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Abstract

Introduction

The shortage of primary care doctors in rural America is on a continual incline, with only about 3% of recent Family Medicine residency graduates expressing interest in rural practice. Medical schools across the country have implemented various programs to attract students to rural medicine, with varying success in their graduates setting up rural practice.

Methods

The UAB Marnix E. Heersink School of Medicine (UABSOM) Huntsville Regional Medical Campus (HRMC) operates a three-part Rural Pathway with college premedical, medical school, and Family Medicine residency elements. The residency specialty and first practice locations for students in this path were analyzed from 2004 – 2022.

Results

These pathway elements work together with a current success rate of up to 54% practicing in rural Alabama. For students who participated in all three elements, while the number is small (5) the success rate is high, with 80% now in primary care practice in rural Alabama.

Conclusions

These elements are inexpensive to implement, embrace the often-underrepresented rural student, and create physicians to serve rural patients.

Keywords: Rural physicians; Rural medical students; Rural medicine pathway

The mission of medical schools notably includes patient care, research, and education of the state's medical workforce. Training physicians who will serve rural populations is a priority for many medical schools and approximately 69% have implemented strategies to recruit rural students while 45% recruit those with interest in primary care.¹

This is because although 20% of the US population lives in rural areas, only 11% of doctors practice in such areas.² The most important indicator is hometown: students with a comprehensive rural background are 2.5 times more likely to end up in rural practice than urban students.³ Unfortunately, there has been a decline in rural medical students who now represent just 4.3% of the incoming medical student body, and only 3% of senior residents would consider practice in a community of less than 25,000.⁴

The decline in the number of medical students from rural areas has been substantial. From 2002-2017 the drop was 28% while the overall number of matriculants increased by 30%.⁵

In 2008, Bowman⁶ developed a standard primary care year estimate to highlight the issue of the declining primary care utility, especially in rural communities. The estimate consists of four factors: career length in years, percentage estimated to remain in primary care, percentage active in practice, and the percentage of primary care volume compared with a family practitioner. The study showed that family medicine is the most permanent primary care example with an average of 29.3 standard primary care years over a 35-year career. All other primary care avenues contributed much less, showing that one may need 10 nurse practitioners to equal the

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same contributions as a family medicine physician. This study shows the importance of maintaining adequate graduates in the family medicine specialty.

UAB Marnix E. Heersink School of Medicine has three regional medical campuses along with the main campus in Birmingham, Alabama. The entering class of 186 students spend their basic science years in Birmingham (MS1 and MS2). For the MS3 and MS4 clinical years, 98 students remain in Birmingham, 34 each go to the Huntsville and Tuscaloosa campuses, and 20 go to the Montgomery campus. Each student knows upon matriculation their clinical campus placement.

UAB Heersink School of Medicine identifies students as rural based on the U.S. Census Bureau definition of being non-urbanized areas of less than 50,000.⁷ The Huntsville and Tuscaloosa campuses have similar rural primary care pathways to recruit students from rural Alabama. Additionally, Huntsville operates a Rural Premedical Internship (since 1992) and a Family Medicine Integrated Residency (since 2017); Tuscaloosa adopted both of these programs in 2022.

The Huntsville Rural Medical Campus (HRMC) rural pathway is an effort to produce more physicians for rural Alabama. The pathway consists of three formal components, with students able to enter and exit the pathway at any or all components. The Huntsville Rural Premedical Internship is for college students from rural Alabama; the Rural Medicine Program for UAB Heersink School of Medicine admission is open to any Alabama applicant from a rural area; and the Integrated Residency is for any UAB Heersink School of Medicine student interested in rural family medicine.

I. Undergraduate Recruiting and the Huntsville Rural Premedical Internship

Beginning at the high school and community college level, we make contacts and interview interested students. We sponsor a day of Camp L.E.A.P. (Learning Everything About Patients), a North Alabama AHEC program for high school juniors and seniors. We teach simple suture procedures and how

to scrub for surgery, as well as making a presentation about the role of rural primary care physicians. We speak to about 25 students each summer (the COVID-19 years excluded).

The next effort is a 19-year-old project for college premedical students from rural Alabama. Since 2004, the **Huntsville Rural Premedical Internship (HRPI)** recruits undergraduate rural students into a seven-week summer program exploring primary care medicine in rural and urban settings, and observing experiences of medical students and residents at a regional campus. The interns spend four weeks in Huntsville (population 217,000) shadowing doctors in the campus clinics (family medicine, internal medicine, pediatrics), including rounding with residents at the hospital. They also shadow community family physicians. They attend noon clinical conferences learning skills such as EKG interpretation and basic X-ray interpretation. They then spend two weeks shadowing family medicine physicians in their rural home towns (populations 25,000 or fewer).

The final week they return to Huntsville to create a team-based grand-rounds-type presentation related to the state's rural medical issues and create accompanying scientific posters. This element of the internship is designed to enhance the skills of teamwork, research, and leadership and to introduce the learners to the fundamentals of rural medical research.

Many HRPI participants subsequently apply to UAB Heersink School of Medicine via regular admission or as part of the school's Rural Programs; others choose different medical schools or non-physician careers. Students receive a \$3,000 stipend from the state's Alabama Family Practice Rural Health Board to cover housing, meal, and travel expenses in Huntsville. HRMC contributes .15 FTE of the director and .25 FTE for the administrative assistant.

II. UAB Marnix E. Heersink School of Medicine Rural Medicine Program

The Rural Medicine Program (RMP), now 15 years old, is a sister program to the older, successful Rural Medical Scholars Program based at the Tuscaloosa regional campus.⁸ RMP is a five-year path to the MD

degree open only to rural Alabamians who complete a special application examining the applicants' medical exposure, rural experiences, and community service (which serve as indicators of sense of place and interest in non-urban practice). The admission process is the same as all UAB Heersink students with the addition of rural physician interviewers. The academic metrics of RMP students are often less rigorous than the average regularly admitted Heersink School of Medicine students; the most recent RMP metrics showed an average MCAT of 503.9 (495-512) and BCPM GPA of 3.71 (3.28-4.0) while regularly admitted students as a whole produced an average MCAT score of 509.2 and GPA of 3.8.

RMP begins with a prematriculation (post-baccalaureate) year on the campus of Auburn University under the auspices of the College of Science and Mathematics. This extra year is to ensure that rural students, who often had weak high school preparation leading to modest college performance, are given the opportunity to excel while taking rigorous medical school prep courses: anatomy, physiology, immunology, and histology (the exact curriculum tailored to the individual needs). Additionally, learners are exposed to the principals of rural practice and the state's primary health care needs, as well as FM skills via the year-long Clinical Applications course. Upon matriculation in Heersink School of Medicine, RMP students complete their preclinical education in Birmingham before moving to the Huntsville campus for the clinical years. They participate in a rural curriculum blended into the regular coursework. These curriculum enhancements include rural rotations and mentorship, participation in the state and national Academies of Family Physicians, state and national meeting participation, and rurally oriented seminars and research activity. Leadership skills are fostered and multiple RMP students have served as chief residents, AAFP Emerging Leaders, AAFP National Student and Resident Board of Directors, and FMIG Regional and National Coordinators. The triad of scholarship, leadership, and insight into the needs of underserved Alabama is intentionally cultivated.

RMP members are typically recruited to remain in Huntsville for a family medicine residency. The RMP requirements are .4 FTE for the Director, .6 FTE for the

administrative assistant and .1 FTE for both the academic and clinical coordinators at Auburn University. The UAB (Birmingham) contribution is 0.5 FTE for admissions duties (personal communication).

III. Residency Preparation Rural Program
The Integrated Residency (IR) in Family Medicine is the third component of the rural pathway and is in its fifth year. This is a targeted curriculum for fourth-year rural medical students to prepare them for family medicine residency.

The transition to residency is difficult for many students in FM where the wide variety of patient types requires a greater number of clinical skills compared to narrower specialties. The fourth year of medical school often does a poor job of preparing students for transition to residency and has been described as "lacking structure and clarity" and a period of "drift, lax evaluations and passive absorption."^{9,10} Often a significant amount of time in the fourth year is devoted to visiting potential residency locations. These factors have contributed to numerous problems facing new residents, among them: "poor organizational and study skills, difficulty with multitasking and a lack of medical knowledge competency."¹¹

The Huntsville FM Residency interviews interested MS III applicants from any UAB Heersink campus who have a rural background and have expressed interest in practicing in rural Alabama. The IR can accept up to six students per year, which is half the next year's residency class of 12.

IR students enroll in the special MS IV year curriculum including rotations in rural family medicine, pediatrics, family medicine, pulmonary medicine, cardiology, nephrology, and emergency medicine. The students follow family medicine clinic patients throughout their fourth year under the supervision of their assigned senior resident mentors who are selected based upon their willingness to teach, personality, and clinical acumen. IR students attend the resident didactic sessions, morbidity and mortality conferences, grand rounds, and special topics discussions taught by the mentors. These opportunities also produce mastery of the EHR (both clinic and hospital) as well as enhancing patient skills,

increasing the IRs' confidence and competence. For the increased work, a \$20,000 scholarship is awarded to cover 66% of senior tuition; students with preexisting full scholarships are not eligible for compensation.

If the student excels, it is hoped that they will rank the Huntsville program in the match but are under no obligation to do so; all students are required to submit the ERAS application, which is the residency matching system for the United States. If significant academic or professional issues are encountered, the students are coached during the IR Year and potentially are dismissed from the program early enough so they can participate in residency match interviews.

The IR was created in response to the observation that the majority (70%) of Alabama's FM resident physicians were not from Alabama and many left the state, often due to visa issues.¹² The Huntsville Family Medicine residency recognized that a number of UAB Heersink rural and non-rural students went out of state for FM residencies and remained out of state. The Integrated Residency incentivizes our own students to choose the Huntsville residency. The IRs who match in Huntsville (to date they all have), will do a rural rotation as a resident, which is required for all Huntsville FM residents.

The chief residents for the past three years have been Integrated Residents and, of the nine IRs who have completed residency, seven are practicing in rural Alabama.

We have found that those joining the IR influence other students to stay in the Huntsville FM residency; maintaining medical school friendships and knowing with whom one will be working seems to be an attractive feature. When the program began six years ago, only five out of 36 Huntsville FM residents were UAB Heersink graduates; at the beginning of the 2022 academic year, 21/37 were from UABSOM and 24/37 were from the state of Alabama. Fifteen (15) of these were members of the IR. Eleven (11) of the 12 IRs who are either currently practicing or have signed contracts are staying in the state of Alabama.

The programmatic requirements are .1 FTE for the Residency Director; the remainder of the duties are borne by the FM residents.

Table 1. Success Rates of Rural Pathway Programs

HRPI 2004-2022		
Total HRPI Participants	232	
Accepted to Medical School	153	69.5%
Currently in Residency	42	
Currently in FM Residency	15	35.7%
Currently in Practice	68	
Currently in FM Practice	31	45.6%
Currently in Alabama Rural Practice	22	32.4%
<i>HRPI became a rural-focused program in 2004</i>		
RMP 2006-2022		
Total RMP Participants	159	
Total Graduated from Medical School	103	
Currently in Residency	30	
Currently in FM Residency	13	43.3%
Currently in Practice	73	
Currently in FM Practice	50	68.5%
Currently in Alabama Rural Practice	30	41.1%
<i>The first RMP class began in 2006</i>		
Participated in both HRPI & RMP 2004 -2016		
Currently in Practice	24	
Currently in FM Practice	18	75.0%
Currently in Alabama Rural Practice	13	54.2%
<i>Those who began Medical School in 2016 are not yet in practice and not included in this chart</i>		
Participated in all: HRPI, RMP & IR 2018-2022		
Total HRPI/RMP/IR Participants	10	
Currently in FM Residency	4	
Currently in Practice	5	
Currently in Alabama Rural Practice	4	80.0%

Discussion

Rural physicians comprise only 7.1% of UAB Heersink graduates (including all specialties).¹³ The rural primary care needs for Alabama are substantial and are growing secondary to the aging population of physicians. Though UAB Heersink is ranked as the 26th best primary care medical school in the US, all available resources must be mobilized to meet this need.¹⁴ The UAB Huntsville Campus program leverages established medical school admissions and resident resources combined with a small number of employees whose main duties are rurally-oriented. The state provides money to support rural programs, as the economic impact of a practicing family medicine doctor in Alabama was \$1,000,000 per year in 2014; \$1,488,560 if their practice includes obstetrics.¹⁵

The UAB Heersink rural pathway students are tracked throughout their training years until first year of practice by personal communication via e-mails, phone calls, and in-person conversations. The outcomes compare favorably to other medical school rural programs (Table 1). The successful program at the University of Missouri reports that 32% of their graduates become rural Family Medicine doctors (personal communication) and the excellent Rural Physician Associate Program in Duluth, MN reports 26% of their graduates practice rural FM (though the combination of the Duluth preclinical experience plus RPAP produced a large number of primary care practitioners).¹⁶ The University of Kentucky Rural Physician Leadership Program produced 17.9% family medicine physicians.¹⁷

In 2021, 12.6% of the United States medical graduates matched into Family Medicine overall.¹⁸ Indeed, only 22% of family medicine doctors engage in rural practice nationwide.¹⁹

We believe that rural medicine exposure at the undergraduate level combined with a commitment to admit carefully selected rural applicants to medical school and, leveraging mentorship to imbed them in rural tracks through residency, provides a successful method of producing rural family physicians at a manageable programmatic cost.

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