Editorial

Trends in Myocardial Infarction Mortality in Spain and the United States: A Downhill or Uphill Race in the Twenty-first Century?

Tendencias de la mortalidad por infarto de miocardio en España y Estados Unidos: ¿una carrera cuesta abajo o cuesta arriba en el siglo XXI?

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Beginning in 1958, the Seven Countries Study surveyed cohorts of men for dietary habits and followed them for cause-specific mortality.[1] Among the observations of the Seven Countries Study was that the "Mediterranean diet"—a diet characterized by high intake of vegetables, fruits, legumes, cereals, and fish and moderate red wine intake—was associated with the relatively lower ischemic heart disease and all-cause mortality observed in the Southern European cohorts compared with the United States and Northern European cohorts. Numerous observational studies have suggested that the Mediterranean pattern diet, whether consumed in Mediterranean nations like Spain or non-Mediterranean nations like the United States, is associated with lower risk of premature mortality from ischemic heart disease (IHD).[2]

The pattern of higher IHD mortality in North America and Northern Europe compared with Southern Europe was confirmed by the Monitoring Trends and Determinants of Cardiovascular Disease (MONICA) Study from the mid 1980s until 1994.[3] Over the latter half of the 20th century, IHD mortality first rose and then declined in all of the nations of the high-income world, with the steepest rise and fall in the United States and Northern Europe and a slower rise and fall in Southern Europe.[4] In the article published in *Revista Española de Cardiología*, Orozco-Beltran et al.[5] analyzed cause-specific mortality data from Spain and the United States in order to estimate age-standardized trends in myocardial infarction (MI) mortality from 1990 to 2006, describing many of the years spanning the close of the Seven Countries and MONICA studies until recently. As expected, MI mortality was lower in Spanish men and women and higher in United States men and women in 1990 and MI mortality declined in both Spain and the United States. What was interesting was that MI mortality has continued to decline more steeply in the United States, to the point where age-standardized mortality reached identical rates for the 2 countries by 2006. The authors' projections suggest that MI mortality rates may be lower in the United States than in Spain in the near future—if not now.

One finding that is not given sufficient attention is that the rate of decline in MI mortality in Spain has accelerated over the past 2 decades. In Spain, the rate of decline was substantially faster in men from 1996 to 2006 compared with 1990-1996, and in women from 1995 to 2006 compared with 1990-1995. In contrast, in the United States the rate of decline was modestly faster from 2001-2006 in women, and steadily declined in men over the entire follow-up period. If this acceleration in decline in MI mortality rates were to continue, it is possible that the overall rates of decline in Spain would surpass those in the United States. This was not reflected in short-term projections. Given the historical non-linear trends in IHD death, and complex interplay of factors that influence MI mortality rates, it is challenging to accurately predict future trends.

International comparisons should be interpreted with caution due to differences in the recording of vital statistics across countries. Age standardization adjusts for differences in age structure, but not for differences in vital statistics registration. Variability in cause-of-death coding practices may lead to artificial differences at the national[6] or subnational level.[7] For example, Spain and a number of other Western European nations may have systematically underestimated IHD mortality due to over-use of ill-defined cardiovascular mortality codes more than in the United States, a problem that has improved dramatically since the 1980s.[6] However, ill-defined coding errors would not likely affect MI mortality estimates, since the MI death codes are clearly defined and linked to an acute, objectively definable clinical event (unlike defining what part of "sudden cardiac death" is attributable to IHD). Another potential problem with comparing MI mortality in 2 nations between 1990 and 2006 is that these years were the transition period between the International Classification

of Disease 9th and 10th editions, but again one is less concerned since the International Classification of Disease codes for MI have remained relatively stable across these 2 International Classification of Disease versions. Overall, the methods used by Orozco-Beltran et al.[5] in the MI mortality trend analysis were consistent with prior published analyses.

If the observations of Orozco-Beltran et al.[5] prove accurate, why might the United States be racing faster to a lower MI mortality rate than Spain? Is it because the United States has pursued prevention more aggressively, or become more "Mediterranean" or because Spain has pursued prevention less aggressively or adopted unhealthy aspects of the United States diet? Nations like the United States with the steepest increase in IHD from 1950 to 1970 also had the steepest decline after 1970,[4] but still one would expect the United States to catch up to, not surpass, Spain's low IHD mortality. Observational and modeling studies of the IHD mortality decline in the United States found that the decline was due to a combination of improved risk factor patterns (primary prevention due presumably in part to dietary changes but also to dyslipidemia and hypertension treatment) and improved acute MI treatments. Orozco-Beltran et al.[5] cite comparative studies and Spanish population-based surveys suggesting that Spain might push MI mortality lower more aggressively with hypertension, high cholesterol and cigarette smoking policies that parallel or exceed those of the United States. The authors did not specifically compare utilization rates of acute MI treatments in the United States and Spain. The Global Registry of Acute Coronary Events (GRACE) Study showed that on average, the most effective acute treatment—reperfusion for ST-elevation MI—was used as often in Europe as in the United States.[8] Last, Orozco-Beltran et al.[5] did not entertain the possibility that the Spanish diet has become less "Mediterranean" and now includes more processed foods. According to the *Comité de Nutrición de la Asociación Española de Pediatría*, the consumption of soft drinks in Spain increased 42% from 1991 to 2001.[9] A shift towards increased consumption of high-calorie, processed foods could have an important impact on the incidence and severity of IHD.[10,11]

The ecological associations between risk factor levels and mortality rates implied in the discussion by Orozco-Beltran et al.[5] may point toward a need for improvements in primary MI prevention in Spain. At the same time, it is worth asking for both countries: is the race to control MI and other cardiovascular diseases a downhill race toward lower mortality rates, or an uphill slog against increasing rates? There are 3 primary driving factors that could increase the number of IHD deaths expected in future years. First, the global population of older adults is expanding due to demographic changes and decreased premature mortality from IHD and other diseases. Age-standardized projections obscure increases in total incident MI cases and deaths stemming from the aging of the United States and Spanish populations.[12,13] Second, for the United States in particular, many predict that the current high prevalence of youth overweight and obesity may reverse gains in cardiovascular disease prevention.[14,15] This could also impact IHD incidence and mortality in Spain if an increase in caloric consumption or decreases in physical activity lead to a similar increase in overweight and obesity. Third, the years in which the United States, Spain, and other high income nations curbed the epidemic of IHD were also years of economic wealth. The recent economic downturn has led to cut-backs in social services in the high income nations of the West, policy decisions

that may have adverse health impacts and cause nations like the United States and Spain to lose ground in the race to control cardiovascular disease.[16]

So regarding cardiovascular disease epidemiology, the first part of the 21st century may not be a continuation of the last part of the 20th century. The 21st century may require different approaches to cardiovascular disease prevention. First, a lifespan approach would extend prevention both to younger ages (eg, preventing obesity, hypertension, and dyslipidemia through early diet and lifestyle interventions) and older age (eg, treating hypertension more aggressively in eligible older adults). Second, the focus must shift toward prevention of the cardiovascular diseases in older adults, in part by redirecting resources toward preventing chronic vascular disease states like heart failure and vascular dementia. Third, it has become clear that prevention cannot be managed exclusively in clinics and hospitals, but will require a whole society effort inclusive of the mass communications media, agricultural policy, food manufacturing, and planning of urban built environments. Control of IHD and other cardiovascular diseases in the 20th century was an enormous public health success that can be repeated in the 21st century—but continued success may require new targets and approaches.

CONFLICTS OF INTEREST

None declared.

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