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Remote renaissance: Expanding telehealth and provider incentives in rural areas

Kathleen Warner

Ms. Warner is third-year medical student at Johns Hopkins University School of Medicine, Baltimore, MD. She is the recipient of the second place award (tie) in the Alpha Omega Alpha Honor Medical Society 2024 Helen H. Glaser Student Essay Award.

Americans in rural areas experience shorter lives riddled with more chronic health conditions and inferior access to health care compared to their urban counterparts.[1,2] A rural area is defined by the United States Census Bureau as any area that is not an urbanized area or an urban cluster.[3] An urbanized area is composed of a group of densely populated census tracts with a population of 50,000 people or more, and an urban cluster has a population of at least 2,500 but less than 50,000.[3] Thus, according to the Census Bureau, a rural area includes census tracts with a population of less than 2,500 people.[3] That said, there is no universally used definition of the term "rural." Research teams and political bodies use varying definitions based on population density, size, and/or proximity to urban areas to determine whether a geographic area will be classified as "rural."[2]

This lack of a common definition leads to confusion and variation in data collection, which can hinder efforts to address health disparities. While 97 percent of U.S. territory is classified by the Census Bureau as being rural, only 19 percent of the U.S. population lives in rural areas.[3] Rural populations experience disparities in mortality, morbidity, health care utilization, and hospitalization rates compared to their urban counterparts.[1]

Magnitude of the problem

Rural populations experience disparities in age-adjusted excess mortality for each of the 10 leading causes of death: heart disease, cancer, unintentional injury, chronic lower respiratory disease, stroke, Alzheimer's disease, diabetes, kidney disease, influenza and pneumonia, and suicide.[3] This disparity spans all stages of life.[2] Rural populations experience higher rates of infant mortality as well as higher rates of mortality due to preventable illness among the elderly.[2]

Part of this disparity in health outcomes can be attributed to utilization of health care services. Rural populations receive less preventive medical care than their urban counterparts.[1] They receive fewer screenings such as mammograms and pap smears, and are less likely to be genetically tested for breast cancer gene mutations.[4] They are less likely to be tested for human immunodeficiency virus (HIV). One study analyzed the Behavioral Risk Factor Surveillance System and found that while 26.9 percent of the urban residents surveyed reported that they had been tested for HIV in their lifetime, only 21.5 percent of rural residents reported that they had been tested.[5] Additionally, a study conducted in Pennsylvania found that women in rural areas were significantly less likely than women in urban areas to receive counseling from their primary care provider on topics such as smoking, birth control, nutrition, physical activity, and alcohol/drug use.[6]

Rural populations are more likely to be hospitalized for preventable illnesses, and when they are hospitalized, they have worse outcomes.[7] A study conducted in 2018 found that patients admitted to rural hospitals for atrial fibrillation experienced a 17 percent increased risk of death compared with patients admitted to urban hospitals, after accounting for potential confounders and differences in patient characteristics.[7]

There are fewer health care providers for both primary care and specialty care in rural areas compared to urban areas.[8] While 19 percent of the U.S. population lives in rural areas, only nine percent of doctors practice in rural areas.[8] Sixty percent of Primary Medical Health Professional Shortage Areas are located outside metropolitan areas in the U.S.[9] In rural areas, there are approximately 40 subspecialists per 100,000 patients, while in urban areas there are 132 subspecialists for every 100,000 patients.[9] This shortage also extends to nurse practitioners, pharmacists, and dentists.[8] According to "Rural Healthy People 2020," access to care is the number one health priority for rural residents, followed by nutrition and weight status, diabetes, and mental health.[8]

There are several reasons that explain why there is a shortage of health care services in rural areas. These reasons were broken down by Weinhold and Gurtner into six broad categories, "physical/infrastructural; professional; educational; social–cultural; economic; and political reasons."[1] The physical barriers include lack of transportation, burden of travel time and cost, and lack of social facilities.[1] Professional barriers include higher workload for rural providers, more home visits, professional isolation, lack of continuing medical education opportunities, lack of resources, and inefficient use of health care services.[1] Some of the educational barriers listed were relatively few medical students with a rural background; lack of targeting of students interested in rural medicine; trends among medical students to specialize rather than practice primary care; and perceived inferiority of medical school programs and residencies that occur in rural communities.[1]

Socio-cultural barriers include provider lack of familiarity with rural culture; insufficient employment and educational opportunities for the families of rural providers; and greater responsibility for providers in rural areas to care for age diverse populations with complex cases.[1] Some economical barriers include high rates of uninsured individuals in rural areas, and insufficient income for rural providers.[1] Political barriers listed were insufficient government funding for rural facilities; political bias toward urban regions; lack of research of political interventions on rural areas; and the tailoring of health care services to meet the needs of urban criteria.[1] To increase the number of providers in rural areas, these factors need to be addressed. Several strategies have been implemented to attempt to address this issue, including expansion of remote care and implementation of incentives to convince providers to practice in rural areas.

Expanding the use of telehealth

One way to improve access to primary care for rural populations is to expand the use of telehealth. Telehealth is defined by the Health Resources Services Administration as "the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration."[10]

Telehealth visits have been found to produce equivalent improvements in health compared to in-person visits in many settings.[9] One study found that asthmatic children at a rural school-based health clinic who received telemedicine visits experienced similar improvements

in quality of life and symptoms of asthma compared to children who had in-person visits.[9] Another study found that children with Type 1 diabetes who participated in monthly televisits from their school nurse's office experienced improved levels of hemoglobin A1c and an improved quality of life.[9]

A program from the University of Arkansas utilized telemedicine to conduct obstetrical and neonatal rounds, video education conferences, and round-the-clock access to telemedicine consultations for expectant mothers.[9] This program reduced the percentage of very-low-birth-weight babies from 13.1 percent to 7.0 percent in the nine participating hospitals.[9]

As the use of live telemedicine becomes increasingly widespread, more studies will likely be conducted to ensure that the quality of these visits is equal to that of in-person visits, and to ensure that these services are user-friendly and accessible to populations that may not be technologically oriented.

Store-and-forward telemedicine

Improvements in smart-phone cameras have allowed for the expanded use of store-and-forward telemedicine. This approach has been implemented in multiple aspects of health care. In the field of dermatology, it is becoming increasingly common for patients to send photos of their lesions and/or rashes to providers to determine whether the area requires additional treatment. It is also an option for primary care providers to take pictures of lesions on their patients' skin to send to teledermatology experts. This is particularly useful for rural patients who are more likely to receive dermatological care from their primary care providers rather than specialists.

Using store-and-forward medicine to assess dermatologic conditions is often equivalent to in-person evaluation. One study of 391 dermatology patients found a concordance of 91.05 percent between face-to-face and store-and-forward assessments.[11] An analysis of 12 studies found that using store-and-forward teledermatology allowed 43 percent of patients to avoid travelling to a dermatologist.[12] These studies indicate that teledermatology has the potential to save patients a significant amount of time while producing similar results as in-person visit.

Store-and-forward telemedicine also can be used to coordinate analysis of radiologic images between primary care providers and specialists. Specialists are able to read images and generate reports without having to physically be near the patient or the center where the patient had the image taken. The specialists can then send results to the patient's primary care provider, who can use the information to further coordinate care. One example of this type of telemedicine includes the reading of retinal images for diabetic retinopathy by remote ophthalmologists, who can share the results with the patient's local provider.[13] Such collaborations between primary and specialty providers can enable patients to receive expert diagnoses without needing to span great distances and visit different providers for each of their health conditions.

In a program at Partners HealthCare, providers utilized telehealth to monitor patients with congestive heart failure. More than 3,000 patients with the disease utilized at-home monitoring to keep track of their heart rate, pulse oximetry, weight, and blood pressure. This data was uploaded daily, and software was used to determine which patients needed direct attention from a provider. As a result, hospital readmission rates decreased by 44 percent and savings of more than $10 million were generated over a period of six years.[13]

Another program, Care Coordination/Home Telehealth, was implemented by the Veterans Health Administration. This program "integrated telemonitoring and health informatics with disease management technologies."[13] It reached nearly 120,000 veterans over a period of four years. Participants experienced 25 percent fewer bed days of care, and 19 percent fewer hospital admissions compared to usual care.[13] The program also generated savings of $1,999 per patient per year compared to usual care.[13] This type of care presents opportunities for rural patients with chronic and severe health conditions to receive care from their home when they might otherwise be forced to relocate to assisted living facilities.

The expansion of telehealth can be incentivized through the development of accountable care organizations (ACOs), which reward providers financially when they control costs while improving health outcomes.[13] ACOs are therefore likely to lead to the reduction of expensive in-person visits in favor of more efficient telehealth services. According to Kvedar, et al., "Providing remote dermatology or radiology consultations to primary care providers instead of referring patients to additional (and expensive) specialty visits may become a safe and recommended practice."[13]

As this practice becomes more commonplace, remote access to specialists will likely become more affordable and accessible for rural patients.

Technological advantages

Regardless of the type of telehealth utilized, the technology has several advantages in certain settings. It can reduce the cost of health care by reducing travel time for providers and patients. It allows patients to consult with generalists and specialists without having to take time away from work, or find transportation. For patients who are immunocompromised, telehealth enables them to stay home and reduce their risk of contamination.

Telemonitoring allows some patients with chronic diseases to reside at home, when they would otherwise need to be in an assisted living facility. These benefits are all amplified in rural settings, since residents often experience fewer resources, longer travel times, and reduced access to health insurance.

A study by Becevic, et al., found that 67 percent of patients who used a telehealth service felt that appointments were easy to set up.[14] While this indicates that the design and accessibility of telehealth software is fairly successful, it also means that 33 percent of users felt that it was not easy to set up telehealth appointments.[14] Thus, further strategies are needed to make telehealth services easy to use for patients who are not technologically savvy.

Incentivizing practice in rural areas

Though there are clear benefits to expanding the use of telehealth, it is important to understand that telehealth cannot fully address the shortage of primary care providers in rural areas. Procedures and tests such as bloodwork, biopsies, palpation of injuries, X-rays, and many more important aspects of health care cannot be conducted via telehealth. While the practice has the capability to reduce the number of in-person visits and thus reduce the number of healthcare providers needed in rural areas, it will never fully eliminate the need for providers and facilities to be available within rural communities.

It is essential to implement additional strategies to increase the number of providers in these areas. This can include programs that recruit prospective medical students from rural areas, scholarships for students who intend to enter rural practice, and loan repayments for people who commit to practicing in rural areas for a certain period of time.

International studies have found three factors to be most strongly associated with entering rural practice[1] —"a rural background; positive clinical and educational experiences in rural settings as part of undergraduate medical education; and targeted training for rural practice at the postgraduate level."[15] Programs in various countries have attempted to address each of these factors.

Eight medical schools have established the Training for Health Equity network (THEnet) with a social accountability mandate. Part of this mandate involves recruiting students from, and training doctors to work in, underserved communities including rural areas.[15] One member school, the Northern Ontario School of Medicine (NOSM) was established by the government of Ontario, Canada in 2001. This rural, community-based medical school "actively seeks to recruit students from Northern Ontario or from similar northern, rural, remote, aboriginal, or francophone backgrounds."[15] Nearly half of each class is from rural and remote areas. Studies found that 67.5 percent of family medicine residency graduates from NOSM decided to practice in rural areas.

Flinders University in South Australia created the Parallel Rural Community Curriculum (PRCC), a program in which medical students spend their third year of medical school living and learning in a rural community.[15] Though there were concerns that rural education would be inferior to metropolitan education, studies on the PRCC demonstrate that students who participated in the program "were found to have a higher level of confidence and competence, and a broader range of clinical knowledge and skills when compared with their metropolitan counterparts."[15] Additionally, 70 percent of PRCC graduates were practicing in rural areas 12 years post-graduation.[15] This shows that programs that focus on rural education can be as academically rigorous if not more so compared to traditional medical programs, and training health care professionals to practice in rural areas results in many of them deciding to practice in rural areas for prolonged periods of time.

Several universities in the United States are also implementing programs to motivate students to become rural providers. As of 2020, more than 40 medical schools have created rural training tracks.[16] The University of Kansas School of Medicine enacted the Scholars in Rural Health program to encourage people from rural areas to go to medical school. The program strives to identify promising undergraduate students from rural areas in Kansas and invite them to apply to the medical school during their sophomore year of college. If accepted, these students are guaranteed early admission to the medical school.[16]

Oregon Health & Science University (OSHU) School of Medicine sends recruiters to undergraduate institutions in rural areas of the state to guide students through the medical school application process and provide

information about financial aid. Debbie Melton, the school's director of undergraduate medical education, said, "We help them see that going into medicine is a doable and realistic goal for them."[16]

OSHU and the University of California, Davis, School of Medicine have cooperated to create the California Oregon Medical Partnership to Address Disparities in Rural Education and Health (COMPADRE) to find individuals from rural and underserved areas who are interested in medicine, help them through medical school, and link them to one of thirty-one residencies in rural and underserved communities nationwide or in California and Oregon.[16]

University of South Dakota Sanford School of Medicine created the Frontier and Rural Medicine (FARM) program, which allows medical students to do a rotation in a rural area. One student of the program, Kristin Inman, outlined some of the advantages of participating in FARM. "Because the community is so small, I was able to work closely with the same attending physician all year, which was the best learning experience I could have. Everyone on the team got to know me, to identify my strengths and weaknesses, and encourage me," she explained.[16] A participant of the Rural and Underserved Populations (RUUP) program at the University of New Mexico explained how the program changed her perspective of practicing rural medicine. "I didn't have any particular interest in a rural practice until I got to the University of New Mexico. You get to do everything—work in the emergency room, deliver babies, work in the clinic, and in the hospital," she said.[16] While medical school students often focus on the disadvantages of practicing in rural areas, participants of programs that allow students to gain experience in rural areas often realize that there are several advantages that they had not previously considered. These kinds of programs have been shown to produce more rural practitioners than programs that do not have a focus on rural education.[16]

Multiple programs exist to financially incentivize health care providers to practice in rural areas. These take the form of scholarships, loan repayment programs, and supplementary payment programs and have been enacted at the university, state, and federal levels. The National Health Service Corps (NHSC) has a scholarship program in which recipients receive funding for tuition and fees as well as a monthly stipend for attending medical school, as long as these individuals commit to providing primary care services in Health Professional Shortage Areas (HPSAs).[17] Given that approximately two-thirds of HPSAs are in rural areas, this program serves to address the disparity in providers between urban and rural areas.[17]

The NHSC also has a Rural Community Loan Repayment Program, which grants providers including physicians, nurse practitioners, physician assistants, pharmacists, and registered nurses, up to $100,000 in loan repayment as long as they practice for at least three years in rural, NHSC-approved sites.[18] The NHSC has additionally created an online training portal that includes information about serving in isolated settings. It contains chat rooms, forums, and file sharing so that rural clinicians can feel connected to their peers even as they are geographically isolated.[17]

Additionally, there are financial incentives for current providers to continue to provide care in rural areas. Providers in certain facilities including Critical Access Hospitals (CAHs), Federally Qualified Health Centers (FQHCs), and rural health clinics are also eligible for federal reimbursements and grants if they meet certain criteria. This can serve to attract more providers to rural areas, and improve the quality of care in rural facilities.[17]

The current shortage of rural practitioners demonstrates that medical schools cannot simply accept more applicants and expect an "overflow effect."[15] Instead, medical schools need to be intentional about accepting more students who are from rural areas and/or have expressed interest in practicing in rural areas.[15] This, in conjunction with implementing programs based in rural communities, has been found to be an effective way to convince graduates to practice in rural areas. Additionally, by providing financial incentives for providers to practice in rural areas through scholarships, loan repayment, and supplemental income, state and federal governments can motivate more providers to practice in rural areas.

Financial incentives can certainly help convince some providers to practice in rural areas, but unfortunately the scholarships and grants that are currently available often do not make up for the fact that primary care providers in HPSAs earn much less than the average doctor. While a family practice provider in an HPSA can expect to earn $107,807 per year,[18] the national average salary for a family practice provider is much higher at 224,460.[19] Specialists earn even more, with mean salaries of $302,970 for anesthesiologists, $327,650 for dermatologists, and $421,330 for cardiologists.[19] A 10 percent bonus or partial loan repayment simply cannot match the salaries of providers in higher-income, higher-resourced areas.

A combination of interventions

One isolated approach will not be sufficient to address the many causes of decreased access to primary care in rural areas. In order to address this disparity, a combination of interventions must be implemented. Availability and insurance coverage of telehealth services must be increased, and programs to incentivize providers to practice in rural areas must be expanded.

Given that the use of telemedicine recently has been greatly increased, researchers and policymakers have a unique opportunity to implement and assess strategies that improve the quality and accessibility of telemedicine for rural residents.

At a policy level, state and federal governments should enact permanent legislation to increase the scope and Medicare/Medicaid coverage of telehealth services.

At the university level, medical schools should create and expand programs that prepare students to practice in rural areas. Governments can assist in this process by offering grants to medical schools that take such initiatives.

These approaches together have the potential to greatly increase access to care and therefore health status of rural residents.

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The author's E-mail address is kwarne15@jhmi.edu.