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Targeting cardiovascular and metabolic disorders through annual nationwide screening and lifestyle intervention: insights from a cohort of 5 819 041 subjects with a 4-year follow-up

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Cardiovascular and metabolic disorders are among the leading causes of morbidity and mortality. Therefore, interventions aimed at reducing cardiovascular risk are the mainstay of modern medicine.

The long-term beneficial effects of nationwide screening operations are well established in cancer and infectious diseases.[1,2] Several reports have described the favourable impact of lifestyle interventions on cardiac and metabolic disorders, leading to clinically relevant improvements in cardiometabolic health.[3–5] However, the exact long-term impact of government-enforced operations of screenings and interventions has not been investigated in a large population. In this issue of the *European Journal of Preventive Cardiology*, Yoko Nakao and collaborators[6] present the data from the Japanese Health Screening and Health Guidance Programme offered in the context of universal health. This programme was initiated in 2008 with the main scope to decrease abdominal obesity and improve cardiovascular health.

A cohort of 5 819 041 subjects (~2.3 million women and ~3.5 million men) who received lifestyle guidance and counselling were followed up for ~4 years. The authors used the 2014 data as a baseline (including individuals who participated in health screening between April 2014 and March 2015).[6] Lifestyle guidance consisted of an initial session with a clinician, followed by support lasting at least 3 months, which may be renewed annually, for instance, for individuals who continued to be flagged for obesity.

Receipt of government-provided health guidance in the Japanese intervention resulted in only modest improvements in obesity and cardiovascular risk factors. For instance,

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in men, body mass index (BMI) decreased by 0.07 kg/m^2 and waist circumference by 0.27 cm; in women, BMI decreased by 0.11 kg/m^2 and waist circumference by 0.34 cm. Importantly, these modifications associated with the mass screening and counselling intervention attenuated over time. Similarly, short-term improvements were also observed in the levels of blood pressure, fasting glucose, HbA_{1c}, and triglycerides across both sexes.[6] The assignment to the health guidance was also associated with lifestyle changes including a reduced use of snacks in women and more exercise and less smoking among men. Remarkably, to mitigate the confounding factors of observational studies, the study design emulated randomization by subjecting all data to regression discontinuity analysis, in which health outcomes were compared between groups just above and just below the threshold for assignment to health guidance.

The observations of the Japanese study are fully in agreement with the results of the Danish Cardiovascular Screening (DANCAVAS) trial, published recently in the *New England Journal of Medicine*, in which the invitation to undergo comprehensive cardiovascular screening did not significantly reduce the incidence of death from any cause at a 5-year follow-up.[7] In this clinical trial, 46 611 men aged 65–74 years were randomly assigned (1:2) to undergo screening (invited group) or not to undergo screening (control group) for subclinical cardiovascular disease. Of note, a significant reduction in the risk of stroke, but not in the risk of myocardial infarction, aortic dissection, or aortic rupture was detected in the invited group.[7] However, one major limitation of this trial was that the authors evaluated the effects of being invited for screening rather than the actual screening (a critical aspect, considering that <63% of the men invited underwent screening). Moreover, the DANCAVAS trial was restricted to men, and improving screening and prevention programmes is known to be a necessary strategy to reduce gender-related differences in the epidemiology and outcome of cardiovascular disorders, as specifically shown, for instance, in the case of aortic aneurysms.[8] In line with these findings, a microsimulation study assessed a life-long impact of preventive cardiovascular screening strategies initiated after women experienced pre-eclampsia during pregnancy; in this study, the screening benefits were evaluated in terms of costs and quality-adjusted life years and incremental cost-effectiveness ratios, revealing that preventive cardiovascular risk screening and risk-based lifestyle interventions in women with a history of pre-eclampsia were not cost-effective.[9]

In summary, there is a need to develop better tailored models of cardiovascular risk prediction, which will be able to better classify cardiovascular risk; indeed, a proper risk stratification is essential to obtain feasible and cost-effective preventive strategies. The nationwide screening programmes have certainly the advantage of connecting unaware at-risk individuals to medical and preventive actions before their cardiovascular risk becomes high. Starting from this valuable aspect, we believe that a more active and continued participation of patients in the clinical decision-making process, an approach known as therapeutic concordance,[10] would certainly enhance the impact of screenings and counselling interventions, being based on an informed and collaborative relationship between patients and health professionals. Indeed, the European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE) V survey had demonstrated that both physicians and patients pay insufficient attention to lifestyle risk factors, which can unfavourably impact the control of blood pressure, lipids, and diabetes.[11]

In this sense, risk prediction algorithms based on individual and large-area variables could enable clinicians to identify patients who are less likely to achieve risk factor targets and who may therefore need to be specifically targeted.[12] Of course, intervening at the level of the individual with behavioural and psychosocial interventions remains crucial.[10,13]

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