The Efficacy of Preventative Cardiovascular Care for Disadvantaged Rural Communities

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ABSTRACT:

Background

In comparison to their urban counterparts, rural communities have long suffered minimal access to healthcare, primarily due to extensive hospital drive times. As such, rurality increases both the risk of cardiovascular disease and incidence of heart failure. However, preventative care, through rehabilitation programs and support systems, can mitigate the consequences of rural landscapes. This review aims to summarize solutions to aid rural communities in receiving healthcare access.

Methods

A literature review was conducted using Google Scholar and PubMed under the key terms of "prevention" AND "rural healthcare" AND "cardiovascular disease". Studies were limited to original research, while literature reviews, systematic reviews, and case studies were excluded.

Results

Cardiac rehabilitation programs, outpatient screening services, and telehealth are among the most effective solutions for broadening rural healthcare access. Cardiac rehabilitation programs focus on lifestyle improvement pre- and post- cardiovascular disease on the basis of healthy behaviors, remedying distance barriers and promoting self-management. Outpatient screening services provide risk factor detection at optimal locations to mitigate the risk of heart failure, approved by patients and clinicians alike. Telehealth, in the context of blood pressure self monitoring, fundamentally removes hospital drive time and allows patients to lower their blood pressure through independent testing.

Discussion

The efficacy of all three incentives was seen by the lowered incidence of heart failure among rural populations, likely due to risk factors for cardiovascular disease being mitigated as the distance barrier to receive adequate healthcare access was removed. This review is not a comprehensive list of all possible solutions but provides a foundation upon which future, detailed research may be conducted.

INTRODUCTION:

Geographical periphery, referring to the countryside or outskirts, is a social determinant of health negatively associated with cardiovascular disease (CVD) [1-5]. CVD refers to the family of conditions affecting the heart and blood vessels, including heart failure (HF) and atherosclerosis [1]. According to Turecamo et al., rurality increases the likelihood of HF, as 29.6% of underserved individuals in the Southeastern United States experience an increased HF incidence annually [1]. Rural communities are thus disadvantaged compared to urban populations [1-5]. Abrams et al. showcases this inequity, as rural life expectancy (LE) has rapidly declined from 2010-2019, a statistic coined the "rural mortality penalty", while urban LE has modestly increased over the last decade [2].

Rural communities receive minimal healthcare access primarily due to hospital drive times being longer in time and distance compared to suburban regions [3]. Lam et al. states it takes 34 minutes for one-fourth of rural residents to receive acute care, yet those statistics are overshadowed by national averages [3]. Over 64 hospitals have also closed in rural communities from 2013-2017, and as the numbers continue to rise, rural healthcare dwindles [3]. While efforts have been made to remedy travel time, such as outpatient cardiac rehabilitation centers, little primary prevention measures are seen in rural communities [4]. However, it is possible to aid rural communities through CVD prevention programs, as opposed to treating the disease in its final stage at the hospital itself [5].

Objectives

The purpose of this paper is to consolidate current solutions to limited rural healthcare access, including specific CVD prevention trials targeting extensive drive time and isolation.

METHODS:

Search Strategy

Google Scholar and PubMed were searched using the key terms "prevention" AND "rural healthcare" AND "cardiovascular disease". Inclusion criteria stated that the study had to correlate rural communities with cardiovascular disease while detailing preventative solutions. Exclusion criteria included literature reviews, systematic reviews, and case studies as well as studies not published in English.

RESULTS:

The results from the compiled studies showcase three primary preventative solutions: cardiac rehabilitation programs, outpatient screening services, and telehealth at an increased frequency [6 -11].

Cardiac Rehabilitation Programs

Cardiac rehabilitation programs (CRPs) are therapeutic incentives that engage rural healthcare providers with acute-care residents, introducing risk factor management, screenings, and lifestyle treatment to prevent future cardiac illnesses [6]. As per Courtney-Pratt et al., eight patients in rural Australia introduced to CENTREd, a "chronic disease self-management model", experienced improvements pre- and post- program [6]. Assessed by completing the HeiQ (Health Education Impact Questionnaire), participants reported an overall mean increase of 0.34 in health-directed behavior, 0.24 in health navigation, and 0.20 in their ability to self-monitor [6]. Following a six month follow up, six participants acknowledged that the CRP removed distance barriers for attendance, holding them accountable through social integration programs [6]. Similarly, according to Aoun and Rosenberg, HeartSmart, a CRP in rural Western Australia, indicated a positive increase in quality of life scores pre-test and post-program, at 0.947 and 0.976, respectively [7]. Exactly 203 patients experienced a 50% reduction in dietary fat, along with an average decrease from 3.58 mmol/L to 3.28 in cholesterol levels [7]. Following HeartSmart, participants became more knowledgeable on cardiovascular health compared to those uninvolved in the study, across both male and female populations [7].

Outpatient Screening Services

Outpatient screening services allow for the examination of high risk patients in rural settings without an overnight stay, facilitating preventative care and treatment for CVD [8]. In the case of Singh et al., the HAPPY (Heart Attack Prevention Program For You) substudy found through automated imaging that of 779 subjects, 8.9% possessed atherosclerotic carotid, of which 7% were below the age of 50 years old [8]. Through the screening service, participants reported greater awareness of CVD risk factors and avenues for further treatment [8]. Saman et al. studied clinical decision support on rural screening services, as 52% of Primary Care Clinicians use CVD risk calculations with their patients beforehand and 88% involve patient input on treatment, as opposed to UC clinicians [9].

Telehealth

Telehealth refers to the virtual administration of healthcare services to patients regardless of location, primarily seen with blood pressure self-monitoring programs (BPSMs) in the context of CVD prevention [10-11]. According to Grant et al., the YMCA's BPSM in rural South Carolina found that 52 participants experienced a mean decrease of 5.63 in mean arterial pressure values [10]. With scores between 96.33 and 106.77, 95% of participants lowered their blood pressure to the "normal" range with monitoring [10]. Similarly, Sanchez et al. found, through their BPSM introduced at a Federally Qualified Health Center, that of the 7.9% of patients enrolled in the program, 72 possessed hyperlipidemia, although they stated they were mostly successful in managing their risk factors [11].

DISCUSSION:

This review sought to present effective solutions addressing the inequity seen in rural healthcare, introducing preventive cardiovascular incentives to increase patient wellness. The three primary solutions found through the search included cardiac rehabilitation programs, outpatient screening services, and telehealth in the context of self-monitoring [6-11].

In evaluating their efficacy, CRPs affected overall rural quality of life positively, with a 0.029 increase in the HeiQ index [6]. As per Courtney-Pratt et al., the health domains recorded in the study included emotional well-being, health navigation, self-monitoring, and social support and integration [6]. During the six month follow up, patients considered the program worthwhile and lauded its self-management approach, whilst experiencing decreased hospital drive times, excepting patients 3 and 7 [6]. Based on the personal testimony of patients and the success of the program, CRPs are an effective mechanism that can be used to monitor the lifestyle of patients both pre- and post- CVD. In the case of risk factors, concentrated focus on the SNAPPS behaviors (Smoking Cessation, Nutrition, Alcohol restraint, Physical activity adoption, Psychosocial wellbeing and Symptom-management) mitigated patients from developing CVD risk factors and controlled blood pressure levels [6]. Similarly, Aoun and Rosenberg found a 0.30 mmol/L decrease in cholesterol within their cohort study, integrating the CRP HeartSmart [7]. In experiencing rehabilitation, community integration, and given the opportunity to self monitor, rural patients within CRPs benefit from personalized care, a successive preventative. Aiding acute-care patients outside of a hospital setting, CRPs mediate travel time, suggesting they would decrease the incidence of HF among at-risk rural populations.

Outpatient screening services, assessing physical health through automated imaging, allow patients to consult their physicians on risk factor calculations, decreasing the incidence of CVD and HF [8-9]. According to Singh et al., 8.9% of 771 participants who underwent carotid ultrasounds possessed atherosclerotic plaque, 2% of whom reported a family history of CVD [8]. In doing so, however, they received detection for “subclinical disease”, preventing coronary calcification and the onset of CVD [8]. Outpatient screening services increase quality of life via preventive examination and treatment, allowing physicians to administer medication to disadvantaged rural communities. Saman et al. purports this notion, as 52% of clinicians integrate CVD risk factors in their treatment, signifying they take screening as evidence for their diagnosis [9]. Targeted at impoverished rural residences, outpatient screening services are thus an effective mechanism for bridging the barrier of limited healthcare access.

Telehealth, or virtual healthcare administration, is one of the most underutilized tools for rural healthcare, although an effective one [10-11]. From Grant et al., BPSM decreased blood pressure levels by a mean of 5.63, denoting normal levels from patients once hypertensive [10]. Using programming to chart multivariate outcomes for blood pressure, BPSM alleviated constriction in 95% of its 52 patients [10]. BPSM was also administered in Federally Qualified Rural Health Centers, allowing subjects prone to hyperlipidemia to receive outpatient care at a convenient location [11]. As databases record improvements from patients who incorporate telehealth, its

adoption is a pivotal one in eradicating hospital drive time and increasing rural healthcare access. In turn, telehealth would prevent CVD by controlling its risk factors.

This review summarizes a specific list of solutions that have yet to be widely incorporated into rural communities. Based on previous studies, the discrepancy between urban and rural healthcare access is vast and well known, with innovative technologies likely exacerbating the difference in the next several decades. However, the awareness and integration of CVD preventives has not been propagated nor summarized in a distinct paper thus far. The issue at hand is evident, yet the strategies for combatting it are still being discovered. Outlining the mechanism and efficacy of CRPs, Outpatient screening services, and telehealth through BPSM provides a backbone upon which more extensive research may be conducted.

Limitations of this study include its nature as a scoping review, as opposed to a systematic review. The list of solutions presented was not exhaustive and only incorporated two studies per incentive. Additionally, attrition bias was evident in the HeiQ CRP study, with 4 participants dropping out prior to 8 completing the program [6]. The same can be said for the HAPPY substudy, with 30% of original participants dropping out prior to completion [8]. The studies presented ranged across several countries, specifically the United States, India, and Australia, so the comparative populations, societal conditions, and other CVD risk factors may have impacted the results. However, successful trials from rural Australia could be implemented into the US.

Policymakers, along with the US federal and state government, should integrate the aforementioned incentives into rural regions. By assessing cost considerations and prioritizing the welfare of underserved rural communities, they can reverse the “rural mortality penalty” and increase rural LE. Future research upon the subject should focus on streamlining the administration of the solutions on a national level, as opposed solely to clinical trials.

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