ORIGINAL ARTICLES

Institutional Characteristics Influencing Medical Student Selection of Primary Care Careers:

A Narrative Review and Synthesis

Dean A. Seehusen, MD, MPH; Meghan F. Raleigh, MD; Julie P. Phillips, MD, MPH; Jacob Prunuske, MD, MSPH; Christopher P. Morley, PhD; Molly E. Polverento, MSEd, CPH; Iris Kovar-Gough, MA, MLIS, AHIP; Andrea L. Wendling, MD

BACKGROUND AND OBJECTIVES: There is an ongoing shortage of primary care physicians in the United States. Medical schools are under pressure to address this threat to the nation's health by producing more primary care graduates, including family physicians. Our objective was to identify institutional characteristics associated with more medical students choosing primary care.

METHODS: We conducted a systematic literature review with narrative synthesis to identify medical school characteristics associated with increased numbers or proportions of primary care graduates. We included peer-reviewed, published research from the United States, Canada, Australia, and New Zealand. The existing literature on characteristics, including institutional geography, funding and governance, mission, and research emphasis, was analyzed and synthesized into summary statements.

RESULTS: Ensuring a strong standing of the specialty of family medicine and creating an atmosphere of acceptance of the pursuit of primary care as a career are likely to increase an institution's percentage of medical students entering primary care. Training on regional campuses or providing primary care experiences in rural settings also correlates with a larger percentage of graduates entering primary care. A research-intensive culture is inversely correlated with primary care physician production among private, but not public, institutions. The literature on institutional financial incentives is not of high enough quality to make a firm statement about influence on specialty choice.

CONCLUSIONS: To produce more primary care providers, medical schools must create an environment where primary care is supported as a career choice. Medical schools should also consider educational models that incorporate regional campuses or rural educational settings.

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There is an ongoing shortage of primary care physicians in the United States.[1] Population growth, aging, and insurance expansion are all factors that will lead to an even greater shortage in the future.[2] Limitations in access to primary care will result in more expensive, but less effective, health care at the population and individual patient levels.[3-5]

Efforts to increase the primary care physician workforce have occurred at many levels. In some states, legislation has been passed toward this end, including Medicaid payment rate increases and the opening of new medical schools with the intent to address workforce shortages.[6] Nationally, eight family medicine organizations have adopted a collective goal of 25% of medical students entering family medicine by 2030.[7]

Medical school administrators and leaders have a social obligation to educate physicians to provide for the health care needs of the nation, including the provision of primary care to meet the public's needs.[8] This obligation is directly acknowledged and reflected in the mission statements of some medical schools.[9]

To positively impact the production of primary care physicians, it is important to identify institutional characteristics that are associated with increased percentages of

From the Department of Family Medicine, Medical College of Georgia, Augusta University, Augusta, GA (Dr Seehusen); Family Medicine Residency, Carl R. Darnall Army Medical Center, Fort Hood, TX (Dr Raleigh); Department of Family Medicine, Michigan State University, East Lansing, MI (Drs Phillips and Wendling), Michigan State University Libraries, Michigan State University, East Lansing, MI (Ms Kovar-Gough); Department of Family Medicine and Institute for Health Policy, Michigan State University, East Lansing, MI (Ms Polverento); Department of Family and Community Medicine, Medical College of Wisconsin - Central Wisconsin, Wausau, WI (Dr Prunuske); and Departments of Public Health & Preventive Medicine and Family Medicine, SUNY Upstate Medical University, Syracuse, NY (Dr Morley).

medical students choosing to enter a career in primary care generally, and family medicine specifically, as students matching into family medicine are those most likely to enter the primary care workforce.[10] These characteristics may be modifiable or fixed, and may include things like geographic location, funding source, governance structures, or institutional missions. Our goal was to review, synthesize, and summarize the existing literature pertaining to those medical schools' attributes.

Methods

We conducted a systematic literature search with narrative synthesis to identify medical school characteristics that were associated with increased numbers or proportions of primary care graduates. This study was part of a larger study examining undergraduate medical education interventions associated with primary care specialty choice.[11] The study was deemed to not be human subjects research by the Michigan State University Institutional Review Board.

Articles focused on medical school structures, and characteristics were obtained from a larger pool of articles that met inclusion criteria for the larger study. The scope of the study included peer-reviewed research studies conducted at medical schools in the United States, Canada, Australia and New Zealand. We utilized the definition of primary care of Phillips et al.[11]

Additional focused secondary searches were performed to identify relevant studies conducted using database-specific controlled vocabulary and free-text search terms developed through language mapping during the scoping review. The additional search strategy is detailed in Appendix 1 (https://journals.stfm.org/media/4921/appendix1-seehusen-july22.pdf). The supplementary searches were conducted February 27, 2020 in Medline (PubMed) and Education Resources Information Center (EBSCO), and no date limit was applied. Two medical librarians assisted with search strategy development and implementation and manuscript retrieval. We used citation chaining to ensure comprehensiveness and identify literature not captured by the database searches.

Initially, we planned to incorporate medical school admission processes and practices into the broader set of institutional factors. However, during the analysis and synthesis of the initial data set of articles, it became clear that those describing admissions processes offered a qualitatively distinct content area and were thus analyzed and synthesized separately.[12]

First, we identified institutional characteristics that had been sufficiently studied to be included in this review. Next, we analyzed and synthesized the existing research on each institutional characteristic into summary statements reflecting the whole of the literature that met inclusion criteria for that characteristic. One author (D.S.) took the lead on extracting findings from individual studies and synthesizing generalized results from the included papers. A second author (M.R.) independently verified the conclusions of the first author and validated and edited the first draft of results. Other authors independently validated the summative statements against their own interpretation of the literature. Disagreement was adjudicated by collaborative discussion.

Finally, institutional characteristics associated with primary care specialty choice were classified by their relative mutability. This classification was based on both evidence of mutability in the literature and the reflections of the authors. The entire author team reviewed and edited the draft and contributed to the narrative synthesis and interpretation of the findings.

Results

We identified a total of 73 included and related studies obtained from the primary scoping review as potentially eligible for the topic area of institutional admissions processes and other institutional characteristics. Additional focused searches for this topic resulted in retrieval of 1,153 additional articles. After review of the titles and abstracts, we evaluated the full text of 98 articles for inclusion. We also evaluated 16 articles discovered through citation chaining in full for possible inclusion. Of these 187 articles, 50 ultimately met our inclusion criteria specifically for institutional characteristics associated with primary care career choice. These articles explored seven distinct factors: institutional ownership, mission, stature of family medicine within the institution, acceptance of primary care as a career choice, financial factors, research, and location.

Ownership

Public allopathic schools produce a higher percentage of primary care graduates than private allopathic schools,[13] a finding that remains highly significant after controlling for multiple variables.[14-16] This finding may not apply to osteopathic schools, most of which are private.[16,17]

Institutional Mission

An institution's mission, in theory, influences what is considered important by institutional personnel. In the early 1990s, Martini reported that 35% of allopathic medical schools, and all osteopathic schools, had mission statements that included a comment about primary care. Among allopathic schools, private schools with such a mission produced significantly more primary care physicians; this was not the case among public schools.[17] Schools that have a primary care mission and are perceived as being more encouraging of student interest in primary care also have a history of producing a larger percentage of generalists.[18]

Mullan et al created a social mission score that combined scores based upon the percentage of graduates who ultimately practice primary care, the percentage of graduates practicing in health professional shortage areas, and the percentage

of graduates belonging to underrepresented in medicine groups. The 20 schools with the highest social mission scores produced significantly more primary care physicians than the 20 schools with the lowest scores.[8] Morley et al expanded upon this idea, also creating a social mission scale, and determined that schools with a higher degree of social mission produced more family physicians and more physicians who ultimately provided care to underserved populations.[9]

Besides these studies, the majority of the literature around institutional mission consists of descriptive reports of exemplar institutions that link successful production of primary care physicians to an institution's broader mission (Table 1).

We found no reports of a medical school successfully changing its mission to include producing more primary care physicians. On the contrary, Kuzel reported on a Virginia state legislative mandate that three of the state's medical schools produce 50% generalists, resulting in student backlash against perceived pressure within the institution for students to choose primary care.[19]

Stature of Family Medicine Within the Institution

While most medical schools have departments of family medicine today, this was not always the case.[20] Literature from the 1980s, when departments of family medicine were less common, described an association between having a family medicine department and higher production of family physicians.[13,17,21] However, this association disappeared after controlling for other variables.[14] More recently, Phillips et al reported that the few allopathic medical schools that do not have a department of family medicine produce fewer family physicians than those that do. This dichotomy is not found among osteopathic schools.[16] Herold reported an interesting counterexample in which plans were developed to demote a department of family medicine to a division of internal medicine. Subsequently, the number of graduating students entering family medicine at that institution decreased.[22]

Campos-Outcalt found the proportion of family medicine faculty at an institution was a statistically significant predictor of the proportion of family medicine graduates.[15] Using linear regression modelling, Wimsatt et al found that medical schools with at least one family medicine faculty member in a leadership position had a 3% higher match rate into family medicine residencies.[23]

The Acceptance of Primary Care as a Career Choice

The "hidden curriculum" in medical education was defined by Thomas Inui as the experiences of students

Table 1: Examples of Institutions With a Mission Related to Producing Primary Care Physicians

Institution	Mission	Key Findings	Reference(s)
West Virginia School of Osteopathic Medicine (WVSOM)	Produce primary care physicians for Appalachia	Part of the Southern Regional Education Board (SREB), a multistate organization that contracts educational exchange among 15 Southern states. Of the first 148 WVSOM SREB graduates, 103 entered primary care specialties.	Roberts 1995[57]
Sophie Davis School of Biomedical Education, City University of New York School of Medicine* (SDSBE)	Two explicit missions: (1) Allow inner-city students an opportunity to pursue a medical career; (2) encourage its graduates to pursue careers in primary care	Of the first 15 classes entering the SDSBE program, 81% of students graduated the program; 38% of the graduates entered primary care specialties compared to 29% nationally during that time period.	Roman 1994[58]
Morehouse School of Medicine	Train minority physicians for primary care careers in underserved areas	An analysis of the first 261 medical students entering Morehouse (between 1978 and 1985) found 57% entered primary care.	Blumenthal 1997[59]
James Cook University (JCU)	Produce graduates who can address the health needs of the local population	JCU graduates mostly expected to work in rural locations and had a higher preference for general practice (OR = 1.5; 95% CI 1.1-2.1) than Australian physicians as a whole. Of the first seven cohorts of JCU students, 44% went into general practice, compared with 37.2% of all Australian medical students (P=.044).	Vietch 2006,[43] Sen Gupta 2013,[44] Woolley 2019[45]

*Sophie Davis School of Biomedical Education, although an independent institution at the time of this published study, became a pathway program within the City University of New York School of Medicine in 2016.

outside their formal coursework, "what we actually do in our day-to-day work with patients and one another, not what we say should be done when we stand behind podiums and lecture halls."[24] This concept has been applied to describe the pressure within the culture of medical education that steers medical students towards specialty care and away from primary care careers. A significant amount of literature on this topic exists, although it is not always explicitly labeled hidden curriculum. Occasionally is it described as "badmouthing"[25] or "bashing"[26] primary care. More often, it is studied through the lens of an institutional culture that unconsciously emphasizes specialization over generalization.[27]

Multiple studies have found that a perceived lack of respect for primary care, or family medicine specifically, is associated with lower student enthusiasm for primary care.[28-32] By contrast, institutional support to pursue family medicine as a career can influence students to choose family medicine.[30]

Negativity toward primary care is not always hidden. Campos-Outcalt demonstrated that medical students frequently hear negative comments about the specialty of family medicine, but in this study did not identify an association between these comments and eventual career choice.[33] However, subsequent studies indicate that these comments are influential. In a qualitative study, Canadian medical students reported little exposure to family medicine in the preclinical years but did report hearing disparaging comments. These students reported these comments did have an impact on their opinion about family medicine as a career.[34] Students who attend schools reporting high levels of badmouthing primary care are less likely to report an intention to go into primary care.[35] Students who report being exposed to a higher ratio of negative-to-positive comments about primary care are less interested in a primary care career.[36]

Financial Factors

Although much literature has been published on medical student debt and student perception of specialty income, only three studies addressed financial issues that are directly controlled by institutions: tuition rates, scholarships, and other institution-sponsored financial aid (Table 2). Two of the three were single-institution studies. These studies have not clearly demonstrated that programs reducing the cost of medical education, either for all students or for individual students, influences students' specialty choices.

Research Emphasis

For over 5 decades, the literature has consistently shown that the rate of medical students going into primary care is inversely related to institutional research emphasis.[8,13,37-39] Studies that have separated schools by public or private funding have found this association is most significant for private institutions, with public schools producing similar percentages of family medicine graduates among research intensive and nonresearch-intensive schools.[38,39] A noteworthy qualitative study of four institutions with both a large proportion of primary care graduates, and high research productivity, found that each institution had strong primary care leadership and a commitment to service. All four were public, state-supported allopathic institutions.[40] Table 3 summarizes key studies of institutional research emphasis and production of primary care physicians.

Location

Medical schools tend to admit more applicants from their state and region, sometimes because of a legislative or institutional mandate. Graduates, in turn, tend to practice close to where they train.[20,41] In 2012, 45% of medical students entered residency in the state in which they attended medical school.[20]

Completing at least part of undergraduate medical education in a rural area is associated with a higher likelihood of primary care career choice. The impact of training location can be difficult to isolate because students are generally given a choice about where they want to train, and this regional education is often in the context of an educational pathway program.[10,20,21,42-47] However,

Table 2: Studies of the Relationships Between Tuition, Scholarships, and Institution-Sponsored Financial Aid and Primary Care Specialty Choice

Group Studied	Methodology	Key Findings	Reference
Allopathic US medical schools	Cross-sectional analysis of AAMC data	Tuition was not correlated with proportion of students entering family practice after controlling for other variables.	Campos-Outcalt 1989[14]
Practicing physicians	Survey	Among graduates in the classes of 1983-1984, underrepresented minority graduates were more likely than white graduates to report that financial aid had influenced their specialty choice.	Xu 1996[60]
Graduates from two BS/MD programs in Texas	Survey	Between 2003 and 2013, BS-MD students, who received scholarships that covered full tuition and fees, did not enter primary care specialties at a higher rate than other students.	Nguyen 2019[61]

Table 3: Studies Examining the Relationship Between Institutional Research Emphasis and Students Entering Primary Care

Methodology	Key Findings	Citation
Longitudinal surveys of Canadian medical students correlated with medical school characteristics	Institutional emphasis on certain specialties, in the form of faculty and research dollars, had an influence on student career choice.	Roos 1980[37]
Secondary analysis of existing databases comparing low and high primary care producing schools	Schools producing more primary care physicians tended to received less NIH research funding.	Whitcomb 1992[13]
Descriptive anthropologic analysis of four schools that receive a large amount of NIH funding and produce a large proportion of primary care physicians	These four "bimodal schools" were all public schools with relatively low tuition costs. These institutions gave preference in their admissions criteria to students who had performed significant amounts of community service; had Departments of Family Medicine that were well respected; and had family physicians who participated in leadership of the medical school.	Osborn 1996[40]
Secondary analysis of existing databases	Research intense schools, as defined as being among the top 25 medical schools in 2010 NIH research funding, produced significantly fewer graduates entering primary care (29% versus 36%, $P<.001$) and about half the percentage of graduates entering family medicine (5% versus 9%, $P<.001$) when compared to research non-intense schools. These findings were driven by the 16 private schools on the top-25 list.	Choi 2013[39]
Family Medicine Clerkship Director survey merged with NIH funding data	There was an inverse correlation between NIH funding and the proportion of medical students entering family medicine. When separated into public and private institutions, this was a highly significant finding among private schools but was not a significant predictor among public institutions.	Mainous 2018[38]

most studies of career choice of students training on regional campuses have demonstrated that distributed models lead to higher numbers of primary care physicians, [10,41,48-50] with one exception.[51] In some studies, this association was present even in the absence of a distinct curricular pathway.[50,52] Table 4 summarizes studies examining the associations between regionally distributed educational models and eventual primary care specialty choice.

Discussion

Our findings show that several institutional factors may impact primary care choice, including an institution's climate surrounding primary care, the presence of regional campuses or rural training experiences, or a school's ownership structure or research emphasis. Some of these characteristics are more easily mutable, or have a higher impact, than others. Figure 1 depicts the relative mutability and impact of each of the institutional factors.

In the course of reviewing and synthesizing the literature, the authors were struck by the consistency of the findings, and also the limited evidence of institutional efforts to change structural characteristics. It would be difficult to change a medical school's geographic location, and we found no reports of institutions that have changed from public to private governance (or vice versa). There was also very limited change over time between a 2015 study of medical school mission statements[53] and a 2019 network analysis of mission statements.[54] However, changes in National Institutes of Health funding disbursement to researchers based at medical schools demonstrate that research intensity is clustered in fewer and fewer schools over time.[55] One interpretation of this finding could be that institutions do change their functional missions, including a change in focus toward–or away from–research intensity. Similarly, regional campuses are becoming an increasingly commonplace feature of medical schools.[56] Medical education researchers should consider ways to take advantage of these natural experiments, not only to document the effects of these changes on the future primary care workforce, but to help medical schools consider the potential unintended consequences of changes.

The climate surrounding primary care at an institution, including an institution's mission, overall number and leadership strength of family medicine faculty, and positivity or negativity toward primary care, impacts the proportion of graduates who ultimately choose primary care careers. Although the literature supports this association, organizational culture is also notoriously difficult to change, and we found no successful examples of an institution deliberately changing their mission or culture to produce more primary care physicians. Still, it seems logical for institutions hoping to produce more primary care graduates to add this goal to their mission statement and to actively promote a culture that

Table 4: Selected Institutions Where the Relationship Between Medical Education Location and Student Specialty Choice Has Been Studied

Institution	Campus Description	Key Findings	Relevant Citation(s)
Indiana University School of Medicine (IUSOM)	IUSOM uses eight regional campuses to complete the first two years of medical school. Half of their medical students complete their basic science curriculum at these campuses, the other half at the main campus in Indianapolis. All IUSOM students complete their final 2 clinical years in Indianapolis.	Among 2,487 graduates, attendance at one of these regional campuses between 1988 and 1997 was a significant predictor of becoming a primary care physician practicing outside of Indianapolis in 2003. For all the regional campuses combined, students were 41% more likely to enter family medicine compared to the Indianapolis cohort.	Brokaw 2009[50]
University of Washington School of Medicine (UWSOM)	UWSOM uses regional medical campuses (RMCs) to provide the first year of basic science education to some medical students.	Among graduates of the UWSOM between 1996 and 2016, the location of the first year of education at a RMC did not impact students' likelihood of eventually practicing primary care.	Collins 2018[51]
Michigan State University College of Human Medicine (MSU-CHM)	MSU-CHM sends students to many campuses throughout the state for their third and fourth years of medical school.	Analyzing over 3,100 graduates, over a 50-year timeframe, where a student trained had a significant influence on where they eventually practiced. Overall, 44% of MSU-CHM graduates entered primary care and 20% practiced within 50 miles of their clinical campus. Among 1974-2011 graduates of MSU-CHM, those trained in the rural Upper Peninsula were more likely to enter primary care (61.5% versus 51.3%, $P<.01$) and more than twice as likely to enter family medicine.	Phillips 2018,[49] Wendling 2020[10]
Northern Ontario School of Medicine (NOSOM)	NOSOM has a mission to improve the health of the local, rural, population. All students complete a longitudinal family medicine clerkship in which students stay in one rural community their entire third year and are taught traditional clerkship blocks in the context of family medicine.	Since opening, 62% of NOSOM graduates had entered family medicine. Most graduates have stayed in rural locations in Northern Ontario to practice.	Strasser 2018[52]
University of Queensland Rural Clinical School (UQRCS)	The Rural Clinical School (RCS) concept in Australia was established in 2000 as a track program designed to increase the number of medical students pursuing careers in rural practice by providing 1 or 2 years of their clinical training at rural sites. UQRCS was the first RCS established.	The first five cohorts of the UQRCS were studied in 2007. A high percentage of the graduates of this program did enter primary care, with 18% entering general practice. In 2010, 115 graduates of a RCS were surveyed and 45 of these agreed to follow-up interviews. The most common specialty choice of RCS graduates was general practice (24%).	Eley 2009,[46] Eley 2012[47]

celebrates primary care as a career choice.

However, we did find limited published evidence that some schools made changes that increased the visibility and stature of primary care. Incremental changes made to influence climate, such as family medicine faculty taking on more visible leadership roles or consciously promoting positive messages regarding primary care, are early strategies that institutions could adopt. This is not work that can be undertaken by family medicine departments alone, but work that needs to be shared among the entire institutional leadership. We encourage future medical education researchers in all disciplines to focus on innovative strategies to build a more positive culture toward primary care in US medical schools.

Once established, it is difficult to change the location or ownership of a medical school, but incorporating a regional campus or expanding education in rural settings may be feasible for institutions hoping to bolster the primary care physician workforce.

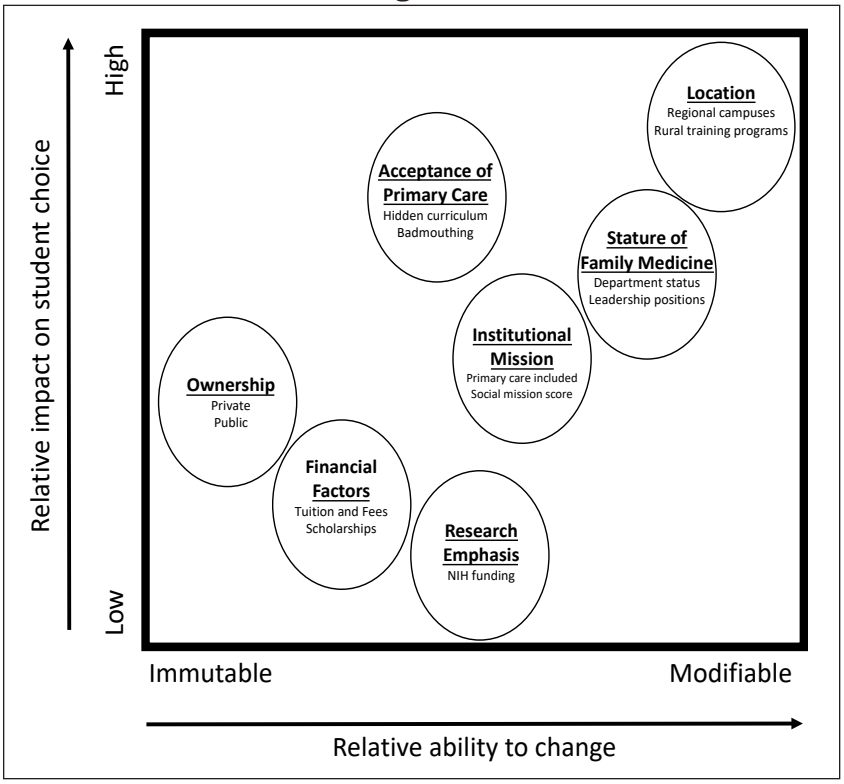
Medical schools that have invested in these educational models have seen higher overall proportions of graduates enter primary care fields. States and medical schools should consider adding rural or regional campuses as a deliberate strategy to augment the primary care physician workforce.

This literature supported an inverse association between research intensity and the proportion of primary care graduates among private schools, which may be a reflection of the culture of these institutions. In other words, high research intensity may be a surrogate marker for the hidden curriculum of low respect for primary care. The exceptions to this rule demonstrate that institutions can foster a culture of positive regard for primary care while also maintaining a highly productive research culture.[40] For this reason, we suggest departments of family medicine should continue to engage in research, particularly in research-intensive institutions, not only for the benefits of the work itself, but also because students with research interests need family physician clinician-scientist role models. Future studies could prospectively explore this relationship by tracking primary care graduate output after significant changes in institutional research funding, both globally and within departments of family medicine. Funders and policy makers could create additional granting mechanism targeted toward primary care. This would make primary care more attractive to students with research interests.

Our study has several limitations. First, the definition of primary care varies in the literature. Sometimes studies used a narrow definition while others a more expansive definition. Second, the influence of some factors has shifted over time and is likely to continue to shift. Lastly, limiting our search to just four countries may also limit the generalizability of our findings.

Changing either the culture or the foundational structure of an institution is challenging, but the foundational goal of medical education is to promote the health of our communities. Strong evidence supports that the shortage of primary care physicians in the United States has negative downstream patient and public health consequences. We encourage all medical schools to consider investment in institutional changes to support student choice of primary care careers.

Figure 1



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CORRESPONDING AUTHOR: Address Correspondence to Dr Dean Seehusen, Augusta University - Family Medicine, 1120 15th St AE 3046 Augusta, GA 30912-0004.

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