

Addressing the Rural Primary Care Physician Shortage: A Focused Review of Policy Interventions and Their Implications

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Abstract

The primary care physician (PCP) shortage in the United States presents a critical public health concern with far-reaching implications for healthcare access and general population well-being. This is underscored by a PCP distribution problem as rural communities face the worst of the shortage. The PCP shortage is an immediate public health crisis by examining its effects on healthcare delivery, access, and outcomes, particularly in rural and underprivileged populations. A search of the Ovid Medline database yielded several studies that can be utilized to target the PCP shortage. Policy interventions extrapolated from the review of the literature include changing medical school selection processes, expanding and furthering recruitment to the National Health Service Corps (NHSC), mandating the incorporation of rural health exposure during medical school, and widening the scope of practice and lessening restrictions for physician assistants (PAs) and Nurse Practitioners (NPs). The Institute of Medicine (IOM) developed the Six Aims of Improvement (AOI) framework to measure healthcare quality, but it is used in this paper to address the feasibility and potential for success in addressing the PCP shortage in rural areas. These interventions are analyzed using the Six Aims of Improvement framework, focusing on their potential to provide safe, effective, patient-centered, timely, efficient, and equitable healthcare services by increasing the number of primary care providers. This analysis yielded several strong options, but ultimately, while many of the approaches have shown promise in solving the PCP

shortage, for a more immediate impact on patient care, priority should be given to increasing the utilization of already available healthcare resources, such as PAs and NPs.

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1.0 Background and Significance

1.1 Essay Objective

This policy paper aims to study and address the primary care physician (PCP) shortage in the US, specifically, the distribution problem that exacerbates the shortage of PCPs in rural areas. First, by evaluating the PCP shortage's significance to public health by illuminating the broader consequences for population health and healthcare access. Then, by analyzing available literature and examining the potential effectiveness of particular policy interventions in reducing the PCP shortage in rural communities. The goal is to provide recommendations to resolve this crucial healthcare workforce dilemma in rural areas and provide everyone with fair access to primary care services and improved health outcomes regardless of geographic location.

1.2 Policy Interventions Discussed in This Paper

This paper examines several policy approaches aimed at addressing the PCP shortage, including alterations to the medical school selection processes, widening the reach of the National Health Service Corps (NHSC), mandating the incorporation of rural health exposure during medical school, widening the scope of practice of physician assistants (PAs) and lessening restrictions to the scope of practice of nurse practitioners (NPs).

1.3 Primary Care Physicians

PCPs are responsible for diagnosing and treating common illnesses and injuries. They are also the first point of contact for individuals and families seeking medical care. They provide preventive care, such as screenings and vaccinations, and they help coordinate care with other specialists. In the US, there are 445,000 practicing PCPS as of 2020, and although this is only 31% of all practicing physicians, PCPs provide more than half of all outpatient visits (Gitnux, 2023). As the health professionals who handle the day-to-day care and are the first line of contact to the healthcare system, their availability is essential to supporting the pursuit of good health (Starfield et al., 2005).

1.4 Overview of the PCP Shortages in the United States

A critical issue in American healthcare is the shortage of PCPs. The widening disparity between the demand for primary care services and the supply of PCPs significantly impacts the nation's healthcare system. In the US, there are currently 8,352 PCP Health Professional Shortage Areas (HPSA), or areas where the patient-to-PCP ratio is more than 3,500 to 1 (Primary Care Health Professional Shortage Areas (HPSAs) | KFF, 2023). The number of PCPs needed to remove the HPSA designation across the US is 17,396 (ibid). New data suggests that this shortage is expected to worsen and estimates that by 2034, the United States will be short 17,800 to 48,000 PCPs (“AAMC Report Reinforces Mounting Physician Shortage,” 2021). PCPs play a vital role in the healthcare system, providing preventive care, diagnosing, and treating common illnesses, and helping to manage chronic conditions. As the US population gets older, chronic disease will

become more prevalent, so without enough PCPs, the healthcare system may be unable to meet the needs of the growing and aging population (Promoting Health for Older Adults, 2024). AAMC also projects that within the next ten years, the US population of 328 million people will grow to 363 million, with a 42.4% increase in seniors (AAMC Report Reinforces Mounting Physician Shortage, 2021). This increased demand for PCPs will put additional strain on the healthcare system. A significant increase in seniors in the U.S. will also result in a significant increase in the number of retired physicians, as more than two of every five active physicians in the U.S. will be 65 or older by 2050 (AAMC Active Physicians by Age and Specialty, 2019). Their retirement decisions will dramatically affect the magnitude of national workforce shortages. Although an aging workforce in some industries means more opportunities for newcomers, because PCPs are not compensated as much as other physician specialties, opportunities are not being filled at the same rate that people are retiring (Stephens, 2023). In 2021, the median salary of a PCP was \$243,000, earning more than only pediatric physicians at \$236,000 and public health medicine at \$183,000 (Physician Thrive's Physician Compensation Report [2021 Data], 2023). At the top of this salary ranking were orthopedic surgeons, with a median earning of \$546,000 (ibid).

1.5 PCP Shortage Background and Impacts

Research indicates that seven million Americans live in places where there may be more than a ten percent shortage of PCPs compared to the demand (Huang & Finegold, 2013). These data emphasize the regional differences in primary care service accessibility, which result in PCP HPSAs that negatively influence the health of the impacted communities. Death rates are higher in areas with less access to PCPs than in areas where there is an adequate supply of physicians

(Basu et al., 2019). This indicates that there is a negative correlation between mortality rates and the availability of PCPs in various US regions. Delays in diagnosis, inadequate treatment of medical diseases, and a rise in avoidable fatalities are the results of insufficient and untimely primary care services (Shi, 2012). Preventable chronic disease costs the US \$54 billion annually or an estimated 30% of each healthcare dollar (Batarseh et al., 2020). This number does not account for the cost of health-related unemployment and other benefits, further underscoring the burden of poor primary care conditions. Concerns regarding the healthcare system's overall ability to handle the population's expanding healthcare needs are also becoming more prevalent (Zhang et al., 2020).

Access to primary care ultimately reduces healthcare costs and improves patient outcomes. The system is severely strained by the ongoing shortage of PCPS, which perpetuates a loop of delayed care access, disrupted service continuity, and increased reliance on expensive acute care treatments. The consequences of this are felt in the real-life experiences of people looking for prompt healthcare. The absence of PCPs exacerbates healthcare access inequities, especially for marginalized and vulnerable communities. This problem is not isolated; it is entwined with more general systemic issues like regional inequities, access constraints, and a changing healthcare environment.

1.5.1 Inequity and Rural Communities

The shortage of physicians in rural areas profoundly impacts the well-being of rural and underprivileged communities because this scarcity is associated with elevated mortality rates stemming from delays in diagnosis and insufficient management of health conditions (Gong et al., 2019). Due to the extra obstacles that members of these communities confront, such as poverty

and a lack of educational resources, this shortfall amplifies already existing socioeconomic inequities. Long travel times are a common issue for rural residents seeking medical care, which causes delays in getting the help they need (Gong et al., 2019). Delays of this nature can have negative repercussions, especially for those experiencing a healthcare emergency or having ongoing medical needs.

1.6 The Role of Alternative Primary Care Providers

Primary care providers come in different degrees and practices, and the PCP shortage may be felt more intensely because of the underutilization of the diversity of these primary care providers. Despite the shortage of physicians, there are other providers, such as the two listed, that can provide primary care, and unlike other providers, these two can have a high level of independence depending on their state's rules on the scope of practice. PCPs obtain an undergraduate degree, graduate from medical school after four years, complete a residency program that takes at least three years, and some take an elective fellowship program (Clinic, 2020). PAs graduate from a two-year ARC-PA accredited PA program, pass the Physician Assistant National Certifying Exam (PANCE) and obtain and maintain state licensure (Become a PA, 2024). NPs obtain a bachelor's degree in nursing, pass the National Council Licensure Examination (NCLEX) and receive an RN License, enroll in a three-year graduate program, and pass the National NP Certification Board Exam and obtain NP licensure (The Path to Becoming a nurse practitioner (NP), 2020).

Scope of practice describes the parameters of the activities an individual of a particular profession can perform. This scope is decided at the state level via licensure and scope of practice

laws. Because of this, there is much variability in terms of what states people can see PAs or NPs as their primary care providers and where they cannot. Full practice means NPs can engage in care similar to a physician, like evaluating, diagnosing, ordering tests, managing treatments, and prescribing medication (State Practice Environment, 2024). Reduced and restricted practice are increasing degrees of reduced ability to participate in elements considered full practice. NPs can be either full practice, as in 27 states, reduced practice, as in 12 states, or restricted practice, as in 11 states. For PAs, the scope of practice tiers are optimal practice, advanced practice, moderate practice, and reduced practice. The PA scope of practice environment is optimal in 3 states, advanced in 18 states, moderate in 14 states, and reduced in 15 states (PA State Practice Environment, 2024). Although PAs in North Dakota, Wyoming, and Utah enjoy the most independence with the optimal scope of practice, PA scope laws require that PAs have physician supervision in all 50 states. The categories vary by increasing levels of supervision and restrictions (Team, 2023).

The impacts of the underutilization of alternative primary care providers in some states are compounded by the bottlenecks of medical school and residency admissions. From applications to medical school to medical students matching into residency programs, the bottleneck in the medical education pipeline poses a serious problem since it keeps the number of PCPs in limited supply by excluding many outstanding people at each stage. A disproportionately small number of seats are available for the large number of competent applicants. According to statistics, tens of thousands of people apply to medical schools in the US each year, but only a small percentage of these applicants—usually 40% or less—are accepted (AAMC, 2023). This glaring disparity shows how much potential is still unrealized because of the limitations in place for medical school admissions procedures. In the residency matching procedure, a bottleneck persists. Medical

students compete for residency slots in a range of specialties, including primary care. However, only 81.1% of students match into residency, meaning the number of available opportunities falls short of the demand (Primary Care Residency Opportunities, 2023).

2.0 Literature Review

Searching Ovid Medline uncovered studies and systematic reviews concerning the PCP shortage. This search involved the following keywords: medically underserved area, physician shortage, underserved population, systematic review, systematic reviews, evidence report technology, public policy, health policy, health care reform, health care economics or organizations, economics, costs and cost analysis, cost-benefit analysis, cost control, cost savings, cost of illness, cost-effectiveness analysis, health care costs, health expenditures, law, laws, legislation, policies, policy, health care economics, nurse practitioner, physician assistant, rural health, rural providers, health policy, cost analysis, cost-effectiveness, family medicine, education, medical, graduate, residency, medical student, United States. The search yielded 89 results and was then sorted out based on relevance to the topic, relevance to the US, relevance to PCPs and not just physicians, year of publication older than 2010, and language written in.

2.1 Medical School Admissions

When one thinks of the PCP shortage, the first tactic that comes to mind might be to train more physicians. Although this may be a good step, the current medical school pipeline is falling short and must be molded to serve the current health needs better (Prober & Desai, 2023). Prober and Desai argue that there are three overarching areas that can be focused on to improve the medical school process. The first of these is the adoption of methods that encourage diverse applicants in both personhood and aspirations. The authors assert that medical school selection

processes favor students of higher socioeconomic status (SES) standing and often result in student populations that are unrepresentative of the population. Being as half of the applicants accepted into medical school during the 2017, 2018, and 2019 cycles were from the top 20% income levels, whereas only 6% were from the bottom 20%, the discrepancy is clear. It was also stated that medical schools overvalue standardized tests as a means of evaluating applicants, and seeing as those results skew based on SES, this only reaffirms the diversity issue. The other diversity issue involved is diversity of career paths and aspirations. The authors argue that many qualified applicants, many of whom may be interested in primary care, are being discarded. By disregarding whether applicants are interested in being practicing clinicians, physician-scientists, members of the public health workforce, or policymakers, schools miss the opportunity to discover the many different routes that students can take in addressing the nation's current healthcare needs. The second area of concern for the authors was modifying the selection process for medical school students to align it with the competencies expected of medical school graduates. By this, Prober and Desai juxtapose organic chemistry with leadership and development skills. One is a prerequisite and serves as a gatekeeper to admissions while not being inherently present in all areas of medicine, while the other says more about the applicant's longevity and success in medicine but is not often inquired about. The authors claim that some standardized tests can be replaced by assessments that value and predict “academic capacity, adaptive learning skills, curiosity, compassion, empathy, emotional maturity, and superior communication skills.” The final area to work on is incorporating the use of artificial intelligence and innovations in data science in the selection process instead of relying on things like the U.S. News and World Report for undergraduate school rankings. The authors state that medical schools look to the prestige of an

applicant's university, and this ranking is often biased and not a strong measure of a student's future success.

All in all, this writing by Prober and Desai lays out some of the flaws in the current medical school selection process. In closing the gap of PCPs, it is vital to not just develop more doctors but also to optimize the workforce and talent by incorporating the pillars of diversity, equity, and inclusion.

2.2 Medical School Debt

A study by Caitlin S. Davis et al. explores the debt forgiveness offered to medical professionals via the Public Service Loan Forgiveness (PSLF) and National Health Service Corps (NHSC) programs (Davis et al., 2023). This study is meant to examine variation between the groups and how the debt requirements correlate to respondents' loan repayment program uptake, demographics, scope of practice, and likelihood of practicing with a medically underserved or rural population in each program cohort.

Davis et al. surveyed 10,677 respondents to the American Board of Family Medicine's National Graduate Survey and found that participation of early career family physicians in the PSLF increased from 2017 to 2020 from 7% to 22%, while that of the NHSC remained about the same at around 4-5%. They also found that PCPs enrolled in the NHSC program were more likely than those in PSLF to be from underrepresented demographics and to have a more comprehensive array of services provided. Additionally, NHSC participants were more represented in rural areas (23.3% vs. 10.8%), in health professional shortage areas (12.5% vs. 3.7%), and in medically underserved areas (82.2% vs. 24.2%) than those participants of PSLF.

This study and its results show that there are debt forgiveness programs geared towards PCPs, and some align more with those who are more involved in rural and shortage areas even after the loan forgiveness. It prompts questions about the differences in the NHSC and PSLF programs, their requirements, and their support. The PSLF seems to be more popular overall, but the NHSC targets the people who might be the solution to the PCP shortage. The NHSC should be more central early in the process of medical schooling for the sake of students who may want to go into primary care but are looking for ways to mitigate the debts from medical school. The NHSC has space for more utilization and could be a valuable tool in drawing out more physicians willing to fill the gaps in rural and underserved communities.

2.3 Exposure to Rural Communities During Medical Training

A systemic review found that interactions with rural health during medical school are positively associated with starting and remaining in rural health systems (Russell et al., 2021). This review consisted of 34 observational studies and 58,188 total participants found via databases Medline (OVID), Cinahl (EBSCO), Embase, Web of Science, and Informit. Specifically, Russell et al. found that PCPs exposed to training in rural areas, either during university or post-graduate university or those involved in regulatory interventions requiring return-to-service (ROS), were more likely to remain in rural areas after finishing their training. Alternatively, ROS in exchange for visa waivers, professional licenses, or provider numbers was less successful than exposure in retaining providers in rural areas, especially after the term ended.

2.4 Physician Assistants as a Resource

A comparative study explores the functions and capabilities of medical residents with PAs for two years (Dhuper, Choksi 2008). In this study, medical residents were replaced by PAs in a community hospital for two years, and after this tenure, patient outcomes were collected retrospectively. The outcomes compared between each group were mortality, adverse events, readmissions, and patient satisfaction. The authors found that for all of the criteria, outcomes were comparable when patients were seen by residents or by PAs. All-cause and case mix index-adjusted mortality were lower with PAs than with residents (1.94% v 2.85%).

Although this is a limited study, the results are promising for mitigating the PCP shortage. The shortage means gaps in patient care, but studies like these show that other health professionals can work to fill these gaps and ensure that patient care is uninterrupted. This study shows that residents and PAs can attend to patients and produce comparable results. PAs are underutilized, and this source illustrates that PAs can mitigate the loss created by the PCP shortage.

2.5 Removing Nurse Practitioner Restrictions and Expanding Scope of Practice

In a systematic review of Medline, CINAHL, PsycINFO, and PubMed articles between 2000 and 2019, Yang et al. found that relaxing state NP practice regulations were associated with greater NP supply and improved access to care among rural and underserved populations without decreasing care quality (Yang et al., 2020). Using Nebraska as an example, research shows how removing restrictions on NPs can be beneficial to the healthcare system as well as patients (Holmes & Waltman, 2019). These authors explored the impact of the removal of the integrated practice

agreement (IPA) requirement for NP licensure in 2014. They found that after the removal, more NPs were registered to practice in Nebraska, and there was an increase in NPs starting their own practices in rural communities. Foregoing this licensure requirement was a net positive for patients and did not lead to a decrease in healthcare quality.

A systematic review of nursing scope of practice and its impact on the national health care system concluded that NPs can be used to realize economic and clinical gains if their scope of practice is widened to provide a wide variety of health services (Bauer, 2010). Bauer's analysis of available studies found that NPs were providing comparable clinical care to their other healthcare contemporaries. They were also rated just as well or even better than physicians in clinical outcomes, patient satisfaction, and other measures of quality.

Removal of the IPA is an avenue by which the NP scope of practice can be expanded. By working independently, they can serve as a source of support for alleviating the pressure of the PCP shortage.

3.0 Analysis

The National Academy of Medicine’s (formerly known as the Institute of Medicine) Six Aims for Improvement (AOI) is a framework typically used to measure and enhance healthcare quality (Six Domains of Health Care Quality, 2022). This improvement framework will be used in this paper to examine the policy changes introduced and measure their feasibility in enhancing healthcare quality and access by increasing PCPs in rural areas. The AOI, featured in Table 1 below, consists of six attributes: safe, effective, patient-centered, timely, efficient, and equitable. This framework is generally used for clinical interventions, but these attributes are used here to compare the policy changes suggested in the literature review section.

Table 1 Six Aims of Improvement Technical Definition and Pragmatic Use

ATTRIBUTE	Safe	Effective	Pateint-Centered	Timely	Efficient	Equitable
TECHNICAL DEFINITION	Avoiding harm to patients from the care that is intended to help them.	Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and misuse, respectively).	Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions	Reducing waits and sometimes harmful delays for both those who receive and those who give care.	Avoiding waste, including waste of equipment, supplies, ideas, and energy	Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status
PRAGMATIC USE	Would this change significantly decrease harm to patients? How does it impact the system and/or professionals within it?	Is there evidence that this change would positively impact patients and the healthcare system at large?	How much does this policy consider patient needs?	How quickly could this change be implemented? How quickly could it start having a positive impact on patients?	What waste considerations need to be considered?	Does this change make patient care more equitable?

3.1 Comparing the Policy Options

Table 2 below illustrates the use of the AOI in examining how the possible policy changes measure up to the six attributes of healthcare quality.

Table 2 Applying the Six Aims of Improvement to the Select Policy Options Aimed at Increasing PCPs in Rural Areas to Increase Healthcare Access

	SAFE	EFFECTIVE	PATIENT CENTERED	TIMELY	EFFICIENT	EQUITABLE
Changing the Medical Admissions Process	may increase patient well-being down the line is not a direct impact on increase primary care providers	may increase patient well-being down the line is not a direct impact on increase primary care providers	garnering more equitable and competent health professionals keeps patient needs in mind	changes to admissions requirements could be made pretty quickly if schools are open to it, but this is an upstream change that will create downstream effects so it does not have an immediate impact on the PCP shortage	no clear waste = efficient	meant to create a more equitable admissions process and so will likely even the chances and demographics of medical students
Expanding and Multiplying the NHSC Program	expansion will have a positive impact on patients by unburdening doctors to work in underserved areas which will increase patient safety	debt forgiveness program was found to have a correlation to service in underserved communities and its expansion may lead to more professionals going that route	NHSC program will likely result in PCPs having more freedom to work in rural or shortage areas	expansion will take time to implement. Considerations need to be made for funding availability and requirement examination	no clear waste = efficient	this expansion is meant to increase the positive patient care correlations seen in Davis' study
Require Medical Students to Gain Exposure to Rural Healthcare	rural training will have a positive impact on patients by potentially increasing the number of PCPs in rural areas	exposure to rural health was found to have a correlation to continued service in rural communities	goal of this intervention is to encourage more medical students to work in rural health post-graduation	will take time to implement. Considerations need to be made for school resources, funding availability, and time for curriculum building	no clear waste = efficient	will result in more PCPs in rural areas, thus expanding health equity to underserved communities
Expand Physician Assistant's Scope of Practice to Allow PCP Work	mentioned study presents support for PAs' ability to fill the gaps left by PCPs in shortage areas	mentioned study presents support for PAs' ability to fill the gaps left by PCPs in shortage areas	mentioned study presents support for PAs' ability to fill the gaps left by PCPs in shortage areas	States would have to ease SoP but healthcare systems could implement those changes very quickly from that point.	having more medical professionals available to perform primary care services will increase efficiency and equity at the hospital and system levels	having more medical professionals available to perform primary care services will increase efficiency and equity at the hospital and system levels
Removing the Integrated Practice Agreement for Nurse Practitioners Nationwide	this licensing relaxation was found to not lead to a decrease in quality or ability	this removal of the IPA leads to an increase in NPs especially in rural communities	IPA removal led to more NPs opening their own practices which can serve as primary care locations for individuals in rural communities.	States would have to remove IPA but healthcare systems could implement those changes very quickly from that point.	having more medical professionals available to perform primary care services will increase efficiency and equity at the hospital and	more medical professionals available to perform primary care services will increase equity

Prober and Desai explored in detail the shortcomings of the current medical school admissions process structure and suggested changes. Namely, arguing that it is important to weigh patient goals and values more than standardized test scores, emphasize leadership skills as a prerequisite, and remove dependence on school rankings. As seen in Table 2, this change makes sense because it would have a positive impact across the six categories of the AOI by increasing PCP diversity. However, the practicality of its implementation and its ability to create more PCPs is drawn into question. A more diverse medical student class does not necessarily mean more aspiring rural PCPs. Additionally, soft skills or qualitative information will be challenging to quantify and evaluate. How does one measure leadership, and what is the benchmark for values? Ultimately, the determination of what makes a good medical student is difficult if all the metrics are subjective. This determination is also heavily dependent on society's perception of what is valuable and what is not. These perceptions can change over time and may lead to admissions playing a cat-and-mouse game with the definition of "a strong candidate." Additionally, if this qualitative information proves too tricky, admissions may look to something more quantitative and observable, many of which, like standardized test scores, may serve as proxies for race or SES. This dynamic of finding other proxies to discourage diversity is being seen at the undergraduate level. A study of 100 colleges and universities found that making admissions tests optional only increased the share of ethnic minorities by 1% and students of low SES needing Pell grants by 1% (Barshay, 2021). These findings and strategies proposed by Prober and Desai might point to a need for a societal upstream change in education in the US first before they can become a viable structural change.

Davis et al. explored the different debt forgiveness programs and their correlations with PCPs' representation in various communities. The authors found that PCPs enrolled in the NHSC

program were more represented in rural areas, in health professional shortage areas, and in medically underserved areas. Despite this, NHSC is underutilized, as only 5% of the 10,677 participating PCPs were enrolled in this program. This begs the shift nationwide to recruit more medical students to NHSC or to create more programs state by state. But it also begs the question of whether utilization is low because the target populations are from rural and/or low-income communities themselves and thus are more inclined to pursue more highly paying medical specialties. Prevailing preferences among medical students for more lucrative specialties, coupled with the perception of primary care as less prestigious, perpetuate the shortage (Wilder et al., 2010). Could it be more worthwhile to increase the salaries of PCPs in rural communities? The question of where this money is more efficiently spent weakens this strategy.

Russel et al. found that PCPs exposed to training in rural areas, either during university or post-graduate university, were more likely to remain in rural areas after finishing their training. This supports an addition to pre-med and medical school curricula nationwide of rural health-specific lessons and, if applicable, firsthand hand work in those communities. The AOI framework found this a strong idea based on the six criteria because exposure to rural health is correlated to career paths in rural areas, increasing access for those communities. Perhaps the proposal is for all medical schools to provide a rural rotation. This exposure is essential to illustrating the possibilities in rural health care. The weakness of this strategy lies in the lack of a causal relationship. The correlative nature of exposure and practicing in a rural community is nice, but in order to incentivize medical schools far and wide to add this to the curriculum, there needs to be a more direct link and data to back it up.

Dhuper and Choksi conducted a study replacing medical residents with PAs in a community hospital for two years and compared patient outcomes. The outcomes compared

between each group were comparable when patients were seen by residents or by PAs. This suggests that PAs may be underutilized when they can fulfill the tasks of residents and, thus, likely PCPs. The AOI analysis suggests that states should consider expanding the scope of practice to allow PAs to fill the gaps left by PCPs in shortage areas.

Holmes and Waltman write about how Nebraska removed the integrated practice agreement (IPA) requirement for NP licensure in 2014. This resulted in more NPs being registered to practice in Nebraska and an increase in NPs starting their own practices in rural communities. Foregoing this licensure requirement was a net positive for patients and did not lead to care quality decreasing. Although Nebraska is the example in this study, it is not the only state that has relaxed restrictions for NPs and seen positive outcomes (States with Full Practice Authority for Nurse Practitioners | Maryville Nursing, 2023).

4.0 Discussion, Recommendations, and Public Health Significance

Policy interventions explored via this literature review include reorganizing medical school selection processes, incorporating rural health exposure during medical school, expanding debt forgiveness programs like the National Health Service Corps (NHSC), as well as altering the scope of practice and regulations for PAs and NPs.

Addressing the PCP shortage requires a multifaceted strategy. The AOI helped analyze and compare each of the options. The strategy that stands out as a solid first step is the relaxing of restrictions that allow the expansion of the scope of practice for PAs and NPs. This is because these strategies, similarly, include the use of resources already present in the health care system, thus allowing for a more immediate and lasting effect on patient care. The American Medical Association (AMA) serves as a barrier to the scope of practice expansion and holds the belief that physicians should head patient care (Scope of Practice, 2023). This introduces a level of political back-and-forth but given that 27 states have full NP practice and the scope of practice widening to optimal PA has begun in three states, this expansion happening nationwide is possible. The other strategies, though good, are more upstream changes that can take several medical resident cycles to see the desired impact. Those strategies also involve convincing or creating more PCPs, which may prove more difficult without closing the compensation gap between general practitioners and their specialty contemporaries.

It is imperative to address this shortage immediately to guarantee timely and comprehensive healthcare services for every person, irrespective of their location or socioeconomic standing. The first step should be utilizing PAs and NPs. A comprehensive reform can later include the other strategies contained in this paper.

Bibliography

- 2023 FACTS: Applicants and Matriculants Data. (2023). AAMC. <https://www.aamc.org/data-reports/students-residents/data/2023-facts-applicants-and-matriculants-data>
- “AAMC Report Reinforces Mounting Physician Shortage.” 2021. AAMC. 2021. <https://www.aamc.org/news/press-releases/aamc-report-reinforces-mounting-physician-shortage>.
- Active Physicians by Age and Specialty, 2019. (2019). AAMC. <https://www.aamc.org/data-reports/workforce/data/active-physicians-age-and-specialty-2019>
- Bárbara Starfield, Leiyu Shi, and James Macinko. 2005. “Contribution of Primary Care to Health Systems and Health.” *The Milbank Quarterly* 83 (3): 457–502. <https://doi.org/10.1111/j.1468-0009.2005.00409.x>.
- Basu, Sanjay, Seth A Berkowitz, Robert L Phillips, Asaf Bitton, Bruce E Landon, and Russell S Phillips. 2019. “Association of Primary Care Physician Supply with Population Mortality in the United States, 2005-2015.” *JAMA Internal Medicine* 179 (4): 506–6. <https://doi.org/10.1001/jamainternmed.2018.7624>.
- Barshay, J. (2021, May 10). PROOF POINTS: Test-optional policies didn’t do much to diversify college student populations. *The Hechinger Report*; *The Hechinger Report*. <https://hechingerreport.org/proof-points-test-optional-policies-didnt-do-much-to-diversify-college-student-populations/>
- Batarseh, F. A., Iya Ghassib, Deri Sondor Chong, & Su, P.-H. (2020). Preventive healthcare policies in the US: solutions for disease management using Big Data Analytics. *Journal of Big Data*, 7(1). <https://doi.org/10.1186/s40537-020-00315-8>
- Bauer, Jeffrey C. 2010. “Nurse Practitioners as an Underutilized Resource for Health Reform: Evidence-Based Demonstrations of Cost-Effectiveness.” *Journal of the American Academy of Nurse Practitioners* 22 (4): 228–31. <https://dx.doi.org/10.1111/j.1745-7599.2010.00498.x>
- Become a PA. (2024, February 27). AAPA. <https://www.aapa.org/career-central/become-a-pa/Clinic>, C. (2020). Primary Care Physician (PCP): Role, Education, Average Salary & Where to Find. *Cleveland Clinic*. <https://my.clevelandclinic.org/health/articles/23467-primary-care-physician>
- Davis, Caitlin S, Peter Meyers, Andrew Bazemore, and Lars E Peterson. 2023. “Impact of Service-Based Student Loan Repayment Program on the Primary Care Workforce.” *Annals of Family Medicine* 21 (4): 327–31. <https://doi.org/10.1370/afm.3002>

- Dhuper, S., Choksi, S. (2009). “Replacing an Academic Internal Medicine Residency Program with a Physician Assistant--Hospitalist Model: a Comparative Analysis Study.” *American Journal of Medical Quality*, 24(2), 132-9. <https://dx.doi.org/10.1177/1062860608329646>
- Duquesne University. (2020, June 26). *The Shortage of Healthcare Workers in the U.S.* |
- Duquesne University School of Nursing. Duquesne University School of Nursing. <https://onlinenursing.duq.edu/post-master-certificates/shortage-of-healthcare-workers/>
- Gitnux. (2023, December 20). GITNUX; Gitnux. <https://gitnux.org/primary-care-statistics/#:~:text=Primary%20care%20physicians%20provide%20more,according%20to%20a%202021%20poll>
- Gong, Gordon, Scott Phillips, Catherine Hudson, Debra Curti, and Billy U Philips. 2019. “Higher US Rural Mortality Rates Linked to Socioeconomic Status, Physician Shortages, and Lack of Health Insurance.” *Health Affairs* 38 (12): 2003–10. <https://doi.org/10.1377/hlthaff.2019.00722>.
- Huang, Elbert S, and Kenneth Finegold. 2013. “Seven Million Americans Live in Areas Where Demand for Primary Care May Exceed Supply by More than 10 Percent.” *Health Affairs* 32 (3): 614–21. <https://doi.org/10.1377/hlthaff.2012.0913>.
- Holmes, L. R., Waltman, N. (2019). “Increased Access to Nurse Practitioner Care in Rural Nebraska After Removal of Required Integrated Practice Agreement.” *Journal of the American Association of Nurse Practitioners*, 31(5), 288-292. <https://dx.doi.org/10.1097/JXX.0000000000000153>
- McGhee, M. K. (2023). 2023 State by State Scope of Practice: Physician Assistant. Vivian.com. <https://hire.vivian.com/blog/2022-state-by-state-scope-of-practice-physician-assistant>
- Nurse Practitioner Practice Authority: A State-by-State Guide | NurseJournal.org. (2024).Nursejournal.org. <https://nursejournal.org/nurse-practitioner/np-practice-authority-by-state/>
- PA State Practice Environment. (2024, February 14). AAPA. <https://www.aapa.org/advocacy-central/state-advocacy/state-maps/pa-state-practice-environment/>
- Physician Thrive’s Physician Compensation Report [2021 Data]. (2023, September 8). Physicians Thrive; Physicians Thrive. <https://physiciansthive.com/physician-compensation/report/>
- Primary Care and Emergency Medicine Have Highest Number of Unfilled Residency Positions. (2023). Trillianhealth.com. <https://www.trillianhealth.com/insights/the-compass/primary-care-and-emergency-medicine-have-highest-number-of-unfilled-residency-positions>
- Primary Care Health Professional Shortage Areas (HPSAs) | KFF. (2023, November 6). KFF. <https://www.kff.org/other/state-indicator/primary-care-health-professional-shortage-areas-hpsas/?activeTab=map¤tTimeframe=0&selectedDistributions=total->

primary-care-hpsa-designations&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

Prober, Charles G, and Sanjay V Desai. 2023. “Medical School Admissions: Focusing on Producing a Physician Workforce That Addresses the Needs of the United States.” *Academic Medicine* 98 (9): 983–86. <https://doi.org/10.1097/acm.00000000000005262>

Rosenthal, E. (2023, September 8). The Shrinking Number of Primary Care Physicians Is Reaching a Tipping Point - KFF Health News. KFF Health News. <https://kffhealthnews.org/news/article/lack-of-primary-care-tipping-point/>

Russell, Deborah, Supriya Mathew, Michelle S Fitts, Zania Liddle, Lorna Murakami-Gold, Narelle Campbell, Mark Ramjan, et al. 2021. “Interventions for Health Workforce Retention in Rural and Remote Areas: A Systematic Review.” *Human Resources for Health* 19 (1). <https://doi.org/10.1186/s12960-021-00643-7>.

Shi, L. (2012). The Impact of Primary Care: A Focused Review. *Scientifica*, 2012, 1–22. <https://doi.org/10.6064/2012/432892>

Scope of Practice. (2023, August 31). American Medical Association; <https://www.ama-assn.org/practice-management/scope-practice>

State Practice Environment. (2024). American Association of Nurse Practitioners; AANP Website. <https://www.aanp.org/advocacy/state/state-practice-environment>

States with Full Practice Authority for Nurse Practitioners | Maryville Nursing. (2023, August 30). Maryville.edu. <https://nursing.maryville.edu/blog/states-granting-np-full-practice-authority.html>

Stephens, S. (2023, March 20). How Aging and Retiring Physicians Impact the Younger Physician Job Market. *Healthcareers.com*. <https://www.healthcareers.com/career-resources/trends-and-data/how-aging-and-retiring-physicians-impact-the-younger-physician-job-market>

Six Domains of Health Care Quality. (2022). Ahrq.gov. <https://www.ahrq.gov/talkingquality/measures/six-domains.html>

Team, B. (2023, June 8). In What States Can Physician Assistants Practice Independently? Barton Associates - the Locum Tenens Jobs & Staffing Leader. <https://www.bartonassociates.com/blog/physician-assistant-pa-independent-practice/>

The Path to Becoming a Nurse Practitioner (NP). (2020, November 10). American Association of Nurse Practitioners; AANP Website. <https://www.aanp.org/news-feed/explore-the-variety-of-career-paths-for-nurse-practitioners>

WILDER, V., DODOO, M. S., PHILLIPS, R. L., TEEVAN, B., BAZEMORE, A. W., PETERSON, S. M., & IMAM XIERALI. (2010). Income Disparities Shape Medical

Student Specialty Choice. *American Family Physician*, 82(6), 601–601.
<https://www.aafp.org/pubs/afp/issues/2010/0915/p601.html>

Yang, B. K., Johantgen, M. E., Trinkoff, A. M., Idzik, S. R., Wince, J., Tomlinson, C. (2021). “State Nurse Practitioner Practice Regulations and U.S. Health Care Delivery Outcomes: A Systematic Review.” *Medical Care Research & Review*, 78(3), 183-196.
<https://dx.doi.org/10.1177/1077558719901216>

Zhang, Xiaoming, Daniel W Lin, Hugh Pforsich, and Vernon W Lin. 2020. “Physician Workforce in the United States of America: Forecasting Nationwide Shortages.” *Human Resources for Health* 18 (1). <https://doi.org/10.1186/s12960-020-0448-3>.