

# Trends in Heart Failure Incidence in the Community

## A Gathering Storm

In populations around the world, a gathering storm of cardiovascular disease occurrence is building on the horizon, the likes of which we have not seen in decades. Between 1970 and 2010, age-adjusted cardiovascular mortality rates declined dramatically in almost all Western nations; in many countries, rates fell by  $\geq 70\%$ .<sup>1</sup> However, in 2016, Sidney et al<sup>1</sup> reported that in the United States, a substantial deceleration in the decline of all cardiovascular disease, coronary heart disease, and stroke mortality rates began over the past 5 years, signaling a dramatic shift. Prompted by this report, Lloyd-Jones<sup>2</sup> suggested that perhaps we are now just beginning to “reap what we have sown” in the obesity epidemic over the past several decades. It is not a new concept that the Western world’s obesity epidemic can affect population health. What is less well documented is whether the epidemic obesity is beginning to reverse long-standing declines in disease incidence. A recent report from the Centers of Disease Control and Prevention indicates that between 2014 and 2015, age-adjusted death rates in the United States increased for 8 of 10 leading causes of death, including cardiovascular disease rates.<sup>3</sup> Given that heart disease accounts for  $>30\%$  of all deaths in the United States, the 0.9% increase in age-adjusted mortality from heart disease is of particular concern.

At first glance, from the data presented by Christiansen et al<sup>4</sup> in this issue of *Circulation*, the outlook for the occurrence of heart failure (HF) in Denmark from 1994 to 2012 is not so gloomy. In a national sample of hospitalized patients, the authors report that for individuals  $>50$  years of age, the adjusted incidence rate ratio comparing 2012 with 1995 was 0.90 (95% confidence interval, 0.88–0.93), indicating a statistically significant decline in disease occurrence. They also found that 1-year mortality improved significantly over this period. However, on further inspection, their data portend a less sunny outlook. The mean age at onset of HF declined, and the proportion of patients with incident HF under 51 years of age increased from 3% to 6%. HF is starting to affect people at younger ages. These are some of the only data available on the occurrence of HF in younger adults, and the forecast is not good. Although 1-year mortality improved over time among all age groups, those under 51 years of age did not share equally in the better survival; indeed, this group had the weakest improvement in case fatality rates. The authors note that the observed increase in HF incidence in young adults and the rise in the number of young individuals with HF could translate into a rise in the future burden of HF as this population segment ages. Although the proportion of all HF cases in young adults is relatively small (6%) now, the trend suggests that conditions are right for a growing public health problem.

Like others, Christiansen et al<sup>4</sup> posit that obesity trends in the population may be stimulating the development of the observed increase in disease incidence. A unique and laudable aspect of their work is their attempt to quantitatively explore whether

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obesity trends account for their observations, reporting that obesity-related comorbidities, including diabetes mellitus, hypertension, and atrial fibrillation, increased in the study population, particularly in younger patients with HF. Their results further support growing concerns about how to accommodate the increasing complexity of the HF population.<sup>5</sup> In supplemental tables and figures, Christiansen et al report the results of their birth cohort analyses as an alternative approach to investigate the possible role of secular trends in obesity in HF occurrence. In these exploratory analyses, the dramatic increase in HF incidence rate ratios by birth cohort is ominous; the authors report as much as a 3-fold increase in HF incidence among birth cohorts in the 1990s compared with those in the 1950s. Furthermore, most of this increase has occurred since the 1970s birth cohorts, suggesting that the birth cohort effect on HF incidence is accelerating. If this trend continues, the burden of HF is sure to grow in intensity in the coming decades.

Although Christiansen et al did not present an analysis of disability from HF, it follows that if HF is beginning to affect younger adults and case fatality continues its current positive trends, years lived with HF-associated disability will grow dramatically. In addition to human suffering, there are important economic implications. Current projections suggest that by 2030 in the United States, the total cost of HF will increase by almost 127% from 2012 to \$69.7 billion.<sup>6</sup> If the shift toward HF at earlier ages continues its strong course, in addition to the increased comorbidity burden of this population, these figures may prove to be gross underestimates.

Another key strength of the work by Christiansen et al is the authors' direct determination of national trends in HF incidence rates. By giving each citizen a unique personal identification number at birth, Denmark's national healthcare system enables researchers to link data from several nationwide registries, including all inpatient and outpatient hospital encounters, all medication prescriptions, and mortality data. These data linkages allow direct measurement of national disease incidence, something not possible in many other countries such as the United States. Although the creation of a national cardiovascular disease incidence surveillance system in the United States has been recommended by different scientific groups, it has yet to be established.<sup>7</sup> Estimates from projection models for the United States suggest that the prevalence of HF will increase by 46% from 2012 to 2030, resulting in >8 million adults with HF.<sup>6</sup> The absence of a national surveillance system significantly impedes our ability to track and manage this expected increase.

A particular strength of this study by Christiansen et al is the inclusion of outpatient HF incidence rates, the measurement of which is particularly challenging in countries without comprehensive national surveillance

systems. In a secondary sensitivity analysis, Christiansen et al found that the addition of outpatient diagnosed HF did not change patterns seen in hospitalized events only. Given that as much as a third of HF in the community is diagnosed and treated in the outpatient setting, this is a particularly valuable contribution because few existing published studies have included direct measures of incident HF in both the in-hospital and community setting within the same population.

The valuable work reported by Christiansen et al, in context with other published evidence of HF trends in the Western world, forecasts a grim outlook for the continuation of improving cardiovascular disease rates. This work underscores the critical need for continued research, public health efforts, and effective prevention initiatives to keep the gathering storm from building strength.

## DISCLOSURES

None.

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## FOOTNOTES

*Circulation* is available at <http://circ.ahajournals.org>.

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