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## Editorial

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# Transforming health systems for incorporating personalized health interventions

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Personalized health interventions (PHI) are an innovative approach to healthcare that holds the promise of leveraging genomic applications and personal data to provide more precise treatments and prevention strategies.<sup>1</sup> By moving away from the traditional ‘one size fits all’ model, PHI aim to reshape the landscape of healthcare delivery, placing emphasis on individual characteristics, genomics and environmental factors. As the benefits of personalized interventions become increasingly evident, it is crucial to expedite the implementation of PHI within health services, and address barriers to adoption, establishing a solid foundation for their success.

### Shifting the focus: from disease identification to risk quantification

In contrast to the prevailing disease identification and reactive approach, PHI direct attention toward quantifying disease risk based on an individual’s unique characteristics. By integrating knowledge on inherited and acquired risk factors, PHI strives to prevent disease onset through strategic life trajectory planning. When disease development is unavoidable, early detection becomes paramount, leading to improved health outcomes and reduced costs. While Europe has witnessed applications of PHI in structured healthcare pathways among high-risk subjects, such as breast cancer screening for *BRCA* gene carriers and colon cancer screening for those with Lynch syndrome, a broader implementation in the general population within health services remains limited. Advancements in areas such as pharmacogenomics and secondary prevention of common complex diseases are leading to a growing body of scientific evidence that supports the benefits of PHI in addition to the traditional approaches (e.g. cancer screening programs).

### Strategies for accelerating implementation

To facilitate swift adoption of PHI, several strategies must be employed. There is a need to enhance genomic knowledge relevant to daily care and bolster the education provided to healthcare professionals. Equipping healthcare providers with necessary expertise enables effective leveraging of genomic information in patient care. Demonstration of clinical utility of genomic applications beyond analytical and clinical validity, promoting translational research through guidelines and funding including Health Technology Assessment, and engaging citizens and patients are critical components of a comprehensive implementation strategy. European initiatives, including

International Consortium of Personalized Medicine (ICPerMed),<sup>2</sup> Beyond 1 Million Genome (B1MG),<sup>3</sup> European staff eXchange for integrAting precision health in the health Care SysTems (ExACT)<sup>4</sup>, and A PeRsOnalized Prevention roadmap for the future HEalthcare (PROPHET),<sup>5</sup> recognize the significance of citizen engagement and advocate for educating and involving the public in PHI. This approach fosters awareness, empowers individuals to make informed health decisions, and encourages responsible sharing of personal data.

### Mindset shift and behavioral change

The adoption of PHI faces obstacles beyond the general population’s poor level of genomic literacy. It necessitates a profound shift in the mindset of scientists, health professionals and citizens. Moreover, a change in the way healthcare is organized and provided to individuals is essential. Currently, communicating an increased risk of disease based on genomic background has not consistently resulted in lifestyle changes toward healthier behaviors. To address this, citizens should not only be informed about the benefits of PHI but involved in defining the issues that concern them. Health professionals should educate individuals to adopt healthy lifestyles and adhere to specific interventions in the medium and long term within health services and traditional screening programs.

### The importance of large-scale databases

The success of PHI hinges on the establishment of databases that encompass various types of data, including clinical, genomic, environmental and lifestyle factors, as well as disease histories and drug sensitivity. Initiatives such as the UK Biobank, Finland’s FinnGen Project, and the Estonian Biobank serve as examples of large-scale databases already in existence. Building these repositories relies on the voluntary participation of healthy populations who need to be informed on the pros and cons of health data sharing including genomics. Specific initiatives are underway to create national cohorts of genomes from citizens, such as the Genome of Europe, or to establish the infrastructure for the storage, management, and sharing of genomic data like the Genomic Data Infrastructure project. The efficacy of PHI is contingent on ‘collective and shared participation’. Including populations from various ancestries and ethnicities is essential for applying new discoveries to all populations and avoid exacerbating social and health disparities.

## Trust, ethics and data access

Access to data ultimately depends on the trust that patients and the public have in science. Assessments conducted in the European Union have shown that citizens' attitudes, interest in education, and willingness to participate in personalized health research are positive. However, concerns about how personal data will be used and by which institutions persist. Ensuring data privacy, protection, and transparent governance frameworks is paramount.

## The path to a transformed healthcare landscape

PHI can revolutionize healthcare, supporting its long-term sustainability. The establishment of longitudinal cohorts can facilitate the identification of models for PHI. Moreover, it is crucial to prioritize engaging different populations and ensuring equitable access to personalized interventions. The maturity level model developed by the BIMG project,<sup>3</sup> can assist health decision-makers in understanding the maturity of genomic medicine practices within healthcare systems, enabling informed decisions and optimizing the adoption of PHI.

## Data availability

There are no new data associated with this article.

*Conflicts of interest:* None declared.

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