

## Can Healthcare Expansion Rapidly Reduce Out-of-Hospital Cardiac Arrest?

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Sudden, out-of-hospital cardiac arrest (OHCA) is a major health problem that occurs in an estimated 347 322 adults in the United States annually, with an incidence of 140.7 per 100 000 population.<sup>1</sup> With overall survival averaging as low as 8% to 12% in many parts of the country, OHCA results in an estimated 2 million years of potential male lives lost and 1.3 million years of potential female lives lost.<sup>1</sup> Prevention of this significant cause of premature death has the potential to save many lives every year. In this issue of *JAHA*, Stecker and colleagues<sup>2</sup> performed a pre–post pilot study before and after Medicaid expansion in Multnomah County, Oregon, and documented an astonishing 17% decrease in the incidence of OHCA of primary cardiac etiology in middle-aged adults (aged 45–60 years) within 2 years of the rapid, community-wide expansion of health insurance (Medicaid) coverage. This coverage expanded as part of the Affordable Care Act (ACA). During the same time period, there was no change in the incidence of OHCA in the elderly population (aged  $\geq 65$  years), a group with near-universal healthcare coverage under Medicare that was unchanged by the ACA.

It seems intuitive that expansion of healthcare coverage, particularly for low-income adults and children, will reduce overall mortality. This has been borne out with several “before and after” and comparison studies of state-wide Medicaid expansion. In comparing mortality in the 5 years before and after expansion of state-wide Medicaid coverage in New York, Maine, and Arizona and comparing data in neighboring states without expansion, Medicaid expansion was associated with a

6.1% decrease in all-cause mortality among adults aged 20 to 64 years.<sup>3</sup> Within 4 years of state-wide expansion of healthcare coverage under the ACA in Massachusetts, all-cause mortality in adults aged 20 to 64 years also decreased 2.9% compared with matched counties from states without expansion. This reduction occurred over all income groups but was greatest among low-income adults.<sup>4</sup>

Healthcare expansion has also been associated with significant positive effects for those with chronic and severe illness. Following healthcare expansion in Massachusetts, the largest reduction in mortality (4.5%) occurred in association with conditions such as cancer, infection, and heart disease, conditions that are amenable to health care.<sup>4</sup> The mechanisms for such mortality reduction in cardiovascular patients have been documented by the Institute of Medicine,<sup>5</sup> as well as in several state-wide studies. Such mechanisms of improved care include increased access to primary care, increased outpatient visits, more regular care for chronic conditions, fewer skipped medications and fewer skipped physician appointments due to cost, and reduced likelihood of emergency department visits.<sup>6,7</sup>

Stecker and colleagues caution that theirs is an observational (pilot) study that was not sufficiently powered to enable regression analysis. Another noted limitation is that the determination of primary cardiac etiology for any OHCA was made on the basis of emergency medical services information gathered at the time of cardiac arrest. As a result, the study may have over- or underestimated OHCA magnitude. The study was performed at a time that Oregon was simultaneously experiencing what the authors note was “extensive healthcare payment and delivery innovation.”<sup>2</sup> This included establishment of patient-centered primary care homes with an integrated system of regional coordinated care organizations that were required to follow evidence-based guidelines and to monitor quality of care and cost-effectiveness.<sup>8</sup> Consequently, the findings of Stecker and colleagues may not be generalizable to other states or even to other counties in Oregon. In fact, an earlier 2-year evaluation in Portland, Oregon, was conducted when Medicaid expansion was initially limited to low-income residents who were selected by lottery.<sup>9</sup> Residents who were chosen by lottery and offered expanded health care were compared 2 years later with another group

The opinions expressed in this article are not necessarily those of the editors or of the American Heart Association.

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*J Am Heart Assoc.* 2017;6:e006552. DOI:10.1161/JAHA.117.006552.

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of Portland residents who applied but were not chosen to receive expanded health care. There was no significant improvement in prevalence or diagnosis of hypertension or high cholesterol levels or Framingham predicted 10-year risk of cardiovascular events, although increased diagnosis of diabetes mellitus and greater overall use of preventative services were demonstrated.<sup>9</sup> In this Portland study, the 2 comparison groups were not sufficiently alike, so the authors used an instrumental-variable approach to yield a causal estimate of the effect of insurance coverage. They did not report mortality in the 2 groups.

The hypothesized relationship between healthcare expansion and decline in OHCA incidence is a timely question that requires further study. The causes of and risk factors for OHCA are multifactorial, including prior heart disease, (eg, prior myocardial infarction, congestive heart failure), family history of cardiac arrest in a first-degree relative, lifestyle factors (smoking, inadequate physical activity, diet, and weight), race, and socioeconomic factors.<sup>1</sup> Many of these factors are not amenable to short-term changes. Risk factors such as family history may not be successfully modified through expanded healthcare coverage unless inherited syndromes such as channelopathies or hypercoagulopathies are identified and successfully treated. Other risk factors, such as prior heart disease or arrhythmias can be modified with appropriate access to health care and evidence-based disease management (eg, management of heart failure, management of coronary artery disease, and use of implantable cardioverter-defibrillators and antiarrhythmics),<sup>10</sup> but beneficial effects may not be apparent in short-term studies.<sup>9</sup> The positive effects of modification of lifestyle risk factors typically accrue over time and can be highly variable across individuals and groups. Documentation of risk reduction with smoking cessation, for example, often requires follow-up of 8 to 20 years.<sup>11,12</sup>

The incidence of OHCA among those in the lowest socioeconomic quartile is nearly double that in the highest quartile.<sup>1</sup> This likely represents an interaction among several health determinants, including diet, lifestyle and access to health care and medications. As noted, low-income adults have demonstrated the greatest reduction in all-cause mortality in association with healthcare expansion.<sup>4</sup>

The impact and interaction of health determinants is complex. Direct medical services (including access to care and the quality of care) account for approximately 10% to 15% of overall health outcomes such as length and quality of life.<sup>13,14</sup> Health care is necessary to improve health outcomes, but other factors can have a greater impact. Health behaviors account for ≈30% of health outcomes, social and economic factors account for ≈40%, and the physical environment accounts for ≈10% of health outcomes.<sup>13,14</sup>

It is an oversimplification to equate healthcare coverage with access. Evans, Hsu, and Boerma from the World Health Organization consider 3 dimensions of access: accessibility, affordability, and acceptability.<sup>15</sup> Penchansky and Thomas add 2 additional dimensions: availability and accommodation.<sup>16</sup> Utilization of healthcare services incorporates these 5 dimensions of access, as well as the propriety of the services that are accessed. These utilization factors are demonstrated, for example, when the patient is examined regularly by an established primary care provider and disease is managed in compliance with evidence-based guidelines in a program with a process of continuous quality improvement. Such utilization factors are important when evaluating the effects of healthcare expansion, to determine if and how new coverage translates into increased evidence-based interventions and improved outcomes.

Better controlled and more robust studies are needed to verify the effect of expansion of healthcare coverage on the incidence of OHCA in the nonelderly. These studies should be based on a framework that looks more broadly at a complement of social and other determinants of health, accounts for the various dimensions of access, and evaluates access by looking at utilization. Study design elements such as sample size and power, duration of data collection, data elements and analysis, and control populations should follow the precedent-s of prior noteworthy studies<sup>3,4,6</sup> and conceptual frameworks<sup>10,13-17</sup> to build on the intriguing work of Stecker and colleagues.<sup>2</sup> Confirmatory studies are critical to document the number of lives likely to be lost or saved by changes in healthcare coverage.

## Disclosures

Hazinski is a former consultant to the American Heart Association Emergency Cardiovascular Care Programs. In that capacity she received significant compensation as a Senior Science Editor for resuscitation science statements (including the AHA Guidelines for CPR and ECC) and training materials. Myers has no conflicts of interest.

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**Key Words:** Editorials • cardiac arrest • resuscitation



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*J Am Heart Assoc.* 2017;6:e006552; originally published June 28, 2017;

doi: 10.1161/JAHA.117.006552

The *Journal of the American Heart Association* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231  
Online ISSN: 2047-9980

The online version of this article, along with updated information and services, is located on the World Wide Web at:

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