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EDITORIAL

Rural and urban hospitals in the United States: does location affect care and outcomes of patients with heart failure?

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1. Introduction

In the United States (US), there are approximately 6.7 million adults living with heart failure (HF) [1]. The impact of HF is particularly high in rural America. Approximately 15–20% of the US population lives in rural areas [2]. Rural areas are typically defined by having a population < 50,000, and they are 97% of the land area in the US. Rural communities have a higher incidence and prevalence of HF than urban communities [3]. In one study, rural participants had a 19% greater adjusted risk of incident HF compared with their urban counterparts [4]. Additionally, patients with HF in rural areas also have indicators of lower quality of care and worse clinical outcomes than patients in urban areas.

These disparities stem from a multitude of factors all the way from the epidemiology of HF, which includes social determinants of health, to differences in how patients in rural communities are managed. Patients in rural areas have lower rates of use of medical therapy for HF, including renin-angiotensin system inhibitors and cardiac resynchronization [5]. Rural patients with HF also have higher rates of preventable hospitalizations, and experience higher post-discharge 30-day and 90-day mortality rates when compared to their urban counterparts [6–8]. These statistics highlight a major public health issue and underscore an important health inequity.

2. Comparing urban and rural patients with heart failure

Rural populations have markers of poorer physical health with higher rates of diabetes, obesity, smoking, and hypertension, and lower rates of physical activity, partially attributed to the lack of physical activity resources in rural communities, such as maintained walking paths or bike lanes [2]. In addition to a higher burden of comorbid conditions, rural patients with HF also have challenges regarding income, housing, employment, education, transportation, food insecurity, substance use disorders, and higher exposure to environmental pollutants such as heavy metals. These are all important drivers of health outcomes. These factors contribute to the observation that people living in rural areas are 40% more likely to develop cardiovascular disease than people living in urban areas, and this divide is growing [9].

Paradoxically, in a population where HF risk and prevalence is highest, the availability of care is often limited. Distance to the nearest hospital with cardiac care varies greatly between rural and urban areas, with an average distance of 31 miles vs 8 miles for rural and urban patients, respectively [10]. In addition, there have been > 140 rural hospital closures since 2010 [11]. Although many hospitals remained open through the COVID-19 pandemic due to federal grants, now that federal assistance has ended, there may be even more hospital closures due to inflation and low patient volumes. Rural patients with HF are also less likely to receive outpatient HF care and more likely to be hospitalized or present to the emergency department in the first year after diagnosis than urban patients with HF [12].

3. Efforts to close the divide in heart failure care

3.1. Addressing socioeconomic inequalities

To improve health outcomes in patients with HF, we must dedicate resources targeting the social determinants of health. For example, Healthy People is a government organization whose aim is to provide data-driven national objectives to improve health and wellbeing over the next decade. Utilizing data collected over the previous four decades, this organization has identified objectives relating to not only specific health conditions such as heart disease but also health behaviors and environment. There are goals to improve the number of days people are exposed to unhealthy air, the proportion of adults who walk or bike to work, and vegetable consumption. Local policy makers and governmental bodies should utilize this repository of data, framework, and tools to identify and systematically address these disparities in their communities. This may involve increasing funding for programming and infrastructure to allow community members space to safely exercise outdoors or increase access to healthy foods through community gardens or mobile markets.

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3.2. Improving access to care

3.2.1. Telehealth

Telehealth offers an opportunity for improvement in the quality of care for rural communities while reducing some of the barriers to care such as transportation. The data supporting these programs are mixed and select programs may be useful for remotely titrating medications for chronic HF as well as treating early HF decompensations. For example, in the Telemedical Interventional Management in Heart Failure II (TIM-HF2) study from Germany, a structured remote patient management program was used to identify early signs of decompensation and proactively titrate HF medications. Participants randomized to the intervention had a lower percentage of days lost due to unplanned cardiovascular hospital admissions or all-cause death compared with those receiving usual care [13].

Additional observational data suggest telehealth may be useful to improve HF care for rural patients with HF. For example, patients living in North Carolina with HF who received virtual care during the COVID-19 pandemic had lower observed 30-day readmission rates than those who did not participate in virtual care [14]. Another observational study from the Veterans Health Administration compared the rates of hospitalization and mortality of rural vs urban patients with HF. There were similar mortality rates between the two groups, an improvement from prior research that noted higher mortality rates in rural patients [15]. The investigators attributed this improvement to use of primary and specialty care via telemedicine by rural patients at similar or higher rates compared with their urban counterparts.

Telehealth care offers opportunities to expand care in a safe way not just to rural populations, but also those who are immunocompromised and older adults. However, not all barriers are overcome with virtual care as patients need to have reliable internet connections as well as devices. Additionally, despite having the infrastructure more readily available to healthcare systems to utilize telehealth services, it may take research and more education for both clinicians and patients to use the technology appropriately. Tailored programming for vulnerable patient populations such as older adults and those with lower educational level may be necessary to successfully integrate telehealth care into specialty care clinics [16]. Although telehealth is a promising adjunctive intervention for HF management in rural areas, current data are limited and more investigation is necessary.

3.2.2. Community health worker programs

Despite 25% of patients with HF receiving home health care services, investigators from Cornell University found that home health workers typically lack HF education and effective technologic resources to allow for better communication and data transmission to best care for patients with HF [17]. Outside of formal home health care services, community health worker programs have also been implemented to help improve health literacy and access to care by providing education and support to rural patients with HF. Rural patients recently discharged from the hospital with HF and chronic obstructive pulmonary disease who participated in programs such as the Mobile Integrated Health-Community Paramedicine program had improved medication adherence compared with those who did not participate [18]. Patients enrolled in the program were visited in their homes 24 to 72 hours after hospital discharge and were provided comprehensive education regarding their medications as well as assistance in the coordination of care including scheduling of follow up visits, transportation to those visits, and obtaining durable medical equipment. As we aim to improve outcomes for rural patients with HF, multidisciplinary programming including better HF education for home health care workers will be necessary to improve medication adherence, engage continuity of care, and deliver high quality care outside of the hospital.

4. Future directions

The current inequities in HF care for rural vs. urban patients are an important public health issue. Above we outline several interventions that may help address this. In addition, we also are optimistic about future digital health technologies, including remote monitoring and mobile health [19,20]. We believe these can extend prior telehealth efforts and specifically assist with medication titration and optimization for chronic HF as well as early identification and treatment for HF decompensations. Given recent advancements in digital science, including artificial intelligence, there is also great potential for individualization of management, automated medication titration, and alerts that are scalable across a large, diverse population. Considering the high utilization of social security benefits in rural populations, some of the proposed interventions may best be implemented through existing programs at the government level. We also believe there is an imperative to increase advocacy for HF in general but specifically for patients in rural communities. Some professional societies, including the American Heart Association, have made public calls to action, and we think this should expand to other medical groups and patient advocacy groups [2].

5. Conclusions

Not only do rural patients have increased risk factors for developing HF, but they also encounter barriers to obtaining care to a greater extent than urban patients with HF. This leads to poorer outcomes in rural patients with HF with increased hospitalizations and mortality. This issue is complex and includes social determinants of health, access to care, and quality of care. A multifaceted approach including efforts focused on mitigating the social determinants of health, dissemination of practice guidelines, and the development of innovative ways to care for patients not physically near large institutions with dedicated specialty care is necessary to move toward health equity between our urban and rural patients with HF.

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