

Precision Medicine & Public Health:

How the All of Us Program Can Make Us All Healthier

“So tonight, I’m launching a new Precision Medicine Initiative to bring us closer to curing diseases...to keep ourselves and our families healthier” (State of the Union, 2015). With that announcement by President Barack Obama, the Precision Medicine Initiative – since renamed the All of Us Research Program – was born. At first glance, precision medicine and public health seem incongruous, even contradictory. Fortunately, that is not the case. Precision medicine and public health can coexist, and even thrive together.

The All of Us program’s goal is to accelerate the research and discovery of individualized medical treatments by recruiting 1 million Americans to share detailed health information (National Institutes of Health, 2015). It is the largest federal commitment yet to the concept of precision medicine, which is “an approach to disease treatment and prevention that seeks to maximize effectiveness by taking into account individual variability in genes, environment, and lifestyle” (NIH, 2015).

The precision medicine era has already delivered extraordinary results. Ramaswami et al., (2018) note that genomic screening has allowed people to better estimate their cancer risk based on certain gene mutations. It has allowed researchers to better understand why drugs work for some individuals but not others (Ramaswami et al., 2018). The All of Us Program promises to accelerate these discoveries and to save lives.

Precision medicine and public health seem incompatible. The former dives deeper into individuals' health to tailor individual treatments for individual diseases. The latter slowly – often unglamorously – focuses on policies and behaviors that affect us all. Bayer and Galea (2017) have even argued that fervor for precision medicine may displace funding and attention from public health.

These fears are understandable but overstated. Khoury et al. (2016) ask whether “the same technologies that propel precision medicine can usher in a parallel era of ‘precision public health’ beyond treatment of sick individuals.” They aptly note the irony that precision medicine, which is fueled by big data, requires a population-based approach.

In fact, precision medicine has concrete public health applications. Loomans-Kropp and Umar (2015) argue that researchers could use precision medicine to stratify populations more precisely for the purpose of cancer screening recommendations based on genetic and environmental factors. Ramaswami et al. (2018) write that accelerated genomic screenings of humans and pathogens could lead to better disease surveillance.

The All of Us program may prove particularly valuable for public health due to its collection of non-clinical data. For instance, Khoury et al. (2016) suggest that epigenetic changes due to non-clinical factors help explain population health disparities. The All of

Us program and other precision medicine initiatives may strengthen this evidence base and help researchers identify public health interventions to eliminate these disparities.

While enthusiasm is warranted, caution is key. Precision medicine threatens to exacerbate health disparities. For instance, BRCA gene testing is usually covered by insurance. Those without coverage may be unable to access testing. Even those who can access BRCA testing may be unable to afford a preventive mastectomy should they test positive for a mutation. The public health community must ensure that low-income and uninsured individuals are not left behind.

Moreover, Bayer & Galea warned in 2015 that precision medicine – even if made available to all – is unlikely to eliminate health disparities. The authors reiterated the Whitehall Studies of the British Civil Service findings, writing that “even when health care services were provided as a matter of right and the cost of care was no longer a barrier to treatment, a marked social gradient persisted...” They maintain that health outcomes between and within groups are driven by “social-structural factors that shape our lives” (2015).

The precision medicine era also magnifies longstanding questions about privacy and informed consent, particularly among populations that the federal government has harmed. These questions are especially significant as much of the value in precision medicine comes from data voluntarily supplied by populations that have historically been ignored or oppressed.

In conclusion, public health and precision medicine can flourish together. However, researchers, clinicians, and public health practitioners should not view precision medicine as a panacea. Close attention must be paid to ensure that the country seizes the opportunities presented by the All of Us program and other precision medicine initiatives while being mindful of its limitations and social implications.

References

Bayer, R., & Galea, S. (2015). Public health in the precision-medicine era. *New England Journal of Medicine*, 373(6), 499-501.

<https://nejm.org/doi/10.1056/NEJMp1506241>

Khoury, M., Iademarco, M., & Riley, W. (2016). Precision public health for the era of precision medicine. *American Journal of Preventive Medicine*, 50(3), 398-401.

<http://dx.doi.org/10.1016/j.amepre.2015.08.031>

Loomans-Kropp, H. A., & Umar, A. (2019). Cancer prevention and screening: The next step in the era of precision medicine. *Npj Precision Oncology*, 3(1).

<https://doi.org/10.1038/s41698-018-0075-9>

National Institutes of Health. (2015). *The precision medicine initiative cohort program – building a research foundation for 21st century medicine*. Precision Medicine Initiative (PMI) Working Group.

<https://acd.od.nih.gov/documents/reports/DRAFT-PMI-WG-Report-9-11-2015-508.pdf>

Ramaswami, R., Bayer, R., & Galea, S. (2018). Precision medicine from a public health perspective. *Annual Review of Public Health*, 1(39), 153-68.

<https://doi.org/10.1146/annurev-publhealth-040617-014158>

The State of the Union Address. (2015). Retrieved May 8, 2022 from

<https://obamawhitehouse.archives.gov/the-press-office/2015/01/20/remarks-president-state-union-address-January-20-2015>.