

Editorial

Coronary Disease Deaths: From Birth Cohorts to Prevention



Muertes por enfermedad coronaria: desde las cohortes de nacimiento a la prevención

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Cardiovascular diseases remain the number one cause of death in most of the western world. However, mortality from coronary disease nonetheless started to decline in several countries including the United States¹ and part of western Europe^{2,3} 4 decades ago, and this decline has continued until the present time. Conceptually, the decline in coronary disease mortality could reflect a decrease in the incidence of coronary disease with fewer new cases occurring, or a decline in its case fatality, or a combination thereof. Progress in the primary prevention of coronary disease would decrease incidence while improvement in medical care and secondary prevention would increase survival. Hence, describing temporal trends in different populations and examining their causes is important and can help to design interventions, deploy prevention strategies, and advocate for policy changes. Despite the importance of this endeavor, quantifying the role of each of the aforementioned components in coronary mortality decline remains a difficult task and the determinants of the decline are still incompletely understood. This matter is further complicated by the fact that the respective contribution of potential determinants likely evolved over time and across countries. Within this context, studies of trends according to person, place, and time have the potential to shed some light on this subject.

The article by Ocaña-Riola et al⁴ reports an in-depth analysis of temporal trends in mortality from ischemic heart disease in southern Spain, aiming at separating age, birth cohort, and period effects. In epidemiology, *age effect* can be defined as a change in the outcome rate according to age, irrespective of birth cohort and calendar time; *cohort effect* can be defined as a change in the outcome rate according to year of birth, irrespective of age and calendar time; and *period effect* can be defined as a change in the outcome rate affecting an entire population at some point in time, irrespective of age and birth cohort.⁵ The study pertains to 145 539 deaths from ischemic heart disease that occurred in Andalusia between 1981 and 2008 among individuals aged between 30 and 84 years. For age effect, as expected, mortality from ischemic heart disease increased substantially with age for both men and women. Concerning birth cohort effect, the risk of

death for men and women declined for cohorts born after 1920, with an even steeper decline after 1960, particularly among men. As for period effect, while the association was weaker than that of age and birth cohort, the risk of death from ischemic heart disease varied over time, first remaining stable from 1981 to 1990, then increasing between 1990 and 2000, and decreasing thereafter until the end of the study period in 2008. The above trends were mostly similar across all the provinces and for Andalusia as a whole. The authors concluded that if the observed trends persist, mortality from ischemic heart disease will continue to decline among men and women.

Before discussing the implications of the findings, the methodology used in this study deserves some comments. One way to understand the concept of cohort effects is as the result of an interaction between age and calendar time. This means that calendar time modifies the strength (sometimes even the nature) of the association between age and an outcome. Generally, for chronic conditions such as ischemic heart disease, cumulative exposures that are expressed over long periods of time (eg, smoking, diet, blood pressure) are usually dominant and thus cohort effects tend to influence epidemiological rates to a greater extent than period effects, which tend to be more prominent for infectious diseases and injuries.⁵ Addressing this important epidemiological issue, the study by Ocaña-Riola et al⁴ estimates the net effects of age, cohort, and period on the decline in ischemic heart disease mortality in a defined population. Its findings suggest a strong cohort effect and highlight the importance of cumulative exposures and variability of past exposures across successive generations. There are limitations to this type of ecological analysis, particularly related to the fact that it allows no causal inference. Nevertheless, this study documents the importance of continued surveillance of cardiovascular disease across the world and delineates a way forward. To understand the determinants of the reported decline in ischemic heart disease mortality in Andalusia, one would need to study the temporal trends in the incidence of acute coronary syndromes in Andalusia over the same period and understand the care delivered to these patients. This approach of studying incidence, risk factors and care patterns is the cornerstone of cardiovascular disease surveillance and was implemented in several studies across the world. In particular, the World Health Organization MONICA project (MONItoring trends and determinants in Cardiovascular disease) was deployed across 37 populations in 21 countries and 10-year population trends in nonfatal myocardial infarction, coronary mortality,

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coronary care, and risk factors were validated and monitored. In Spain, MONICA studied such trends in Catalonia among men and women aged 35 to 74 years between 1985 and 1997.⁶ Attack rates increased annually by 2.1%, while case fatality decreased in men. No significant change was detected in women but the number of events was quite small. As nationwide morbidity statistics showed similar trends, the authors concluded that acute coronary syndromes were rising in Spanish men during that time period.

If indeed these trends were applicable to Andalusia, the decline in ischemic heart disease mortality in the face of the rising incidence of acute coronary disease would suggest that improved care of coronary disease is responsible for favorable mortality trends.

However, temporal trends in disease incidence and outcomes are not static. Indeed, trends in the epidemiology of myocardial infarction have evolved considerably over the past 3 decades. For example, in the United States, in the 1980s and 1990s trends in the incidence of myocardial infarction were stable overall.^{7,8} This recently changed and several studies across the world reported profound changes in subsequent years. In the United States, over the first decade of the 21st century, a large decline in the incidence of myocardial infarction was reported along with a shift in case mix, depicted as a major decline in the incidence of ST-segment elevation myocardial infarction, while the incidence of non-ST-segment elevation myocardial infarction increased somewhat.^{9,10} Short-term case fatality after acute infarction declined markedly as did cardiovascular mortality. Similar trends were noted in northern Europe, including Denmark¹¹ and England.¹² However, data specific to Spain are important to this discussion, given the known north-south gradient in ischemic heart disease mortality, with lower rates in southern Europe.¹³ Data from the REGICOR study, a population-based registry in Girona, Spain, suggest that the incidence of myocardial infarction is declining following the national smoking ban¹⁴ but a recent report underscored unfavorable trends in risk factors specific to Andalusia, which showed a greater prevalence of obesity, diabetes mellitus, hypertension, and dyslipidemia in both men and women, along with greater mortality from ischemic heart disease than in other parts of Spain.¹⁵ Hence, it is important to measure the trends specific to Andalusia.

Where do these considerations leave clinicians taking care of patients? As the authors conclude, their data suggest that improved care of established disease is likely to have played a key role in the genesis of declining mortality from cardiovascular disease in Andalusia. The societal implications of this conclusion are major in terms of morbidity, years of productive life lost, and health care costs. Reinvigorating prevention efforts is thus essential¹⁶ and should focus on behavioral risk factors, including exercise, smoking cessation, and healthy diets.

CONFLICTS OF INTERESTS

None declared.

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