

# Diagnostic Excellence in U.S. Rural Healthcare: A Call to Action



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## Issue Brief 24

# Diagnostic Excellence in U.S. Rural Healthcare: A Call to Action

### Prepared for:

Agency for Healthcare Research and Quality  
5600 Fishers Lane  
Rockville, MD 20857  
[www.ahrq.gov](http://www.ahrq.gov)

Contract Number HHSP233201500022I/75P00119F37006

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AHRQ Publication No. 24-0010-9-EF  
September 2024

This project was funded under contract number HHSP233201500022I/75P00119F37006 from the Agency for Healthcare Research and Quality (AHRQ) and the U.S. Department of Health and Human Services.

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**Suggested citation:** Ali KJ, Galvez NJ, Craig S, Fortune M, McNemar M, Fetzer LM, Alexander K, Chanlongbutra A, Freeman W. Diagnostic Excellence in U.S. Rural Healthcare: A Call to Action. Rockville, MD: Agency for Healthcare Research and Quality; September 2024. AHRQ Publication No. 24-0010-8-EF.

## A Path to Rural Diagnostic Excellence

Rural America, home to approximately 60 million people (1 in every 5 patients)<sup>1</sup> in the United States (U.S.), faces distinct healthcare challenges that critically impact the accuracy and timeliness of medical diagnoses.<sup>2-4</sup> These challenges include limited resources (e.g., availability of healthcare services, workforce, infrastructure) and geographic isolation, which contribute to an elevated risk of diagnostic errors,<sup>5</sup> such as delayed treatments and misdiagnoses, and can lead to poorer health outcomes and increased healthcare costs.<sup>2,4,6</sup>

According to the Census Bureau, rural areas are defined as those with fewer than 2,000 housing units or 5,000 residents.<sup>7,8</sup> Small rural hospitals make up 30 percent of all U.S. hospitals<sup>9</sup> and are vital in providing care services to approximately 59 million residents (20% of the population).<sup>8-10</sup>

Rural healthcare delivery encounters significant obstacles that increase the risk of diagnostic errors,<sup>11-13</sup> such as limited access to advanced diagnostic tools, a shortage of specialists, and substantial social determinants of health (SDOH) affecting patients.<sup>2,4,13,14</sup> Rural healthcare entities also struggle with financial viability,<sup>12</sup> limiting their ability to invest in new diagnostic technologies and training programs.<sup>12</sup> A national survey of 474 administrators in Critical Access Hospitals (25 beds or fewer in rural areas) indicated that financial constraints, staff shortages, and outdated technology significantly hinder the implementation of patient safety interventions.<sup>11,15</sup>

A 2020 Centers for Medicare & Medicaid Services (CMS) report, *Examining Rural Hospital Bypass for Inpatient Services*, detailed numerous factors leading to rural hospital avoidance. These include quality concerns and poor reputation,<sup>16</sup> indicating that when initial care is established with a physician at another nonrural hospital, patients are less likely to return to the rural facility for care.<sup>17</sup> Thus, high-quality patient care, including optimal diagnostic care, is crucial for retaining patients within local rural communities<sup>16</sup> and the viability of rural care delivery organizations themselves (e.g., hospitals, clinics). These factors, among numerous others, collectively contribute to delays in diagnosing life-threatening conditions in rural patients with complex comorbidities.<sup>18-20</sup>

Despite significant challenges, interested parties in rural healthcare (e.g., hospitals, clinics, individual providers, and community health organizations) remain steadfast in their commitment to delivering high-quality patient care.

This issue brief explores several critical challenges affecting diagnostic excellence in U.S. rural healthcare settings, emphasizing the need to address these impediments, and proposes three actionable strategies to overcome barriers to delivering high-quality diagnostic care in these areas. The three areas of focus where rural diagnostic patient care can be immediately advanced are:

1. Enhancing specialty care and surgical service lines
2. Strengthening care coordination
3. Screening for social determinants of health

These ideas guide this call to action, contributing to ongoing efforts to improve diagnostic outcomes in rural healthcare settings, recognizing the complexity of these challenges, and acknowledging the potential for meaningful progress in advancing rural patient safety, quality, and equity.

## Improving Diagnosis in the Context of Rurality

Diagnostic errors pose a significant challenge in the U.S. healthcare system, particularly in rural settings. According to the Agency for Healthcare Research and Quality (AHRQ), these errors contribute to approximately 10 percent of patient deaths and 6-17 percent of hospital adverse events.<sup>4</sup>

The National Academy of Medicine (NAM) defines diagnostic errors as the failure to establish an accurate and timely explanation of the patient's health problems or to communicate that explanation to the patient. Each year, approximately 12 million U.S. adults experience a diagnostic error, leading to as many as 80,000 deaths. These errors result in delayed, incorrect, or missed diagnoses, often causing irreversible harm and increased healthcare costs, amounting to an estimated \$100 billion annually in malpractice claims.<sup>21</sup>

At the patient level, it is estimated that 33 percent of diagnostic errors result in patient injury,<sup>22</sup> and 57 percent of these failures occur in ambulatory care,<sup>21</sup> the predominant mode of care delivery in rural settings. Addressing diagnostic errors in rural healthcare is critical for improving patient outcomes and ensuring diagnostic excellence (timely, safe, equitable, effective, patient-centered, and efficient care).<sup>21</sup>

Rural areas are not a smaller version of urban areas. Numerous studies highlight significant disparities in diagnostic accuracy within rural areas, primarily due to physician shortages and higher poverty rates,<sup>4,13,23,24</sup> which are both key determinants of health outcomes.<sup>25-29</sup> Rural areas have fewer primary care physicians (4.9 per 10,000 rural residents versus 8.0 per 10,000 urban residents) and a higher percentage of residents living below the federal poverty level (23.8% rural vs. 17.7% in urban).<sup>14</sup>

Rural status itself imposes additional disadvantages on most healthcare utilization measures, independent of poverty and healthcare supply (e.g., geographic barriers, limited access to specialty care, lower health literacy),<sup>14</sup> which exacerbate challenges in accessing timely and accurate diagnoses.<sup>4,30</sup>

Compared with urban areas, disparities in health outcomes for patients in rural areas are vast.<sup>4</sup> Data from a 2017 Centers for Disease Control and Prevention (CDC) report indicate that mortality rates for the top 5 causes of death in the U.S. are higher in rural areas than in urban areas. In addition, the disparities between rural and urban populations are increasing.<sup>31</sup> Rural patients have a higher prevalence of diagnosed chronic conditions (35% rural areas vs. 26% urban areas)<sup>18</sup> such as arthritis, diabetes,<sup>32</sup> hepatitis, hypertension, and failing kidneys.<sup>18</sup> Rural areas also have a larger percentage of adults over age 65 years (19% rural vs. 15% urban).<sup>33</sup> Further, despite national efforts to reduce preventable conditions such as heart disease (14% rural vs. 10% urban)<sup>20</sup> and stroke (18.6% rural vs. 16.9% nonrural),<sup>34</sup> mortality rates in rural areas decline more slowly than in urban areas. This difference is partly due to a lack of accurate preventive screening and diagnosis.<sup>5,13,20,34</sup>

Rural residents are also at a greater risk of death from frequently misdiagnosed diseases such as cancer<sup>23</sup> and chronic respiratory disease.<sup>31</sup> They are less likely to engage in regular physical activity, leading to a higher prevalence of overweight individuals (30% more overweight compared with urban areas).<sup>5</sup> In addition, they are more at risk for a sedentary lifestyle (60% more compared with urban areas),<sup>5</sup> which affects comorbidities. Rural residents are more susceptible to unintentional injury, as many work in high-risk occupations (e.g., farming, mining, forestry)<sup>30</sup> and have a higher prevalence of behavioral and mental health disorders,<sup>35</sup> substance use disorders, and oral health issues.<sup>13,30,36</sup> They also face significant physical barriers to healthcare access, including transportation difficulties, rugged terrain, and limited broadband internet access, all of which hinder both in-person and remote telehealth services.<sup>13,31</sup>

Given the significant health disparities in rural America, innovative strategies are urgently needed to reduce diagnostic errors in rural healthcare settings.

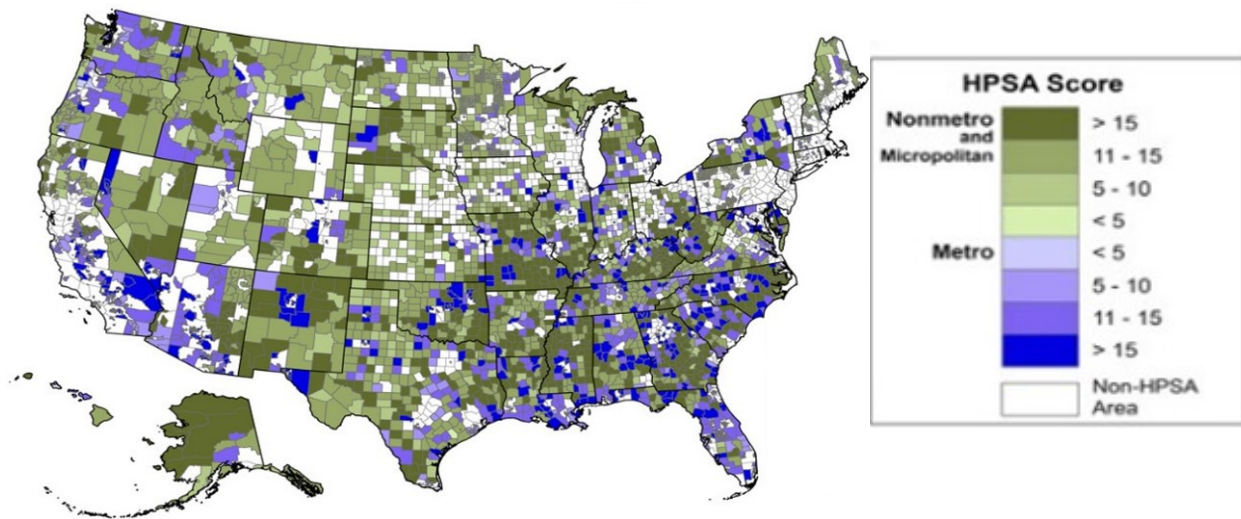
## Three Areas To Immediately Advance Diagnosis In Rural Healthcare

### 1. Enhancing Specialty Care and Surgical Service Lines

Strengthening subspecialized care and surgical service lines in rural hospitals is crucial for improving prompt diagnostic accuracy and reducing the need for patient transfers. By enhancing local subspecialist and surgical capabilities, rural hospitals can provide more comprehensive care and facilitate quicker diagnoses and treatments for conditions that require surgical intervention or specialized treatment plans. This goal can be achieved by addressing the following areas.

***Accessing Care (Preventive, Acute, Specialty).*** Rural residents often face barriers to care such as transportation, financial limitations, and inability to connect with healthcare providers for early diagnosis and treatment, which begins with a primary care provider (PCP). However, as of 2024, 65 percent of all primary care health professional shortage areas (HPSAs) were in rural communities.<sup>37-39</sup>

**Figure 1. U.S. primary care health professional shortage areas<sup>38</sup>**



**Source:** data.HRSA.gov, Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services, July 2024.

**Note:** Alaska and Hawaii not to scale. HRSA scores HPSAs on a scale of a whole number (0-26 for primary care), with higher scores indicating greater need.

Given this shortage of primary caregivers, it is imperative to streamline care and maximize the value from each patient encounter. Rural organizations can ensure their physicians and advanced practice providers effectively use Healthcare Effectiveness Data and Information Set measures<sup>40</sup> to attain high screening rates within patient care panels. Key performance metrics should be established and monitored to track the timely initiation of screenings, appropriate screening intervals, and timely follow-up on abnormal results.

When improving access to care, providers and organizations can move toward regionalization whenever possible.<sup>41</sup> Deploying mobile care units for diagnostic testing (e.g., pulmonary testing, 3D mammography, mobile magnetic resonance imaging) can expand access to technology not immediately available in the rural community and improve diagnostic capabilities. Further, a community-based diagnostic hub-and-spoke model in partnership with other health organizations is another approach to help avoid significant financial outlay and provide easy access to diagnostic testing for rural residents.<sup>42,43</sup>



Integrating artificial intelligence (AI) is also becoming increasingly helpful in enhancing patient care in rural areas. AI algorithms can quickly analyze extensive data, including medical and family histories, demographics, and real-time health indicators. By leveraging these data, clinicians can quickly identify high-risk patients who need immediate attention, ensuring those with urgent needs are seen by specialist physicians without unnecessary delays. AI-driven prioritization optimizes resource allocation and improves overall patient outcomes by facilitating timely interventions.<sup>44</sup> As regional healthcare systems continue to grapple with increasing patient volumes and complexity of care, AI's role in streamlining the referral process for patients in a rural setting becomes advantageous. Use of AI can foster a more efficient, equitable, and responsive healthcare environment.

Combining AI with telehealth models has been shown to improve outcomes for both patients and healthcare professionals in rural settings.<sup>45</sup> This finding suggests that integrating these two approaches could significantly benefit rural communities by improving the timeliness and accuracy of diagnosis for high-risk patient screening.<sup>45</sup> However, it is important to be mindful of AI's potential to exacerbate existing disparities in healthcare, which necessitates careful implementation and monitoring to ensure equitable outcomes for all patients.

***Training and Recruiting Specialists, Surgeons, and Surgical Staff.*** To ensure access to surgeons and surgical staff in rural communities, a multifaceted and intentional approach is needed. A 2017 study found that only 3 percent of final-year medical residents expressed an interest in practicing in communities of 25,000 people or smaller.<sup>46,47</sup> Support of residency programs and fellowships designed specifically to train physicians and advanced practice providers for rural practice is an imperative.<sup>37,46</sup>

Rural hospitals can participate in hosting medical residents through various training programs, or partnering with a medical school to offer rural training experiences – essentially investing in the future of rural healthcare delivery. Programs such as the Targeted Rural Underserved Track Program,<sup>48,49</sup> Rural Residency Planning and Development Program,<sup>50</sup> and Rural Opportunities in Medical Education<sup>49</sup> are excellent options. Among rural track graduates, 44 percent enter practice in a rural community, and physicians who completed more than half of their residency in rural areas chose to practice in rural areas at a significantly higher rate.<sup>51</sup> Providing firsthand experience in rural communities remains a key strategy for engaging residents and should be actively pursued.<sup>52</sup>

In the interim, the American College of Surgeons Advisory Council for Surgery noted that a regional locum tenens solution (a common practice in rural and underserved areas where it is challenging to recruit medical staff) is an option. This approach involves hiring surgeons to cover for staff on leave, during high patient demand, or where shortages exist. It can ensure continuity of care from a few days to several months, providing additional support for rural communities to provide diagnostic procedural and surgical coverage.<sup>53-57</sup> Further, satellite clinics can bring specialty-level diagnosis to places where rural residents would otherwise not have care, improving access to specialty medicine.<sup>58</sup>

For surgical and specialty care physicians, a commitment to lifelong learning is essential, and rural organizations can support ongoing education to expand the specialists' ability to succeed. While urban physicians might experience routinization due to a high volume of repetitive procedures, rural community physicians and teams could display gaps in expertise due to low patient volume. Ongoing education and simulation training are practical ways to address these gaps and bolster experiential learning.<sup>24</sup> Methods of e-learning can expand access to new care techniques for rural providers, such as video conferences with specialists from other locations, virtual patient computer-based simulation scenarios, and web-based learning. When diagnosis is accurate and timely, more complex patients can be transferred to urban facilities specializing in complex care, while rural facilities retain procedures they are equipped to handle. Ensuring that minimum case standards are developed by location, and competency is ensured, will foster high-quality specialty and surgical care. Implementing these models with a focus on diagnostic improvements may yield patient care advances in multiple specialty areas. Competency-based training in all specialties can ensure consistent care for patients regardless of their location, ultimately improving diagnostic outcomes.

Ensuring access to skilled surgical technologists and perioperative nurses is vital for increasing surgical specialists' confidence in providing care in operating rooms. Using tools to validate perioperative skill sets and ensure ongoing continuing education for surgical staff is necessary to create a patient safety culture of diagnostic and surgical excellence.<sup>59</sup> Such tools include Periop 101<sup>60</sup> from the Association of periOperative Registered Nurses and Competency Based Orientation Programs<sup>61</sup> from the American Society of PeriAnesthesia Nurses. These standardized training programs can help reduce variability in surgical training methods and create reliability in programmatic processes needed for safe patient care.

***Establishing Tele-Specialty and Surgical Consultation Networks.*** In rural communities, the scarcity of specialists often limits access to specialty surgical care. One promising solution is the use of telehealth consultation networks, which combine remote specialty physicians with onsite advanced practice providers. This hybrid model enhances patient care while addressing the typical challenges associated with telehealth consultations.<sup>62,63</sup> Rural hospitals can improve care access by partnering with nearby urban medical centers to provide remote surgical consultations and support, particularly when patient volumes do not justify a full-time specialist. A rotation of specialists in areas such as general surgery, cardiology, or obstetrics and gynecology can be arranged through partnerships, with the possibility of embedding specialty services within rural clinics to improve access to care.

Innovative solutions to accessing much-needed specialty care should be considered, such as developing telehealth hubs in rural communities to leverage specialists who choose to reside in or near these areas. Establishing telehealth agreements that allow these physicians to provide virtual care to other rural communities can help maintain a healthy practice volume and ensure sustainable compensation benefiting both the hospital and the specialist. However, this work is not without barriers. According to the Federal Communications Commission 2020 Broadband Deployment Report, nearly 25 percent of residents in rural areas lack broadband coverage.<sup>64</sup> Limited broadband access can impede comprehensive physical examinations, affecting diagnostic accuracy, and highlights drawbacks in the current telehealth model. In regions with poor broadband access, integrating onsite specialty advanced practice providers with virtual or telephonic consultations from specialty physicians can improve the delivery of care. This model allows occasional surgical or interventional visits, minimizing travel demands on specialty physicians.

***Investing in Advanced Surgical and Diagnostic Equipment and Technologies.*** Acquiring advanced diagnostic equipment can be challenging for rural facilities with limited operating margins. However, establishing funding pathways for this technology is crucial to improving diagnostic screening and surgical procedures.<sup>65</sup> Evaluating emerging technologies (e.g., AI-powered colonoscopy tools) can improve screening with minimal investment and enhance the early detection of diseases.

Hospital and clinic administrators must be well versed in federal, state, and private funding opportunities. Training staff in grant writing is recommended to ensure that rural hospitals remain competitive in procuring advanced diagnostic technology. Applying for grants to acquire capital equipment (e.g., computed tomography machines, stress lab equipment, surgical robotics) can considerably enhance diagnostic capabilities.

***Providing Access to Care to Hub Populations on State Lines.*** Many rural communities are located near state lines, presenting opportunities to recruit healthcare providers from neighboring states and provide equitable access to healthcare for patients closer to a healthcare facility in an adjacent state. Removing barriers to recruiting providers across states by adopting multistate Compact Licensure for Physicians, which would eliminate the need for multiple state licenses, would be valuable.<sup>66</sup> Enabling physicians and advanced practice providers to practice across state lines within the Compact would enhance access to care for rural patients and encourage providers residing near state borders to explore adjacent opportunities.<sup>67</sup> A similar initiative has been introduced through the U.S. Department of Health and Human Services' License Portability Grant Program for Social Workers, which maintains quality standards while improving access to care.<sup>68</sup> This model could be adapted to advance specialty and surgical care in rural communities as well.

## **2. Enhanced Care Coordination**

Better care coordination is critical for advancing diagnosis by streamlining patient care, minimizing redundancies, and ensuring accurate and timely diagnoses. The presence of increased rural population-level comorbidities for chronic conditions (e.g., hypertension, diabetes, chronic obstructive pulmonary disease, and kidney disease) further complicates diagnosis,<sup>18</sup> making care coordination among rural care settings and providers essential.<sup>69</sup>

Patient insurance status (whether underinsured or uninsured), health literacy, and transportation, among other factors, can also hinder how patients access the healthcare system. Individuals often rely on emergency departments for both major illnesses and nonemergent needs. Nationally, this use results in 136.3 million emergency department visits annually, with 17 percent (23 million) of these visits attributable to frequent users.<sup>70</sup>

Effective care coordination improves diagnostic accuracy and decreases healthcare costs by reducing unnecessary tests and preventing hospital readmissions affecting patients, providers, and insurers.<sup>69</sup> In rural areas where healthcare resources are limited, efficient care coordination is essential for optimizing diagnostic care, reducing redundancies, and improving care efficiency, particularly when patients can be connected to the most appropriate location at the most appropriate time. This goal can be achieved through several key strategies in the following areas that enhance care delivery by promoting greater integration and collaboration.

**Training and Support for Care Coordinators.** Providing comprehensive training and ongoing support for care coordinators is crucial for equipping them with the skills and resources needed to manage patient care effectively.<sup>71</sup> Care coordinators in rural settings navigate substantial barriers that inhibit patients' access to care, such as arranging transportation to out-of-county specialists, identifying providers who accept patients' insurance plans, and managing long wait times for appointments, scheduling of surgical interventions, and specialty care.<sup>69</sup>

To enhance their efficacy, care coordinators can be trained in areas including health information technology, patient communication strategies, and care coordination techniques.<sup>71,72</sup> Enhancing support for care coordinators through access to professional networks, ongoing education, and real-time decision support tools can help to better address the complex needs of rural populations. By strengthening training and support frameworks, rural healthcare systems can more adeptly manage chronic conditions, improve diagnostic accuracy, and reduce reliance on emergency services.<sup>70</sup> This approach also improves patient outcomes and leads to more cost-effective healthcare delivery.<sup>72</sup>

**Improved Efficiency.** Enhancing the efficiency of patient care by optimizing processes and reducing delays is critical for timely diagnoses; however, most rural care delivery entities are siloed. Practical strategies can focus on standardizing protocols, using telecommunication platforms, conducting joint training exercises, and forming collaborative consortia that involve regional clinics, primary care practices, and hospitals to improve care delivery.

**Integrated Care Models.** A 2020 CDC study found a 40 percent higher prevalence of heart disease among rural residents compared with their urban counterparts.<sup>73</sup> To address this disparity and many similar health disparities for other chronic illnesses, developing integrated care models is essential to connect patients to a wide range of healthcare services to ensure comprehensive care. Integrated care models link patients to primary care for medication management, promote healthy lifestyles, and address social determinants of health, which can substantively decrease the risks of diseases.<sup>42,43,74</sup> Technologies such as telehealth consultations, mobile health applications, and remote patient monitoring also play a role by identifying at-risk patients before they visit a PCP or an emergency department.<sup>75</sup> Integrating these technologies into healthcare care coordination activities can improve diagnostic accuracy and timeliness.

**Telehealth Use.** Care coordination across telemedicine and telehealth networks can considerably improve patient access to personalized care across multiple providers. For example, many rural hospitals lack access to specialized medical expertise, but telemedicine networks, such as telestroke programs, enable quicker and more accurate diagnoses of critical conditions.<sup>76-78</sup> These networks facilitate collaboration between rural hospitals and specialists, improving their ability to deliver a timely diagnosis and critical treatments.

A 2018 study examining telestroke adoption in 107 community hospitals found that hospitals that lack financial resources and capacity can pool resources needed for acquiring essential technology.<sup>76</sup> The use of telestroke networks allows rural hospitals to collaborate with neurologists, enhancing their ability to administer life-saving clot-dissolving drugs during strokes.<sup>78</sup> This approach could be expanded to other high-priority diagnostic areas, such as cardiology and oncology, where specialist shortages also exist. Telehealth can improve patient outcomes through timely access to care, while local and regional resources are optimized, reducing the overall cost burden on both the healthcare system and patients.

### 3. Social Determinants of Health: Screenings and Referrals

The presence of unaddressed social determinants of health (i.e., food, employment, housing, education) that patients experience can lead to significant diagnostic challenges and increase health disparities.<sup>79,80</sup> For example, cultural and language barriers or low health literacy can prevent patients from accurately describing their symptoms or medical history, leading to misdiagnosis.<sup>81</sup> Similarly, poverty may prevent patients from accessing care, leading to delayed diagnoses, or adhering to medication regimes (e.g., filling/refilling prescriptions, managing polypharmacy).<sup>81,82</sup>

Healthcare plays a vital role in population health, and 10-20 percent of SDOH have modifiable contributors that healthcare delivery can assist in addressing.<sup>79,83</sup> Once a patient's social needs have been identified, a plan to address those needs should be in place. A provider (e.g., clinician, hospital) does not have to meet the social need; it could be as simple as providing patients with a list of organizations that can assist with identified social needs. Whether the protocol is providing a list, making personalized referrals, or providing the service themselves (e.g., providing public transportation vouchers, occasional late business hours, flexible billing), it should be streamlined and easy for both the clinicians, staff, and patients to act. Rural hospitals, clinics, and physicians can join existing community partnerships, or form new partnerships, to prioritize, develop, and implement SDOH interventions and define their roles in this endeavor.<sup>84</sup>

To achieve diagnostic excellence in rural healthcare, action to identify and address a wider spectrum of factors influencing patients' health and access to care is imperative, and this need cannot be excised from healthcare delivery. Some actionable steps to help address patient SDOH in rural settings include the following areas.

***Using Standardized SDOH Screening Tools.*** Screening for SDOH is critical in identifying and addressing the nonmedical factors that significantly impact health outcomes in rural communities.<sup>25,85</sup> Integrating SDOH screening into routine patient care helps healthcare providers understand the broader context of a patient's health, enabling more precise and personalized care and diagnoses. Effective screening protocols are crucial for identifying and reducing diagnostic errors by addressing factors contributing to misdiagnosis or delayed treatment. Implementing the consistent use of one of many tested SDOH screening protocols is an immediate step healthcare clinicians can take to improve diagnostic care in rural settings.<sup>25,26,29,74,85</sup>

***Connecting Patients With Community Resources.*** Establishing strong referral networks with community resources that can address modifiable SDOH factors is another immediately actionable area. Once unmet social needs are identified, it is crucial to connect patients with local resources and services to address these needs.<sup>29</sup> An essential first step is meeting with relevant community-based organizations so they are aware that patients may be referred. Community-based organizations can support patients with housing, nutrition, insurance eligibility, and employment support, which can ultimately improve their health outcomes and health-related quality of life.<sup>26,29</sup>

***Training Healthcare Staff.*** Educating healthcare staff on the importance of SDOH and how to integrate this understanding into patient care is vital. Training programs for staff focused on using standardized protocols and developing the skills and sensitivity to identify barriers related to SDOH can contribute to a lower risk of systemic diagnostic errors.<sup>4,86,87</sup>

**Enhancing Community Engagement.** Strengthening community endeavor also is integral to addressing SDOH effectively. Implementing SDOH interventions, such as health education campaigns to raise awareness of health-related outcomes and prevention strategies, community health literacy programs, patient engagement in their healthcare, and fostering of patient-centeredness, are all powerful methods to reduce disparities in health and healthcare.<sup>4,86,87</sup>

By actively involving the community in preventive care initiatives and health management activities, healthcare providers can enhance awareness of prevalent health issues within the population and promote the adoption of proactive health behaviors.<sup>88</sup> This engagement helps bridge the gap between healthcare services and the community by better equipping patients to manage their health, ultimately leading to more timely and accurate diagnosis. This endeavor also facilitates a closer alignment between healthcare services and the community, empowering patients to manage their health more effectively, which in turn contributes to timelier and more accurate diagnoses.

## A Call To Action: Diagnostic Excellence In Rural Healthcare

U.S. rural healthcare is often perceived through a lens of lack—limited resources, limited funding, limited technology. However, healthcare is still being delivered in rural settings despite these limitations, and a path to diagnostic excellence is possible within the constraints of rurality, as numerous entities (e.g., federal and state governments, hospital associations, patient safety and quality improvement organizations) support efforts to advance rural healthcare.

Achieving diagnostic excellence in rural healthcare requires coordinated and sustained actions from policymakers, healthcare providers, healthcare organizations, community members, patients, and other interested parties. By leveraging available funding sources and implementing targeted interventions in the short and long term, it is possible to reduce diagnostic errors, improve patient safety, and enhance the quality of care for rural patients. Such efforts can focus on the following groups.

**Policymakers.** Policymakers could consider prioritizing funding and support for rural healthcare initiatives focused on:

- Enhancing diagnostic services,
- Improving community and patient engagement,
- Implementing comprehensive care coordination strategies, and
- Including strategies to address social determinants of health in financial incentive plans.

Policymakers could consider further supporting and expanding funding for rural healthcare initiatives focused on diagnostic services and specialty care service lines, ensuring that rural populations have equitable access to high-quality diagnostic care and technology.

Policymakers can recognize that applying for grants, the primary mode for a funding acquisition in rural healthcare settings, requires substantial organizational resources, staff time, and clinical expertise. These may not be available in rural hospitals, and application programs may want to consider addressing this barrier. Simplifying the grant application process or introducing alternative methods (e.g., streamlined applications, technical assistance programs) to facilitate funding access for rural hospitals can have an exponential impact in bridging the rural-urban diagnostic divide. Reducing award turnaround time to ensure funding is accessible in a more immediate manner can also help.

Further, refining approaches to improving the value of healthcare delivery is needed as prevalent alternative payment models (e.g., value-based payment models,<sup>89</sup> global budgets<sup>90,91</sup>) do not capture diagnostic accuracy or measure diagnostic errors. This measurement is indispensable because benchmarking data are a cornerstone of longitudinal quality improvement.

Policies, strategies, and funding could also include the development of regionalized rural healthcare networks, identifying zones where connections can be enabled, or where research is necessary, and investing in those areas.<sup>41</sup>

**Healthcare Providers.** Rural healthcare providers (e.g., physicians, nurse practitioners, laboratory, and pharmacy technicians) can use evidence-based diagnostic tools and embrace best practices by joining specialty tele-networks among regional providers. If such networks do not exist, clinicians can form peer networks. Providers can also use and locally adapt existing patient safety and quality diagnostic resources to help improve patient outcomes. Such resources include health information exchanges, telemedicine services (e.g., remote ECG interpretation), and standardized screening protocols (e.g., SDOH screening tools).<sup>25,74,92,93</sup>

Providers can also adjust care, or help address unmet social needs, through referrals. Ensuring that patients have access to culturally and linguistically appropriate services (e.g., having interpreter services available) can improve accuracy of descriptions and discussions related to symptoms or medical history.<sup>94</sup> Rural clinicians can access numerous publicly available patient safety improvement toolkits and resources from organizations such as AHRQ (e.g., TeamSTEPPS for Diagnosis Improvement Course, Toolkit for Engaging Patients To Improve Diagnostic Safety),<sup>95-97</sup> the American Hospital Association rural-specific toolkits (e.g., Get With the Guidelines<sup>®</sup>),<sup>98</sup> and the Institute for Healthcare Improvement (e.g., Optimizing a Business Case for Safe Health Care: An Integrated Approach to Safety and Finance).<sup>99,100</sup>

Individual clinicians in rural areas are encouraged to engage in continuous education and training to stay abreast on the latest diagnostic techniques and error prevention strategies. Where feasible, they should incorporate modalities such as point-of-care ultrasound, wearable technologies, and new biomarker or genetic testing (e.g., multicancer early detection screening). Integrating these practices into routines can enhance diagnostic accuracy and timeliness, positively impacting patient outcomes.

**Healthcare Organizations.** Hospitals can seek grant funding to adopt advanced diagnostic technologies and implement telemedicine and hybrid care models that enhance diagnostic accuracy and reduce delays. In addition, organizations can use a variety of grant funding sources to invest in continuous quality improvement strategies to ensure that high-quality care is consistently delivered across all service lines.<sup>50,101-103</sup>

Organizations can also address social determinants of health by incorporating screening tools, connecting patients with local organizations and resources, and providing culturally and linguistically appropriate care (e.g., on-hand interpreter services to improve medical history or symptom discussions).<sup>26</sup> Care coordination agreements and fostering regional, inclusive healthcare networks of care delivery providers can also support this goal.<sup>71,72</sup>

**Patients.** Patients can be empowered to actively participate in their healthcare by understanding their conditions,<sup>97,100</sup> recognizing symptoms that require medical attention, and engaging in health education initiatives. These include participating in health screenings, asking clarifying questions at the point of care, and engaging with health literacy content. This patient enabling enhances the accuracy and timeliness of diagnoses, contributing to better diagnostic outcomes.

**Communities.** Healthcare providers and organizations can enhance patient engagement by fostering community involvement through culturally appropriate health education campaigns. Initiatives such as health fairs and local workshops aim to improve health literacy, promote regular screenings for early detection of health conditions, and ultimately lead to more accurate and timely diagnoses. Interested parties in communities—including patients, local organizations, and advocacy groups—are essential in driving these efforts and ensuring their success. Communities can also advocate for beneficial healthcare policies at the state and federal level to ensure that rural healthcare systems receive the support and resources needed to achieve diagnostic excellence.

To achieve diagnostic excellence in rural healthcare, interested parties must work together to implement evidence-based tools and embrace technological advancements to address the unique challenges of rurality. Focusing on diagnostic accuracy and timeliness has immense potential to enhance patient health outcomes, minimize diagnostic errors, and bridge the critically widening gap in patient safety and quality between rural and urban healthcare settings. By continuously refining and standardizing best practices, rural healthcare can deliver high-quality, safe, equitable, and timely care, setting a new standard for diagnostic excellence in even the most underserved rural communities.



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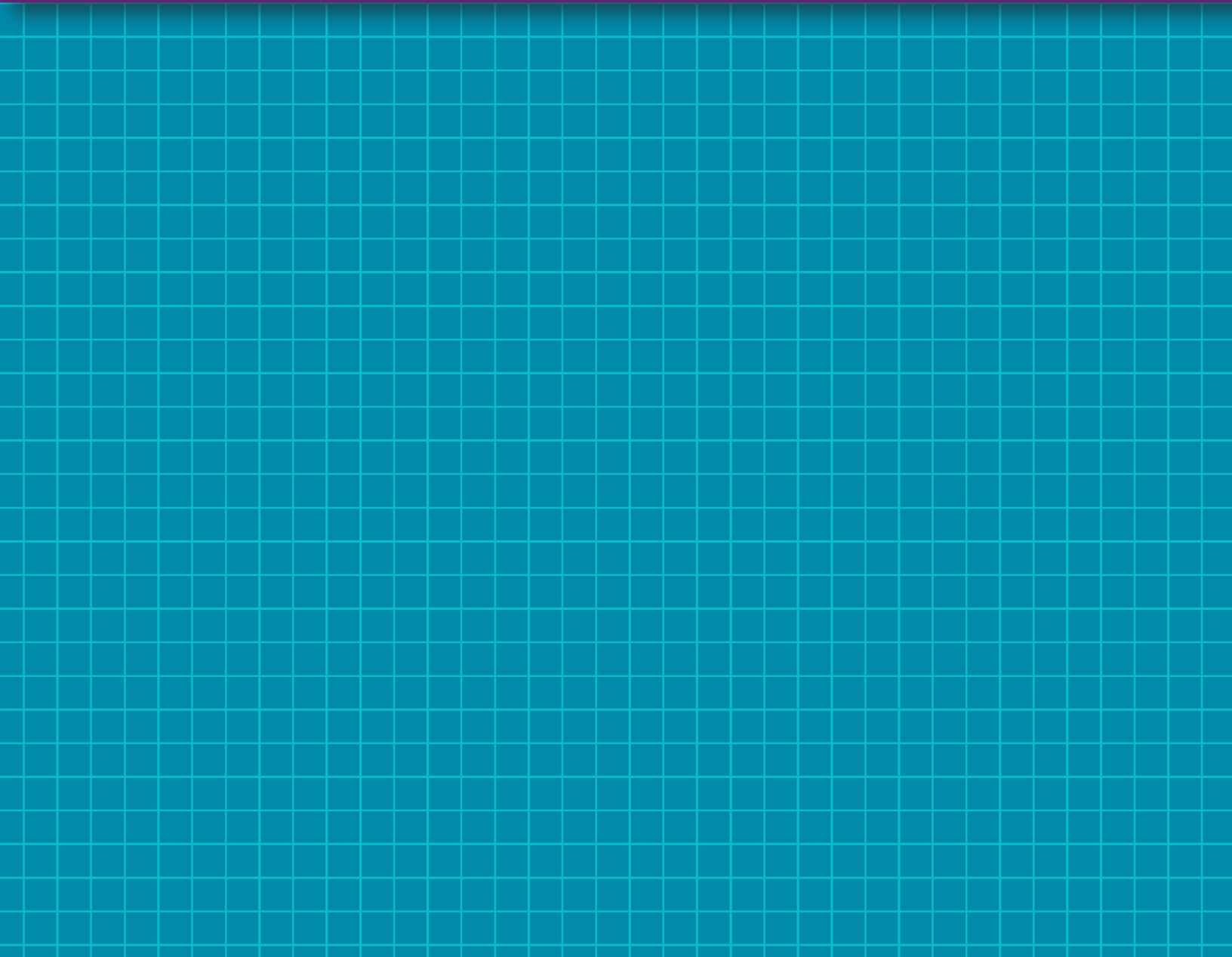
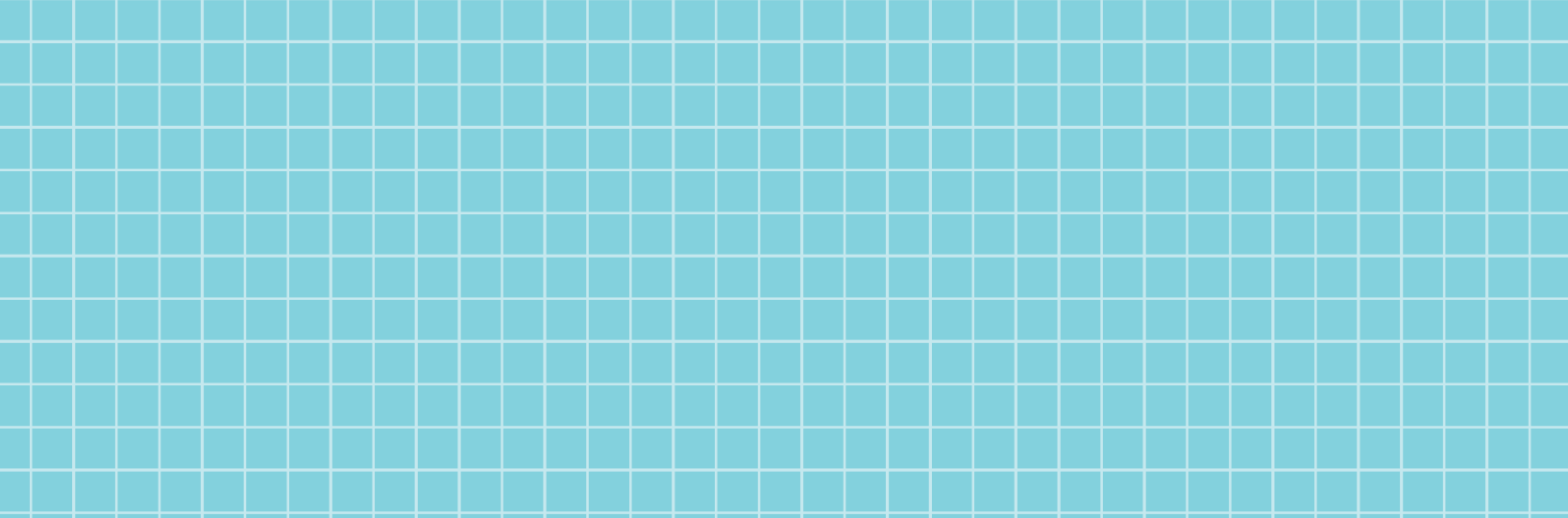
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AHRQ Pub. No. 24-0010-9-EF  
September 2024