

Editorial

Primordial prevention: paramount in cardiovascular prevention

La prevención primordial, primordial en la prevención cardiovascular

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The Global Burden of Disease (GBD) study, published in 2018, revealed the worrying dimension acquired by the cardiovascular disease (CVD) pandemic.¹ In the report, which included the age- and sex-adjusted mortality rates of 195 countries from 1950 to 2017, CVDs caused a third of all deaths in 2015, with an estimated prevalence of 422 million cases, predominantly atherosclerotic cardiovascular diseases (coronary heart disease and stroke). The burden associated with years of life lost, reduced quality of life, and direct and indirect costs is unacceptable.

In the last 4 decades, CVD mortality rates have fallen in developed regions. Improved control at the population level of cholesterol, blood pressure, and smoking is responsible for 44% of the decrease, whereas 47% is due to evidence-based medical therapies and surgical interventions.² The data from the GBD study revealed that this drop in CV mortality has stagnated for the first time in decades. This change in the overall trend has been driven by the increased prevalence of obesity and diabetes, together with general population aging (and particularly that of the population with the highest risk). In addition, the results first show the failure of public health policies to contain chronic nontransmissible diseases and, above all, the urgent need for a paradigm shift that changes the focus to health promotion and cardiovascular prevention.

In this context, in 2010, the American Heart Association (AHA) proposed and developed a new metric of ideal cardiovascular health as a means to evaluate the cardiovascular health of a population.³ The system is based on the ideal values of 7 cardiovascular risk factors and health behaviors, all modifiable. These variables include *a*) the simultaneous presence of 3 healthy behaviors, namely, physical activity, a healthy diet, and abstinence from smoking within the last year; *b*) the simultaneous presence of 4 health factors, namely, untreated blood pressure < 120/80 mm Hg, untreated total cholesterol < 200 mg/dL, absence of diabetes mellitus, and ideal body mass index (the presence of the 7 metrics is defined as ideal cardiovascular health), and *c*) the absence of clinical CVD. Based on this metric, called Life's Simple Seven (LS7), the AHA established the goal of reducing CV mortality and improving population cardiovascular health by 20% by 2020.

In addition to its ability to monitor the cardiovascular health of a specific population, the presence of the 7 LS7 metrics is inversely correlated with CVD incidence, CV mortality, and all-cause mortality. Moreover, given that the CV risk factors and healthy behaviors are shared with other nontransmissible diseases, such as cancer, the promotion of cardiovascular health based on these 7 variables would improve population health in terms of other chronic diseases.

In the last decade, we have witnessed an expansion of the concept of disease, which has evolved to focus our attention on the concept of health itself. The AHA, as well as other international bodies, has decided not only to persevere with strategies aimed at improving disease treatment, but also to adopt a new focus: improving public CV health. This fundamental extension of the concept of prevention will require new tools (such as the LS7) and skills to implement public health policies strongly oriented toward medical therapies that have been successfully implemented in the past, as well as population- and community-level interventions that complement traditional strategies.

Since its conception, the LS7 has been applied as a metric in distinct populations, with worrying results. According to data from the Atherosclerosis Risk in Communities (ARIC) cohort study, which included individuals without CVD aged between 45 and 64 years, only 0.1% of the participants had all of the components of ideal cardiovascular health. Although 17.4% had intermediate cardiovascular health, most (82.5%) had poor CV health.⁴ In China, only 0.2% of a representative cohort of the adult population had ideal CV health.⁵ A Finnish study⁶ of the prevalence of ideal CV health in individuals aged 25 to 74 years in a population health survey found that 8.8% of women and 3% of men had 5 or more metrics. Overall, 50.4% of women and 69% of men had less than 3 metrics of ideal CV health. In 2013, the results were published of a cross-sectional study that enrolled 11 408 people older than 18 years of age in order to determine their ideal CV health status.⁷ Based on the LS7 metric, the study found that only 0.2% of the participants met the 7 metrics of ideal health and that 3.4% and 15.3% had 6 and 5 metrics, respectively. In that study, which used data from between 2008 and 2010, ideal diet was the most prevalent health factor in the population (88.9%).

The main value of the LS7, in addition to its use to measure the status of primary prevention in a population, is undoubtedly its strong association with the incidence of CVD. For example, the study carried out in the ARIC population⁴ found a gradual association of the ideal, intermediate, and poor CV health categories with CVD incidence. Indeed, participants with 6 ideal

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health metrics showed one-tenth the incidence of CVD than those with none of the 7 variables (3.9/1000 persons/y vs 37.1/1000 persons/y).

In a recent article published in *Revista Española de Cardiología*, Díez-Espino et al.⁸ reported the follow-up results of 7447 participants of the PREDIMED cohort (men aged from 55 to 80 years and women aged from 60 to 80 years with high CV risk). The percentage of participants who achieved ideal values in all of the LS7 metrics was just 0.04%. Only 0.2% achieved 6 metrics and 3% achieved 5. The PREDIMED cohort included patients with high CV risk: to be included in this study, the participants had to have type 2 diabetes mellitus or at least 3 of 6 CV risk factors (hypertension, elevated concentrations of low-density lipoprotein cholesterol, low concentrations of high-density lipoprotein cholesterol, obesity or overweight, active smoking, and family history of premature CVD). Accordingly, it is hardly surprising that only 3 of the 7447 patients achieved all 7 metrics. Nonetheless, the results are worrying in the context of the literature. For example, the cohort that participated in the study of the prevalence of ideal CV health in China included 96 121 participants older than 20 years. In the subgroup older than 65 years, although none of the patients had all 7 LS7 metrics, 50.2% had more than 4 metrics,⁹ compared with 17.3% of the Spanish study. Taking into account the differences in the prevalence of smokers and dietary adherence between the 2 countries, the data are truly alarming.

Beyond the measurement of cross-sectional prevalence, the current study shows for the first time in a Spanish population with high cardiovascular risk the population benefit derived from the achievement of a higher number of positive health behaviors and factors: with a median follow-up of 4.8 years, vs participants with only 0 or 1 metrics and after adjustment for age, sex, center, and intervention group, the results showed hazard ratios of 0.73 (95% confidence interval [95%CI], 0.54–0.99), 0.57 (95%CI, 0.41–0.78), and 0.34 (95%CI, 0.21–0.53), for 2, 3, and 4 or more metrics, respectively. The relative risk reduction (RRR) in cardiovascular events of 66% of the population with 4 or more metrics requires further examination. In secondary prevention, it is estimated that the RRRs in major cardiovascular events of aspirin, beta-blockers, angiotensin-converting enzyme inhibitors, and lipid-lowering agents are 25%, 25%, 30%, and 25%, respectively, and about 70% overall. Thus, the results of Díez-Espino et al. reveal a RRR in primary prevention comparable to that of the RRR of combined treatment with 4 cardioprotective drugs in patients in secondary prevention.

The first obligatory question that arises from these data is the following: given that investment in prevention is so rewarding, why are we not investing more in health promotion? The data are alarming: in the United States almost half of the population has 1 or more chronic diseases.¹⁰ More than 80% of the \$3 trillion annual health expenditure (about \$8000 per person-year) is spent on treating chronic diseases. According to recent data, the total budget for the prevention of all chronic diseases of the US Centers for Disease Control and Prevention is just \$1.2 billion, or \$4 per person-year.¹¹

From the point of view of prevention, we must explore the strategies proven to effectively improve CV health at different prevention levels and in different socioeconomic environments, particularly those that are pragmatic (and scalable) and whose implementation at the population level could reduce CVD at the global level.

The different levels of prevention should coincide to decrease the incidence of CVD. In primary prevention, the objective is to influence individuals who have cardiovascular risk factors but have not yet developed disease. Given that 90% of CV events are due to modifiable risk factors that are directly related to behavior, behavioral interventions have shown tremendous usefulness in the effective community and population control of CV risk factors. Accordingly, the Fifty-fifty Program has been successfully

implemented in different regions of Spain in order to improve the overall health of adults from 25 to 50 years of age by helping them to correct their health care habits and to self-manage their main CVD risk factors: overweight, obesity, sedentary behavior, smoking, and high blood pressure. The program involves educational and motivational workshops, as well as peer-support groups, aimed at the development of healthy habits to give the participants the opportunity to improve their lifestyles and manage their CV risk factors. This program has significantly reduced patients' risk scores, mainly due to smoking cessation and weight loss.¹²

The recently published HOPE 4 study¹³ included 1371 people older than 50 years with elevated CV risk (particularly uncontrolled hypertension). After 1 year of follow-up, the participants who received the intervention (involving CV risk factor control by nonphysician health workers who applied simplified management algorithms and support programs, indication for antihypertensive and statin therapy supervised by physicians, and support from a relative or friend) showed an absolute reduction in the Framingham risk score of 4.78% (95%CI, –7.11 to –2.44; $P < .0001$), as well as reductions in systolic blood pressure of 11.45 mmHg (95%CI, –14.94 to –7.79; $P < .0001$) and in low-density lipoprotein cholesterol of 15.5 mg/dL (95%CI, –23.2 to –8.89; $P < .0001$).

The definitive objective of CV prevention goes beyond the mere prevention of events in individuals with risk factors and should focus on preventing the very development of these risk factors. This approach is known as primordial prevention or CV health promotion. Given that CV lifestyle habits are acquired in the earliest years of life, primordial prevention is located at the epicenter of the transition from disease to CV health. In addition, there has been a marked tendency in recent years for increases in the prevalences of obesity, hypertension, and type 2 diabetes mellitus among the pediatric population,¹⁴ which is why future increases are expected in CVD disease burden. There is even a propensity for CV events to occur at ever younger ages. Lifestyle habits are behind the increase in childhood obesity. As an example, between 2009 and 2015, the percentage of children who spent more than 3 hours per day in front of a computer for reasons other than school activities (mainly videogames) increased from 24.9% to 41.7%.¹⁰ Thus, investment in primordial prevention cannot be delayed if we wish to halt the growth in CVD in the coming decades.

The *Salud Integral* Program (Comprehensive Health Program) directed by Dr Valentín Fuster and successfully implemented in Colombia, Spain, and recently in disadvantaged communities in the United States has markedly influenced CV health knowledge, attitudes, and habits through an intervention program in early childhood, primary, and, lately, secondary schools.¹⁵ The results of the recently published FAMILIA (Family-Based Approach in a Minority Community Integrating Systems-Biology for Promotion of Health) study¹⁶ showed that a school program aimed at promoting physical activity, a healthy diet, body/heart awareness, and emotional management more than doubled the primary endpoint of heart-healthy knowledge, attitudes, and habits in the intervention group vs the control group.

As we advance into the 21st century, and while life expectancy continues to increase, CVDs have overtaken transmissible diseases as the leading cause of death for the first time in human history. Paradoxically, this rise in CVD coincides with an improved understanding of atherosclerotic CVDs, more sophisticated diagnostic technologies, and more effective and safer treatments. This incongruity is due to the failure of public health policies to control population risk factors.¹⁷ The work by Díez-Espino recently published in *Revista Española de Cardiología* provides solid evidence from Spain of the population benefit of the management of 7 modifiable risk factors, all related to heart-healthy lifestyle habits.⁸ Given that these habits are acquired in the early stages of life, control of the CVD pandemic must include strategies to

promote health that begin in childhood and continue throughout the entire life of the individual. The concept of ideal cardiovascular health has produced a fundamental shift in our understanding of CV health promotion and its relationship with future CV risk.

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CONFLICTS OF INTEREST

No conflicts of interest.

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