Editorial Commentary

Cost of cardiovascular disease prevention: towards economic evaluations in prevention programs

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At a global level, cardiovascular diseases (CVDs) are the leading cause of mortality, claiming almost 18 million lives annually. Throughout the last decade, this CVD burden is still increasing both in terms of deaths and disability-adjusted life years. Age-standardized death and DALY rates however are decreasing, which points to the fact that population ageing plays an important role in the evolution of the CVD rates and will continue to do so in the future (1,2).

In terms of costs, CVD represent between 7.6% and 21.0% of national health expenditures, mainly due to ischemic heart disease and stroke. The largest share of expenditure (half or more) goes to hospital inpatient care, followed by spending on pharmacological treatment (3-7).

Most existing CVD cost studies consider the costs of care after a specific cardiovascular event, pointing out the need for public health programs or interventions to reduce this burden (3,6). In order to allocate resources to public health programs, more should be known about the cost of those programs.

Recently, Shaw *et al.* published an article on the 10-year cost of CVD in an American cohort within the Multi-Ethnic Study of Atherosclerosis (MESA), a cohort of asymptomatic and apparently healthy individuals (45 to 84 years of age) (8).

The reported increase of cardiovascular risk factors among these asymptomatic individuals, i.e., diabetes prevalence increased from 10.0% to 19.3%, hypertension from 44.9% to 57%, dyslipidaemia from 37.3% to 52.8%, means a higher need for—and use of—health care services in the cohort. Only 30% of individuals did not have an echocardiogram, exercise test or invasive angiography (8).

The 10-year (cumulative) health care cost was reported at just above $23,000 per patient; 78% of which was caused by CVD drugs, and even higher shares for individuals with diabetes (87%) and dyslipidaemia (90%) (8). This pattern differs from other CVD cost-of-illness studies which indicate a higher share of costs towards inpatient care. This is probably because cost-of-illness studies are focused in patients having experienced a CVD, while Shaw *et al.* focused on a cohort before any CVD event occurred.

Shaw *et al.* note the large impact on costs of risk profile on the one hand, and of the socio-economic factors on the other hand (8). Costs increased significantly with a higher Framingham risk score, coronary artery calcium score or elevated C-reactive protein: cumulative costs in low and high-risk profiles are associated with a mean cost of respectively $8,000 and $36,000, up to a 15-fold cost increase between those risk profiles. Low-risk status persons accounted for 5.2% of total costs; while high-risk status persons were responsible for 48% of costs. Other studies have already pointed out this cost increase related to risk factors. For example, Goetzel *et al.* indicated that the combined contribution of risk factors for heart disease and stroke among US employees predicted cost increases by 214% and 62%, respectively (9).

This prevalence of combined risk factors is on the rise and increases the probability of multi-morbidity, which in

turn elevates costs. In 2013–2014, the US prevalence rate was 59.6% with over one fifth (22.7%) of individuals having 4 or more morbidities (10). Aside from risk profile, social determinants such as insurance, education and age strongly impact not just health outcomes, but costs as well (8).

The range of determinants affecting CVD-related costs indicates the need for CVD-focused policies but also for preventive policies or programs.

Shaw *et al.* encouraged public health strategies such as early screening and targeted preventive programs in order to address this set of issues (8). In fact, cost-effectiveness of CVD screening policies in high risk groups is an increasingly important research trend because of its potential for health gains. While tools such as the Framingham Risk Score (FRS) can play an important role in the detection of different risks individuals, leading towards different clinical approaches such as different screening intervals (11), other screening approaches like non-laboratory single screening or multistage might be more cost-effective (12).

Preventive programs targeted at high-risk groups can take many forms; interventions in the context of the broader population or within smaller communities can be effective in addressing multiple lifestyle-related risk factors. Successful examples such as the Västerbotten Intervention Programme can serve as a reference (13).

Including the full range of cost elements (i.e., including productivity losses due to morbidity and mortality, informal care, early retirement costs etc.) may strongly influence cost effectiveness studies on CVD prevention policies and, thus, studies addressing the different patterns of CVD prevention costs are important.

Finally, while there is already some literature and an increasing focus on performing economic evaluations of CVD prevention programs (14-16), there is still a high potential for investment in this field of research, mainly in primary prevention. Additionally, the standardization of methods in order to compare and apply different programs can yield new insights.

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Footnote

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