Introduction
The cardiovascular disease (CVD) mortality risk is higher in rural populations than in urban populations, even after adjusting for age. A probable reason for this disparity is reduced access to timely care. In contextual analysis, Starfield and colleagues found that counties with a lower primary care supply had higher mortality from CVD. Additionally, because cardiologists tend to cluster disproportionately in larger counties, rural residents are less likely to use a cardiologist to manage their cardiovascular disease. Two potential strategies attempt to address this disparity and the challenge of having fewer physicians in rural areas: (1) expanding practice to non-physician professionals (e.g., nurse practitioners, physician assistants, and pharmacists; hereafter “expansion of the team”) and/or (2) using telemedicine approaches to connect rural residents and providers with care teams in larger healthcare systems. Using telemedicine allows the practitioner to provide more routine monitoring of patients from a remote location. Not only would this facilitate more routine care, but it would alleviate some of the burden patients

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1 In this brief, “metro” refers to metropolitan counties. Micropolitan areas have an urbanized population of 10,000 to 49,999. “Rural” and “noncore” refer to the remaining counties (http://www.whitehouse.gov/omb/inforeg_statpolicy#ms).
may face having to travel long distances for every appointment. Both telemedicine and expansion of the team show promise as methods to reduce the CVD disparity in rural areas.

**Burden on Society**

Cardiovascular disease is highly prevalent and more common in rural areas. CVD is a broad set of conditions including heart failure, hypertension, and stroke. It is the most common cause of death among Americans, the cause of nearly one-third of all deaths in 2010. The age-adjusted death rate from CVD (per 100,000) was higher in nonmetropolitan counties (249.4) compared to metropolitan counties (230.2). Similar disparities were seen in rural counties. In fact, the death rate in rural counties was 16% higher than in large “fringe” metropolitan (e.g., suburban) counties. Certain CVD risk factors, such as obesity and smoking, are more prevalent among rural residents than urban. Stroke incidence is nearly 50% higher in rural areas than in urban areas. One study found hypertension and diabetes (a risk factor for CVD) were more poorly controlled among rural African Americans than urban.

**Options for Addressing the Issue**

The use of telemedicine to manage cardiovascular conditions appears to be effective for both acute and non-acute conditions. The use of telemedicine (which includes teleconsulting, telemonitoring, and other methods using technology to transmit medical information) to support the management of acute cardiovascular events, especially stroke, appears to be effective. Because telemedicine in this context is specifically designed to improve access to specialist care, which is lacking in the community, telemedicine may have greater potential in rural populations. Moulin et al. reviewed evidence demonstrating that limited timely access to technology can lead to suboptimal care for strokes in rural areas (e.g., limited use of Tissue Plasminogen Activator [tPA]). A systematic review of telestroke management by Johansson and Wild found that, in most studies, hospitals with telestroke care had an increased use of tPA.

Another way to improve stroke care is by providing specialist consultations to rural providers. One review found that some rural hospitals not providing tPA actually have the capacity to do so, but do not because local physicians are reluctant to provide tPA without local neurologic expertise; this expertise could be provided via telemedicine.

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2 A substance used to dissolves clots that cause strokes.

*PCORI Topic Brief—Telemedicine for rural cardiovascular care*
The effective use of telemedicine in stroke care may also suggest strategies for non-acute CVD conditions. Telemedicine for non-acute events has also generally been found to be effective for numerous conditions, including cardiovascular conditions and risk factor management. For example, a Cochrane review concluded that structured telephone support and telemonitoring programs for those with heart failure were effective in reducing mortality and hospitalizations. A review of home-based telehealth concluded that telehealth showed improved health outcomes. In another review, Kraai et al. concluded that patients are generally satisfied with telemedicine.

Literature on redesigning the care team is more limited, but generally positive. Redesigning the healthcare team by extending to non-physician providers also appears to be an effective way to deliver CVD care in both rural and urban areas. A systematic review by Walsh concluded that the most effective intervention for improving hypertension management was a change in the provider team (assignment of some physician responsibility to a non-physician professional). Majumdar found that diabetes care teams providing outreach to people with diabetes improved control of hypertension but not control of diabetes. Bray et al. reported improved diabetes care by the addition of an advanced practice nurse and some prompts in the electronic health record (including a registry and visit reminder). Bove et al. found nurse management reduced the CVD risk among underserved asymptomatic rural and urban patients with moderate to high risk. Nkansah found that nontraditional use of pharmacists in outpatient settings led to improved outcomes, although few of the studies focused on rural populations specifically, and many were non-CVD. The use of pharmacists in rural settings represents a gap in the literature; the use of pharmacist counseling, pharmacists-assisted training, and so forth are relatively under-researched strategies.

Potential for New Information to Improve Care and Patient-Centered Outcomes Rapidly
Both of these strategies are active topics in the research community, especially given the high prevalence of CVD and the rural-urban disparity. Advances in telemedicine technology and system-wide efforts to redesign the organization of the healthcare team suggest further advances in this field for the foreseeable future and widespread interest in these topics. The combined (tele) strategy of (1) providing access to specialist; (2) overcoming barriers such as

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3 Telemonitoring involves remotely monitoring patients who are not at the same location as the healthcare provider. A patient may have devices at home, and the results of these devices will be transmitted via telephone to the healthcare provider.
4 A lab value that shows how well the patient is controlling his or her blood sugar over the course of a few months.
transportation, healthcare access, and utilization; and (3) improving patient-based care via training of multiple types of providers should be explored further to demonstrate its effectiveness. Notably, recent research has used both telemedicine and expanded teams to deliver multifaceted interventions, and these multifaceted interventions could improve CVD outcomes for rural populations.

Would new information from research on this topic remain current for several years, or would it be rendered obsolete quickly by subsequent studies? The technology of health communication is rapidly changing, as is our ability to integrate these communication types with electronic health records (a prior limitation). Similarly, payment systems to incentivize these types of care are changing. Given capital and time costs of installing and learning to use these technologies, research will be quite useful. Studies should be designed to be short in duration so as to disseminate results to the users while relevant, in case future advances in technology or changes in the healthcare system make the research obsolete.

References


