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Editorials

Personalized prevention and population health impact: how can public health professionals be more engaged?

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Since 2000 incredible advancement in genotyping technology, coupled with the reduction in the costs of genome sequencing and the more recent advent of digital technologies in healthcare including wearable devices and mHealth, initiated a third revolution in medicine. Such technologies are creating unprecedented opportunities for disease prevention, diagnosis and treatment and for disease monitoring on a personalized basis, both within the health system and beyond. As all the new technologies and their applications advance, they are likely to play an integral role in shaping healthcare and the ways in which citizens manage and optimize their health.[1]

While we acknowledge that preventive activities in healthcare represent a key pillar for guarantee health system sustainability, such innovative in diseases' prevention are not yet fulfilled. As highlighted by the European Steering Group on Sustainable Healthcare and more recently reaffirmed in the State of the Health of EU of the Companion report[2], the implementation of sustainable healthcare requires a shift from treatment of established disease, to disease prevention and early diagnosis, and it relies on the need to engage citizens to take greater responsibility for their health. In fact, despite the tremendous increase in life expectancy, the latest Eurostat data reports that the average number of years of life lived with some disability in the EU is around 18. Given the potential for effective preventive efforts in postponing the onset of disabilities and reducing healthcare costs, the expectation is that the current 'one size fit all' approaches in prevention take advantage of the new technologies in healthcare in order to be targeted at those who need more. The expectations to realize such personalized approach in preventive healthcare are not new. Already in 2008 an editorial reported that 'if preventive care could be provided only to those who are going to get the illness, it would be more effective and cost-effective'.[3] More than 10 years later, however, we are still struggling to collect high quality evidences on the efficacy, effectiveness and efficiency of personalized approaches in prevention, ideally in the context of broad Health Technology Assessment evaluations.[4] Additionally, we need to engage public health professionals. In 2018, some scientists argued that whereas public health starts with populations, the word 'precision' or personalized implies a concern only with individuals.[5] Although a later editorial from Lancet replied that 'precision public health . . . should not be feared. It should be embraced',[6] the more traditional public health professionals are still stocked with prejudices that are grounded to some extent. In fact, while Big Data in healthcare already demonstrated their power in providing accurate information for decision makers to target more precise interventions at populations in the greatest need, when we talk about incorporating individual -omic profiling in preventive strategies, the situation is still uncertain. In theory, the -omic profiling might be considered a useful component of health management since birth, but the extent to which it really represents an added value in terms of improved outcomes and quality of life needs additional evidences. Let us consider the polygenic risk score (PRS), which is a number based on variation in multiple genetic loci and their associated weights that can be used to predict a certain diseases' risk. The use of PRS in health subjects is an important area of development for public health and warrants close attention, but there is still a good deal to learn about how to maximize benefits for population health. In principle, estimating the individual susceptibility of a common adult-onset conditions, is central to clinical decision-making, however, risk prediction does not necessarily implies effective prevention and improved outcomes. Although evidences are accumulating from large retrospective cohort studies across Europe on the ability of PRS to accurately stratify population in subgroups that can differentially benefit from target primary and secondary preventive interventions based on drugs or lifestyles, we still need large prospective studies that demonstrate and quantify the impact of PRS at population level in terms of disease prevention.

Last but not least, all the stakeholders should be engaged in the discussion to properly implement precision public health. We need all professionals in healthcare being literate on the potential and challenges of the use of current technologies in healthcare, and we need an increased health literacy at the population level. Premature translation of innovations in prevention can do more harm than benefit, if people are convinced that extensive self-monitoring with devices is useful, or undergoing a Direct to consumer Genetic test will save their lives. In this sense the advocacy of informed public health professionals is a key issue. In conclusion, scientific innovation offers amazing opportunity: it is our responsibility as scientists to support policy makers in dissecting the hypes from the real value-based interventions. It is not easy in such a complex scenario, but it is even more relevant for those working in public health.

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Prevention of vitamin D deficiency improves population health, social inequalities and health care budgets

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Around the world, populations struggle to achieve healthy levels of vitamin D[1] and even in Europe, an estimated 13% of the population is deficient, defined as serum 25OH vitamin D levels below 30 nmol/L.[1] Geographical, cultural and ethnic risk factors such as living in high-latitude countries with limited UVB light, sun-avoidance behaviour and specifically dark-skin pigmentation predispose to vitamin D deficiency and its complications.[2] Hypocalcaemic seizures, tetany, cardiomyopathy, rickets and osteomalacia with associated muscular hypotonia and pain occur specifically in ethnic groups that are vitamin D deficient and/or consume little dietary calcium.[2]

A combination of socioeconomic factors puts migrant and ethnic populations in high latitude, western countries at a disproportionally high risk for severe vitamin D deficiency, with growing children being at greatest risk of complications.[2] In these settings, vitamin D deficiency can be seen as an indicator of health care inequalities between ethnic groups. In Australia, Sweden, Norway and the UK, rickets is almost exclusively reported in dark-skinned children, which signposts public health strategies that continually miss the target.[3] In Britain during the industrial revolution, rickets became known as the English disease before food fortification eradicated it. Once this approach was abandoned, the disease made a rapid comeback. In the last decades, millions of dark-skinned migrants from mainly Commonwealth countries have shifted the UK population's demographics. However, instead of re-designing its public health measures to ensure that rickets was once again eradicated, the UK government continues in policy apathy and stigmatized the disease as 'Asian rickets'.[3]

Protecting entire populations, or just specific high-risk groups, from micronutrient deficiencies is a challenge, and supplementation and fortification are the options. There is evidence that supplementation programmes are inefficient in tackling vitamin D deficiency in some European countries such as the UK, mainly due to poor policy implementation, access, monitoring and adherence. For supplements to be effective, people need to somehow become aware that they need them, find where to get them, purchase them and finally take them religiously according to the appropriate schedule. Often those who need supplements the most likely fall through. In contrast, food fortification overcomes many of these obstacles by reaching all individuals, with the only requirement that they regularly consume the fortified food. Staple foods such as bread, oil and flour are therefore good candidate vehicles to reach entire populations.

A recent economic evaluation found that fortifying wheat flour with vitamin D in England and Wales would prevent 10 million new cases and save the National Health Services' budget £65 million.[4] Adding flour fortification to the current policy was found to be cheaper than doing nothing since savings would be generated through the prevention of hospital admissions caused by vitamin D deficiency. Another important aspect that makes food fortification an economically attractive alternative to the public sector's eyes is that most of the costs fall on the private sector and are diluted as they are passed-on to the consumers. In the case of the UK, some nutrients are already added to wheat flour, which means the structure is already in place and minimal investments need to be made. The benefits, on the other hand would be felt in population health and public sector budgets.

Finland's approach has been highlighted as the example to follow. The country implemented mandatory fortification of a variety of foods, mainly milk and spreadable fats but also yogurt, bread, orange juice and breakfast cereals, and data from its national nutrition survey—the National FINDIET Survey—show that the policy has successfully raised population 25OH vitamin D levels.[5] Despite this great success, concerns persist that policies might not be reaching ethnic minority groups in Finland, specifically due to their low intake of selected vehicle staple foods.