a current location of practice.

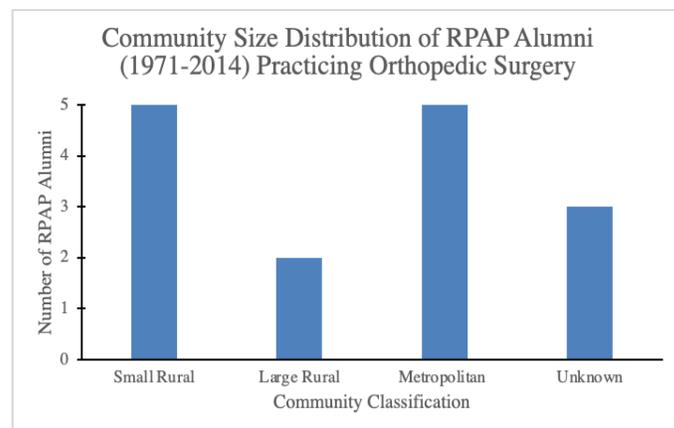


Table 2: Community Size Distribution of RPAP Alumni (1971-2014) Practicing Orthopedic Surgery. Populations of each community are defined as Small Rural = < 20 000; Large Rural = 20 000 - 50 000; Metropolitan = > 50 000. Unknown alumni did not have a current location of practice.

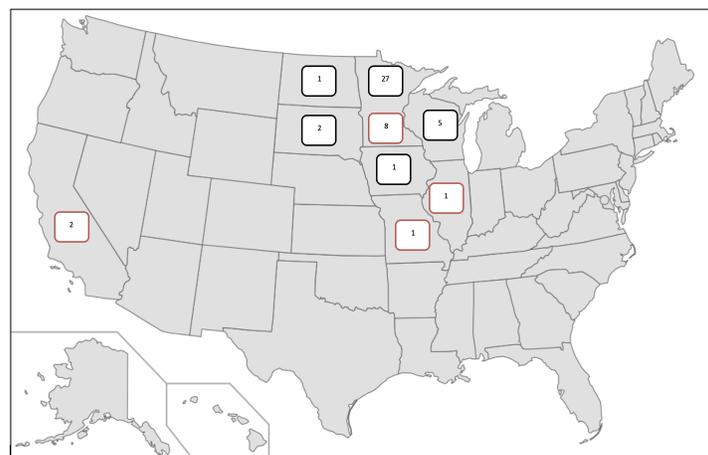


Figure 1: RPAP alumni cohort (1971-2014) last known state of practice. Black Box - General Surgery, Maroon Box - Orthopedic Surgery

Discussion:

This paper serves to investigate how educational experiences, specifically the RPAP longitudinal integrated clerkship, impact residency or career placement in a single public land-grant institution located in the Midwest. This cohort of RPAP alumni suggests that there is not a correlation between the type of residency program an individual will choose; however, students that complete this educational

experience are likely to practice within the state of Minnesota as well as in rural areas.

Building on prior studies from the RPAP cohort,^{4-5,7} this study serves to promote further investigation and discussion around outcomes of rural focused programs on medical student career development. RPAP historically has had higher rates of alumni who practice rural medicine when compared to those who did not participate in the LIC.⁴ With an increasing and aging population, the demand for physicians overall continues to increase as workforce shortages are expected throughout the country by the year 2030.¹¹ The Ohio State University has studied the demand for general surgeons using population-based modeling and have identified an overall general surgery workforce shortage between 4 917 and 7 047 in the year 2050. This is despite increasing medical school enrollment, graduate medical education programs, and new accredited medical schools.¹²

Historically, RPAP students have not chosen community or independent-academic residency programs over university-affiliated programs. This may be due to personal and future practice interest. It may also be related to a desire to remain in the region for training and the options available. Other factors may be at play such as spouse's occupation, family preference or other unknown aspects, yet LIC programs such as RPAP have been one avenue to increase interest through increased exposure, hands-on experience, and increased responsibility. Students in RPAP are able to formally experience what the life of a general surgeon can be like as well as explore the field of surgery with one or a few providers. The symbiotic relationship of primary care physicians with surgeons in rural settings is seen and experienced by RPAP students, highlighting the interdependence. LICs have been critical in providing the opportunity for students to experience and learn about a rural community. This type of experience is critical towards sparking an interest and nurturing it with the hope of enticing new physicians to practice and live in a rural area.

Meta-analysis has shown that third and fourth year students participating in RPAP, or RPAP like experience, appear to be the most influential in impacting choice of rural practice; there is

reproduced data supporting that this may be more important than choosing students from rural upbringings alone.⁸ Rural practice experience later on in medical education in the later years of medical school and in residency increase rural retention by 4 times, but meta-analysis has shown this may range from 1 to 19 times more impactful; this has been studied across the United States and in European countries.⁸ Additionally, immersion into a rural setting for urban raised students in third year clerkships has a positive impact on interest in future practice within a rural setting. The University of Louisville has been sending urban students for 4 to 6 week rural, surgical immersion rotations which has yielded a positive impact on perception of rural practice quality of life, work-life balance, comfort of living, comfort of support, and patient motivation.¹³ Thus, it remains important that RPAP and these rural experiences be promoted to students interested in the field of general surgery and other needed rural specialties.

Lastly, rural general surgery residency programs have been steadily increasing in recent years to accommodate the growing demand of rural surgeons, yet students must have interest in surgery in order to increase resident numbers. It is unclear how rural residency programs and tracks may impact future students who gain their core clerkship experiences at schools which use the LIC model. Specific to RPAP, this will be an interesting topic to explore as more general surgery programs with formal rural experiences come online. In the few years these programs have been open, they have been competitive and drawn strong applicants.^{4,7}

Limitations:

Comparison was not made to other longitudinal programs or traditional clerkships. Data was from a self-reported, de-identified study without recent follow-up. The data set being analyzed is 6 years old, and it is not able to take into account how increasing numbers of rural residency training programs, including the recently established one at the University of Minnesota, may impact candidates preference in training programs.⁷ We did not assess the number of longitudinal clerkship students who applied into rural surgery, but who did not get placement, nor were we able to discern their exact thought process in choosing independent vs.

university affiliated programs. Minnesota has 3 general surgery residencies and 2 orthopedic surgery residencies. In general surgery, Hennepin County Medical Center has an independent-academic general surgery training program. Mayo Clinic has one university affiliated general surgery and one orthopedic program. University of Minnesota has one university affiliated general surgery residency with a rural training track option and one orthopedic surgery residency. Of those who answered the survey 13 completed a general surgery residency (10 independent-academic; 3 academic) and 8 completed an orthopedic surgery residency (7 independent-academic and 1 academic) in Minnesota.

Data from residents currently in training may also change the results of the data we have recorded. Additionally, there is about one-third of data from alumni surveyed that is incomplete which may be quite impactful if those residents did not practice in rural, midwestern locations. Lastly, it is not possible to completely discern if RPAP, rural training experiences, or both have the most significant impact on residents' choices.

Another interesting question that our data set is unable to answer is whether individuals were from the states they currently practice in and how this compares to other states retention rates. Overall, we know that over 70% of University of Minnesota Medical School graduates come from Minnesota given the public land-grant charge of the university to produce physician workforce

Conclusion:

This study has demonstrated that rural focused experiences in a single institution can help to increase the rural physician workforce in state and within a region. While the RPAP program at the University of Minnesota Medical School has made a difference in choice of practice setting for its graduates, it does not appear to influence the match process of residency in either general surgery or orthopedic surgery. This suggests that exposure to rural practice in medical school can be nurtured with a variety of residency experiences. As rural-training tracks in residencies expand, additional research into the influence of those experiences and other programs like RPAP in

medical school on the development of rural surgeons is warranted.

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