

How Medical Education Pathways Influence Primary Care Specialty Choice

Christy J.W. Ledford, PhD; Esther L. Guard, DO; Julie P. Phillips, MD, MPH; Christopher P. Morley, PhD; Jacob Prunuske, MD, MSPH; Andrea L. Wendling, MD

BACKGROUND AND OBJECTIVES: Primary care is associated with improved patient health and reductions in health disparities. Consequently, the demand for primary care physicians is increasing. To meet this demand, medical schools have employed strategies to graduate students interested in primary care careers, including medical education pathways—structured, longitudinal experiences that are explicitly separate from the main curricular scope of the undergraduate medical education experience. Our goal was to explore and identify common characteristics of medical education pathways that influence primary care specialty choice.

METHODS: Using research articles identified through a scoping review, we performed a qualitative content analysis of studies that evaluated the impact of medical education pathways on medical students' choices of primary care careers.

RESULTS: Sixty-three papers described 43 medical education pathways; most studies used quantitative methods to describe outcomes. Program characteristics mapped onto five levels of an emerging socioecological model: state or national, community, institutional, relational, and individual.

CONCLUSIONS: Successful medical education pathway programs complement a medical school curriculum that supports a common goal, and demonstrate multiple levels of structural and institutional factors that develop community connectedness, relatedness, and longitudinal community engagement in students. Further work is needed to better understand how each of these levels influence career choice and to reassess how to measure and report medical education outcomes that will more accurately predict the student choice of primary care careers.

(Fam Med. 2022;54(7):512-21.)

doi: 10.22454/FamMed.2022.668498

A primary care physician practices first-contact, comprehensive, and coordinated care within the context of long-term, person-focused relationships.¹ The United States will require 52,000 additional primary care physicians by 2025 due to population growth and aging.² In recognition of this need,

the Family Medicine for America's Health Workforce Education and Development Tactic Team created a shared aim to increase the percentage of US medical students choosing family medicine from 12% to 25% by the year 2030.³

Primary care specialty choice is a complex decision-making process

influenced by student characteristics, medical school experience, lifestyle and financial considerations, perceived specialty characteristics, and the health care environment.⁴ Student characteristics consistently associated with primary care choice are female gender, rural background, planned rural practice, and lower income expectations.⁵⁻¹² Medical schools can also influence specialty choice. Notably, a school's primary care culture influences student intention to pursue a career in primary care.¹³ Medical schools have made repeated attempts to motivate primary care choice. Interventions associated with primary care choice are a required third-year primary care clerkship, longer family medicine clerkship, and longitudinal primary care experience.¹⁴ Longitudinal programs, or primary care tracks, are one mechanism medical schools

From the Department of Family Medicine, Medical College of Georgia, Augusta University, Augusta, GA (Dr Ledford); Department of Family Medicine, Uniformed Services University, Bethesda, MD (Dr Guard); Department of Family Medicine, Michigan State University College of Human Medicine, East Lansing, MI (Dr Phillips); Departments of Public Health & Preventive Medicine and Family Medicine, SUNY Upstate Medical University, Syracuse, NY (Dr Morley); and Department of Family and Community Medicine, Medical College of Wisconsin - Central Wisconsin, Wausau, WI (Dr Prunuske); and Department of Family Medicine, Michigan State University College of Human Medicine, East Lansing, MI (Dr Wendling).

have implemented to increase recruitment into primary care.¹⁵ The medical education pathway is a structured, longitudinal experience that exists separately from the main curricular scope of the undergraduate medical education experience and exposes the student to the continuity of primary care. During this extended time, students can project themselves into this hypothetical career and role.¹⁶

The goal of our study was to identify the shared characteristics of medical education pathway interventions that have successfully increased the number of medical students choosing primary care.

Method

Our study is a qualitative content analysis¹⁷ of a subset of literature identified in a larger scoping review of interventions that influence primary care career choice.¹⁸ The subset—studies that investigate the implementation and evaluation of medical education pathways (MEPs) on primary care career choice—was identified by the authors in collaboration with the senior investigators on the scoping review. The authors defined MEPs as structured, longitudinal experiences that are explicitly separate from the main curricular scope of the undergraduate medical education experience. Students in MEPs follow a completely different path of study from their medical school peers for a substantial portion of their education. Inclusion criteria were research articles that evaluate the impact of medical education pathways on medical students' choices of primary care careers. Studies from Australia, Canada, New Zealand, and the United States were included. For the outcome of interest, we included only MEPs designed to increase medical student choice of primary care, including programs with an even more specific focus, such as those designed to increase student choice of rural practice. We excluded articles that focused on graduate medical education or were not research.

To ensure the subset of articles identified through the scoping review was a complete representation of the existing literature, a medical librarian conducted an additional search with our keywords of interest (medical education pathway and training tracks) in July 2020. That search detected 10 additional articles that met inclusion criteria.

Our analysis applied a grounded theory method to the data.¹⁹ In the quality rating stage of the scoping review, the first (C.J.W.L.) and second (E.G.) author immersed themselves in the documents. Throughout this process, we met in person three times to discuss the papers. Guided by a quality rating rubric,²⁰ these discussions focused on each paper's purpose, theoretical framework, methods, context, and findings. During this process, we identified which papers described MEPs that successfully increased student choice and which did not (as determined and described by the authors of each study).

During the quality review process, we recognized that MEP characteristics could map onto a socioecological model²¹ that would provide a framework for understanding the multifaceted and interactive effects of personal and environmental factors that influence individual behavior.

After the full quality review, authors C.J.W.L. and E.G. first separately coded half the documents. The unit of analysis was each individual characteristic of a medical education pathway. When multiple papers described the same MEP, we coded all papers to ensure that we captured characteristics that could have been described differently or uniquely across time and publication for one program. Characteristics were identified if they were described in any section of a paper (introduction, methods, results, or discussion).

We then separately categorized all characteristics by model level, labeling the characteristic by MEP and (un)success. Aligning with the qualitative approach of this study, characteristics were not weighted by importance or frequency. We then

met two times in person to map all coded characteristics onto the five levels of the model. In this process, we discussed all characteristics' placement to consensus. As characteristics were mapped onto the model, we grouped them into categories. Through this process, we sought to confirm these categories by reviewing the analysis conducted on the segmented text while also comparing and relating the codes to each other, referred to as axial coding, to define each category's characteristics.

Results

In this data set, 63 papers described 43 medical education pathways that were initiated between 1969 and 2014 (Table 1). Almost all MEPs were associated with allopathic medical schools, with only one osteopathic MEP. Of these pathways, authors described 40 MEPs as successful, whereas three MEPs did not accomplish their goals. Table 2 presents how success was operationalized in these programs. The majority (n=55, 87.3%) of studies focused on quantitative data to examine program outcomes (one study was qualitative only; seven described multimethod or mixed-methods approaches).

The coding process identified 206 characteristics of MEPs, within 31 categories across five levels of influence. Figure 1 presents the socioecological model of medical education pathway characteristics.

Model Mapping: State or National Level

At the state or national level, MEP characteristics mapped onto two categories: financial support and legislative authorization. Financial support was provided through a variety of mechanisms. Some MEPs funneled funding to individuals through state-funded scholarships, stipends, or community preceptor stipends. Others used state or national funding (federal or private foundation grants) to support the MEP more broadly. Separate from financial resources, some MEPs were created in response

Table 1: Medical Education Pathways Included in Analysis

Program Name	Medical School	Country	Year Initiated
Charles R. Drew University of Medicine and Science ^{9,a}	University of California, Los Angeles	USA	1981
Clinical (Binghamton) Campus of SUNY Syracuse ^{35,a}	State University of New York (SUNY) Health Science Center at Syracuse College of Medicine	USA	1981
Commitment to Underserved People (CUP) ^{36,a}	University of Arizona	USA	1979
Community Partnership Program ^{37,a}	East Tennessee State University	USA	1991
Medical School Duluth ^{38,39,a}	University of Minnesota Medical School	USA	1969
Early specialization “streaming” ^{40,b}	McGill University	Canada	1973
Family Medicine Student Track (FaMeS) ^{41,a}	Boston University	USA	2004
Family Practice Track ^{42,a}	University of Utah School of Medicine	USA	1976
Frontier and Rural Medicine Program ^{43,a}	University of South Dakota	USA	2014
Gannon-Hahnemann Family Medicine Program ^{44,a}	Hahnemann University School of Medicine	USA	1975
International/Inner City/Rural Preceptorship (I2CRP) ^{25,a}	Virginia Commonwealth University	USA	1998
John Flynn Placement Program ^{45,a}	Australian College of Rural and Remote Medicine	Australia	2002
Longitudinal Integrated Clerkships ^{46,a}	University of British Columbia	Canada	2004
Longitudinal Primary Care (LPC) program ^{47,a}	University of Illinois at Chicago College of Medicine	USA	1991
Louisville Trover campus ^{10,a}	University of Louisville	USA	2001
Marshall University Accelerated Track ^{48,a}	Marshall University	USA	1992
New South Wales Rural Resident Medical Officer Cadetship Program ^{49,a}		Australia	1988
Northern Territory Clinical Schools ^{50,a}	Flinders University	Australia	1996
Ochsner Clinical School ^{51,a}	Partnership between Ochsner Health System (Louisiana) and University of Queensland School of Medicine	USA and Australia	2008
Parallel Rural Community Curriculum ^{50,a}	Flinders University	Australia	1996
Physician Shortage Area Program (PSAP) ^{11,52-59,a}	Jefferson Medical College	USA	1974
Primary Care Curriculum ^{60,61,a}	University of New Mexico School of Medicine	USA	1979
Primary Care Scholar Pathway ^{62,a}	Lake Erie College of Osteopathic Medicine	USA	2007
Primary Care Training Program ^{63,b}	University of South Florida	USA	1983
Program in Medical Education for the Urban Underserved (PRIME- US) ^{64,a}	University of California at Berkeley and University of California at San Francisco	USA	2006
Pukawakawa ^{65,a}	University of Auckland	New Zealand	2008

(continued on next page)

Table 1: Continued

Program Name	Medical School	Country	Year Initiated
Rural Clinical Schools Program ^{66,a}	Six universities throughout Australia	Australia	2003
Rural Clinical Training and Support Program (RCTS) ^{67,a}	University of Adelaide	Australia	2001
Rural Health Scholars Program ^{68,a}	University of North Carolina and East Carolina University	USA	1993
Rural Medical Education Program (RMED) ^{69-71,a}	University of Illinois College of Medicine at Rockford	USA	1993
Rural Medical Scholars Program ^{72,73,a}	University of Alabama	USA	1991
Rural Physician Associate Program (RPAP) ^{39,74-77,a}	University of Minnesota	USA	1971
Upper Peninsula (UP) Rural Physician Program (RPP) ^{78,79,a}	Michigan State University College of Human Medicine	USA	1974
Rural Program in Medical Education (PRIME) ^{80,a}	University of California at Davis	USA	2003
Rural Scholars Track ^{81,a}	Louisiana State University Health Sciences Center School of Medicine – New Orleans	USA	2002
Rural Track Pipeline Program (RTPP) ^{82,a}	University of Missouri School of Medicine	USA	1995
Salina Regional Medical Campus ^{83,a}	Kansas University School of Medicine	USA	2011
Advanced Standing from Sophie Davis School of Biomedical Education ^{84,b}	Mount Sinai School of Medicine	USA	1970
Rural Medical Education (RMED) track ^{12,85,a}	SUNY Upstate Medical University	USA	1989
Targeted Rural Underserved Track (TRUST) ^{86,a}	University of Washington	USA	2008
The Primary Care Track ^{87,a}	University of Southern California	USA	1987
Training in Urban Medicine and Public Health (TRIUMPH) ^{88,a}	University of Wisconsin School of Medicine	USA	2009
WAMI Program/WWAMI ^{89-91,a}	University of Washington	USA	1971

^a Pathways described as successful in published papers

^b Pathways described as unsuccessful (did not accomplish intervention goals) in published papers.

to a direct mandate from state legislatures.

Model Mapping: Community Level

The community level encompassed two different functions of community: community practice and community connectedness. MEP characteristics mapped onto three community practice categories: place, continuity, and family-centeredness. Place describes the location of practice, where students learn in community practices. Papers often described these settings as rural, underserved, or small

communities. Place enabled students to learn in context. Continuity was also a repeated characteristic. Some MEPs facilitated repeated exposure to communities, either through longitudinal, episodic exposure or through a single, extended (4 months or longer) exposure to clinical practice in the community. This continuity can provide students with the opportunity to experience patient continuity. Within the community practice, some pathways engaged students in family-centered practice, through which they provided clinical care for multiple members of a family.

MEP characteristics mapped onto six community connectedness categories: local funding, service to the community, field work, multidisciplinary engagement, sense of home, and perceived impact. Four of these categories were action-oriented. First, some MEPs received local funding that provided stipends to students and/or preceptors. Second, some MEPs required a community service project that included both community-informed clinical questions and methods and resulted in community-oriented answers and interventions. Third, some MEPs pushed students

Table 2: Measures of Success of Medical Education Pathways

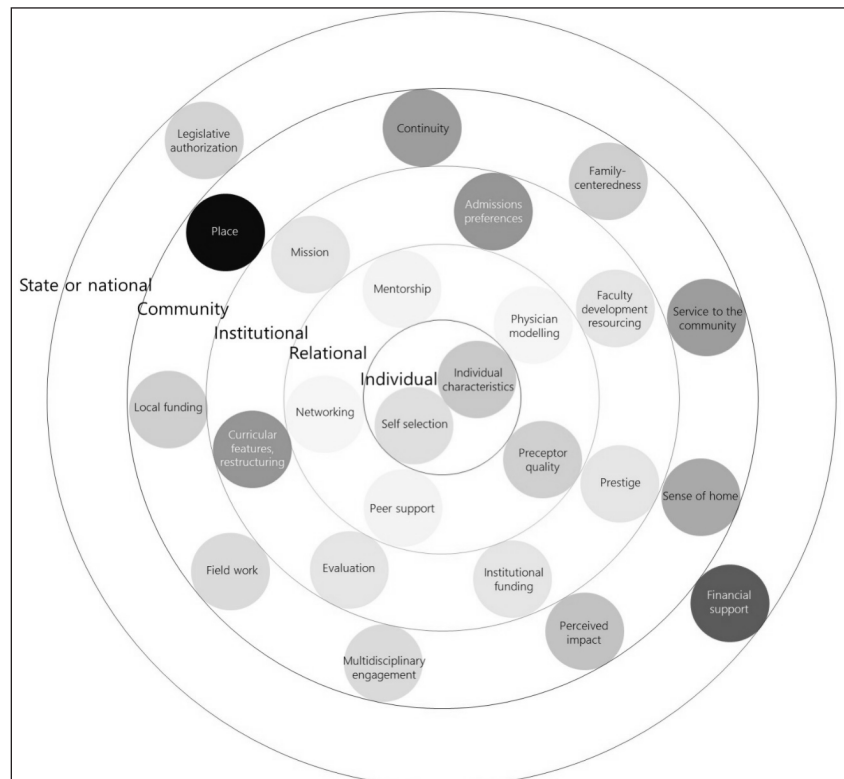
Concept	Students/ Graduates Who...	Measurement	Data Sources
Career preference or intention	...plan to train in primary care	Number of students who plan to train in primary care ^{12, 40,43,45,60,66,87,88,90,91}	Self-report survey
Residency match	... match to primary care residency	Number of students selected into primary care residencies ^{25,35,38,41,42,44,45,47,50,51,56,62,63,65,68,69,71,72,77,80-83,85,86,88}	Self-report survey, university administrative files, National Residency Matching Program
Residency trained	... complete a primary care residency	Number of physicians completing primary care residencies ⁵⁰	Self-report survey
Physician practice	... practice primary care	Number of physicians in primary care practice ^{9-11,25,36-39,45,48,49,52-55,57,58,61,67,69,70,73-79,84,88,89,91}	Self-report survey, American Medical Association Masterfile, alumni association database, content analysis of professional network (eg, Doximity), practice and academic websites

Table includes only measures directly related to primary care aims. The included medical education pathways also commonly measured students and graduates who entered practice to serve specific populations, such as rural or underserved.

to engage in field work outside clinic walls, such as health fairs or agricultural field trips. Fourth, some MEPs provided an opportunity for students to see multidisciplinary care. For example, students engaged in care collaborations with dentistry, nursing homes, and clergy members.

The fifth and sixth characteristics of community connectedness described MEP characteristics that were designed to affect student perceptions. When MEPs enabled students to live in communities, they developed a sense of home. These MEPs were generally designed for students to live in communities for more than 1 year of their education. Some rotations were long enough that students relocated with their families to live in the community. Lastly, some MEPs enabled students to fully immerse in the community, which enabled them to recognize how clinical practice was impacting the local population. Some MEPs sometimes emphasized impact on specific populations, such as underserved populations.

Figure 1: Sociological Model of Medical Education Pathway Characteristics



In this onion model, the socioecological levels are depicted by concentric circles, in which the most central circle represents what has the nearest effect on the individual. As circles enlarge, the levels are less central to each individual decision but still provide context, potentially influencing or controlling circles within it. In this figure, each level is illustrated in a distinct color. The light-darkness of each characteristic represents how common (frequency counts) the characteristic was across the 43 medical education pathways. For example, place was the most common characteristic overall so it is the darkest that a community level characteristic can be.

Model Mapping: Institutional Level

At the institutional level, MEP characteristics mapped onto eight categories: mission, prestige, admissions preferences, student funding, curricular features and restructuring, evaluation, and faculty development resourcing. Institutional-level characteristics describe medical school communication, values, policies, and actions.

Communicatively, the medical school's stated mission was cited as important to the development and continuation of many MEPs. Similarly, how a medical school valued primary care (prestige) was often an important characteristic. This value was connected to an MEP's credibility and students' overall perception of the value of the MEP within the medical school. Policy primarily centered on a program's admissions preferences, which were connected to evidence-based applicant characteristics. Admissions preferences were categorized as institutional-level characteristics when the pathway included a defined admissions policy (in contrast to individual-level student characteristics described in the next section).

Institutions enacted four types of actions as part of MEPs. First, some medical schools provided student funding through scholarships, tuition exemptions, and financial aid. Second, some medical schools designed curricula or restructured curriculum scope and sequence. Curricular components were widely variable, including broader content such as behavioral medicine, telemedicine, or patient advocacy. Most modifications to the standard medical school curriculum were connected to timing and pedagogical framework. MEPs often introduced students to clinical topics earlier and more consistently across their education. Some also introduced problem-based and self-directed learning models. Third, some MEPs provided faculty development in the regions and communities where students were completing clinical rotations, away from the

academic medical center. Fourth, medical schools evaluated the MEPs, measuring their success against stated objectives.

Model Mapping: Relational Level

At the relational level, MEP characteristics mapped onto five categories: mentorship, networking, physician modelling, peer support, and preceptor quality (personal, continuity, trusted). At this level, interpersonal relationships were key features of MEPs. Programs actively sought ways to foster relationships between students and practicing primary care physicians.

Four categories at this level described the purpose of the relationships: modelling, mentorship, networking, and peer support. Some schools recognized that students needed to see physicians modelling the life of a primary care physician. Modeling did not solely focus on clinical practice. Physicians can model leadership, work-life balance, team collaboration, and teaching. In addition to modelling, some MEPs programmed intentional mentorship for students. Mentorship was available from both academic and community physicians. The third purpose, networking, described not only networking for students with primary care physicians but also with other students. This inclusion of peers was extended in the peer support category. Some MEPs provided peer teaching, peer support groups (both before matriculation and throughout medical school), and/or peer social events, which included student family members.

In addition to these purpose-oriented characteristics, preceptor quality was a repeated characteristic at the relational level. Some schools focused on the critical role of the clinical preceptor in medical education and how this role influences student choice. Papers described three broad characteristics of preceptor quality: personal, continuous, and trustworthiness. MEPs sought preceptors who would work one on one with students. This relationship

was amplified when preceptors could work with students across clinical years, creating longitudinal relationships with students. Trustworthiness not only described how a student could trust the preceptor but also that the MEP could trust the preceptor. This trustworthiness was sometimes derived from previous relationships. Two common mechanisms were recruiting medical school alumni to act as preceptors or recruiting preceptors who practiced in the student's hometown where the student was clinically embedded.

Model Mapping: Individual Level

Characteristics at the individual level are not characteristics of the MEPs themselves, but characteristics of students that MEPs identified as evidence-based populations of interest to recruit. In this sample of papers, MEPs described two categories: self-selection and student characteristics. First, most MEPs recognized that students must self-select into pathways for them to effectively reinforce students' career interests. Second, four types of students were often recruited because they were likely to choose primary care: students from rural areas, women, students older than 31 years, and racial and ethnic minorities.

Discussion

This qualitative content analysis demonstrates that medical education pathways can increase primary care specialty choice. The emerging socio-ecological model of medical education pathway characteristics describes the complex landscape of medical education pathways and provides a framework for medical schools to consider as they develop and refine efforts to increase primary care specialty choice.

Results echo previous findings of a 1995 meta-analysis identifying practice rotation factors, relational factors, and individual factors associated with primary care career choice.⁸ However, our results demonstrate that we cannot select or leverage single proven characteristics

from this list. What differentiated successful MEPs from the three unsuccessful MEPs was not individual characteristics but a complex approach to specialty choice that crossed levels. We must design pathways that recognize both personal and environmental influences on individual behavior. Rabinowitz made a similar argument when he outlined the five essential elements of rural tracks (recruiting, training at site, regional teachers, financial and relational support, and evaluation).¹¹ All five of the elements are essential: they are not a menu from which to pick and choose what is existing or convenient. Zuckerman similarly specified three factors of specialty choice: sociodemographics, personality, and structural/institutional factors.²² Our results describe multiple levels of these structural/institutional factors in successful MEPs.

The model of multilevel influence also proposes a nuanced, but important difference in how students are introduced to and engaged in communities. Our findings demonstrate that medical students need to not only experience community practice but also community connectedness. Community-oriented care is care in which clinicians aim to be aware of, and oriented to, the health needs of a community.²³ A community-engaged clinician lives in and understands the community of patients; this engagement enables clinicians to understand the context of community factors such as food insecurity, housing instability, and limited income. By immersing students in community-oriented care, MEPs offer students a realistic preview²⁴ of primary care that showcases the power of community orientation in affecting patient and family outcomes.

In their application of self-determination theory, Park and colleagues explain that student perception of relatedness—feeling like a member of a community—increased their motivation to learn.²⁵ This may create a virtuous cycle of immersion, relatedness, motivation, immersion, and so forth. By developing pathway models that support these virtues, schools

can use resources to facilitate a sustained commitment to primary care²⁶ that feeds that cycle.

This longitudinal engagement also introduces students to the principle of continuity of care.^{27,28} First described by Hennen,²⁹ continuity of care incorporates four domains: longitudinal (the use of repeated patient observations over time as a diagnostic and management tool); informational (the availability of accurate information from one health care encounter to another); geographic (care of the patient in a variety of locations); and interpersonal (the clinician-patient relationship). Since its first description, the concept has expanded to include the dimensions of interdisciplinary (the management of several body systems and diseases at the same time) and family (knowledge about and understanding of the patient and his or her family) continuity of care.³⁰ For a student to experience and understand these domains of continuity, the MEP must provide longitudinal community engagement.

Limitations

This study relied on each author's description of the medical education pathway and its evidence of success. It is possible that some existing characteristics were not described or were misrepresented.

Notably, this study provides evidence from allopathic (MD) programs: only one osteopathic (DO) program emerged in the sample of 43 programs. Compared to allopathic school graduates, a larger number of osteopathic school graduates entered primary care specialties.³¹ The recent *Osteopathic Profession Report* from 2019 shows that 56.9% of all osteopathic physicians practice primary care.³² In both American Osteopathic Association and Accreditation Council for Graduate Medical Education programs, osteopathic resident physicians are in primary care specialties at higher rates (40.6% of all DO residents and 34.8% MD residents).³¹ Based on our present study, it is not known whether osteopathic schools create fewer pathway programs or

publish fewer outcome studies of those programs.

Future Research

Although this narrative review includes qualitative, quantitative, and multi- or mixed-methods approaches, the evidence is overwhelmingly quantitative. To develop a rich understanding of how each of these levels influence student choice, more qualitative and mixed-methods work, both observational and interventional, is needed. Crump recommended larger-scale interviews or focus groups “to provide insight into the variance not yet explained by traditional demographic measures (nature) or educational exposure (nurture).”¹⁰ We also need to reassess how we measure workforce targets. Many of these programs used student intention or residency match numbers as surrogates for primary care workforce outcomes. Studies show that residency match overpredicts the size of our primary care workforce.³³ We need clearer, more valid measures, such as the “rural workforce year,”³⁴ to understand the success of workforce development strategies such as MEPs.

ACKNOWLEDGMENTS: The authors thank Molly Polverento, Iris Kovar-Gough, Shelby Walker, and Virginia Young for their substantial contributions to the literature search, literature retrieval, literature review, and data organization.

FUNDING STATEMENT: This work is supported by a grant from the American Board of Family Medicine Foundation. This project was partially supported by the Health Resources and Services Administration (HRSA) of the United States Department of Health and Human Services (HHS) under grant number D54HP23297, Academic Administrative Units.

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CORRESPONDING AUTHOR: Address correspondence to Dr Christy Ledford, Department of Family Medicine, Medical College of Georgia at Augusta University, 1120 15th Street HB-4000 Augusta, GA 30912. chledford@augusta.edu.

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