

Population Health and Technology: Placing People First

Over the past decade consumers have been exposed to a surge of digital health technologies and other technological innovations including health informatics tools, health information technology in health care, as well as the use of medical devices within clinical care. Consumer health information is now easily accessible and downloadable through mobile phone applications and freely available from health information Web sites and through social media. Advances in technology—the use of Web-based resources, social media and smart phones—have contributed to efforts to increase equity through affordable access to health information. These advances have helped open the door to health-related innovations that are reaching the most vulnerable in society, including populations in the United States that are historically underserved because of race and ethnicity. Health workers and health care systems have embraced technology as a powerful tool for reaching and engaging historically underserved populations for health education and promotion, chronic disease prevention, and care management. Technological innovations are now being used in health care to enhance the performance of clinical delivery systems, to improve the quality of care delivered to patients, as well as to promote and strengthen patient-centered care.^{1,2} These innovations include health information technology to support the use of electronic medical records and personal health records, technology to promote communication between health care providers

and patients and improve chronic disease management, as well as telemedicine to improve provider practice and patient centered care. They also include mobile medical devices and remote patient monitoring devices and sensors with patient-generated data.^{3,4} The ultimate goals are to improve patient outcomes and patient experience with care, and to increase efficiency and reduce costs within the health care system.

Innovations in technology are not limited to health care. Initiatives in public health as well as other sectors, such as education, are being built on the foundation of promoting health in all policy areas.⁵ This rising interest in the use of technology for health across various sectors presents great potential for innovation in population health approaches to reduce racial and ethnic health disparities.

POPULATION HEALTH APPROACHES AND TECHNOLOGY

Utilizing technology as part of a broader effort to improve health outcomes beyond the individual patient requires the adoption of population health approaches. Population health is defined as “the health outcomes of a group of individuals, including the distribution of such outcomes within the group,”^{6(p381)} and includes “health outcomes, patterns of health determinants, and policies and interventions that link these two.”^{6(p380)} Population health approaches provide opportunities to improve the health of populations that are defined by geography,

conditions or health needs. Such approaches are people-centered, engage sectors beyond health care, and incorporate the localized realities of the determinants of health such as social and economic circumstances at the community level.

Incorporating the use of technology within population health approaches requires an understanding and acceptance that people come first and technology second. Placing people first drives efforts to identify and leverage the strengths and assets within a targeted population, and pay attention to health through a social-ecological lens. It enables the development of partnerships and the sharing of resources and data during all phases, identifies the most appropriate technological strategies based on population feedback, and aids in the process of continuous learning for both health system stakeholders and the targeted population.⁷

Placing people first yields information on the most effective processes for sharing knowledge and timely information when required, and supports systems and processes that intertwine knowledge, behavior, and action within the context of the local environment. It facilitates a better understanding of how the social-ecological context shapes health outcomes and the delivery of services. It also helps pinpoint opportunities for investing in structured upstream and midstream interventions across different sectors, with the goal of improving health outcomes. A people first approach may shed light on areas for technology investment in the non-health care

sectors that are known to be associated with improving health outcomes,⁵ with the goal of aligning efforts in health care as well as contributing to long-term improvements in health. Examples include potential technological investments in early childhood development, perinatal care, primary and secondary education, local food systems, and agriculture. For example, mobile health (mHealth) in the form of apps has been developed to assist individuals with making healthful choices by tracking diet and physical activity, identifying options for nutritious food or nearby recreation, and providing customized feedback and suggestions.⁸ mHealth texting platforms can help improve maternal and child health outcomes as seen in the Text4Baby program.⁹ These mHealth innovations not only impact individual health, but also have the potential to target broader population health outcomes. These tools have the potential for people to access the same health information and health care services, promoting health equity—and ultimately reducing health disparities in different racial, ethnic, and social-economic groups.

IMPLICATIONS FOR RACIAL AND ETHNIC HEALTH DISPARITIES

By 2050, racial and ethnic minorities are projected to be approximately 40% of the US population.¹⁰ Given the increasing use of technology in health, this demographic shift underscores the need to understand how technology can be used in efforts to improve health outcomes among racial and ethnic minority populations in the United States. Tremendous opportunity exists to examine the utility of technology such as smart phones because although African

Americans and Hispanics have lower rates of access to Internet broadband services and computers, they own and use mobile phones at higher rates compared with Whites.¹¹ To date, however, limited information exists about the utility of technology within population health approaches to reduce racial and ethnic disparities in health.

The high adoption and utilization rates of mobile phones among racial and ethnic minorities provide a ready-made foundation for interventions in partnership with these population groups through the development, implementation, and adoption of people-centered approaches. It cannot be assumed that technology itself will be a panacea for long-standing disparities in health that are anchored in intractable, historical inequities.

Integrating technology within population health approaches to reduce health disparities may seem to be a prolonged, time-consuming and labor-intensive process, but the potential payback to expanding our knowledge of technology's potential to reduce health disparities could be significant. Based on lessons learned from other promising efforts to reduce racial and ethnic health disparities, we know that multi-sectoral approaches should be utilized that address the social determinants of health and equity, interventions should be culturally informed, and methods and processes should be well-documented and evaluated. This approach calls for the need to ground the development and testing of technological innovations in behavioral or applicable theories, and to identify policies that enable the effective use of technology to reduce racial and ethnic health disparities.

Placing people first, or engaging people first, is a critical approach

for reducing racial and ethnic disparities and this should not be lost or substituted with the introduction of technology. People who are placed first represent the targeted populations that are influenced by technology use, and may include health and health care professionals, patients with health conditions in common, or other groups such as community members within specific settings. Placing people first facilitates integrating technological innovations into the strengths, assets and collective intelligence within targeted populations. Respectfully and successfully engaging people—ascertaining the needs, priorities, solutions, and processes that they may recommend and developing technology in collaboration with them—may help ensure suitable levels of digital literacy, e-health literacy, and media literacy through the lens of cultural competency and sensitivity.

Keeping a focus on the needs and opinions of people and the users involved, as well as the solutions that they may recommend within the realities of their environments should be considered first priority in advancing innovations to improve population health. In summary, it is all about people and the users. Engaging the population at all points is critical to achieving a culturally competent, tailored and appropriate strategy for using technology to improve population health. ■

Gillian Barclay, DDS, DrPH
Alyse Sabina, MPH
Garth Graham, MD, MPH

About the Authors

Gillian Barclay, Alyse Sabina, and Garth Graham are with the Aetna Foundation Inc., Hartford, CT. They are also guest editors for this special theme issue.

Correspondence should be sent to Gillian Barclay DDS, DrPH, Aetna Foundation, Inc, 151 Farmington Avenue, RT 63, Hartford, CT 06156, E-mail: BarclayG@aetna.com.) Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints" link.

This editorial was accepted September 22, 2014.
doi:10.2105/AJPH.2014.302334

Contributors

G. Barclay conceptualized and drafted the article. A. Sabina assisted with drafting and revisions. G. Graham assisted with the article review.

References

1. Bauer AM, Thielke SM, Katon W, Unützer J, Areán P. Aligning health information technologies with effective service delivery models to improve chronic disease care. *Prev Med*. 2014;66:167–172.
2. Shekelle PG, Morton SC, Keeler EB. Costs and benefits of health information technology. *Evid Rep Technol Assess (Full Rep)*. 2006;(132):1–71.
3. Riley WT, Keberlein P, Sorenson G, et al. Program evaluation of remote heart failure monitoring: healthcare utilization analysis in a rural regional medical center. *Telemed J E Health*. 2014; Epub ahead of print.
4. Bonato P. Wearable sensors and systems. From enabling technology to clinical applications. *IEEE Eng Med Biol Mag*. 2010;29(3):25–36.
5. Rudolph L, Caplan J, Ben-Moshe K, Dillon L. *Health in All Policies: A Guide for State and Local Governments*. Washington, DC, and Oakland, CA: American Public Health Association and Public Health Institute; 2013.
6. Kindig D, Stoddart G. What is population health? *Am J Public Health*. 2003; 93(3):380–383.
7. Wallerstein N, Duran B, Minkler M, Foley K. Developing and maintaining partnerships with communities. In: Israel BA, Eng E, Schulz AJ, Parker EA, eds. *Methods in Community-Based Participatory Research for Health*. San Francisco, CA: Jossey-Bass; 2005:31–51.
8. Levine DM, Savarimuthu S, Squires A, Nicholson J, Jay M. Technology-assisted weight loss interventions in primary care: a systematic review. *J Gen Intern Med*. 2014;Epub ahead of print.
9. Whittaker R, Matoff-Stepp S, Meehan J, et al. Text4baby: development and implementation of a national text messaging health information service. *Am J Public Health*. 2012;102(12):2207–2213.
10. Day J. *Population Projections of the United States by Age, Sex, Race, and Hispanic Origin: 1995 to 2050, US Bureau of the Census, Current Population Reports*. Washington, DC: US Government Printing Office; 1996:25–1130.
11. Zickuhr K, Smith A. *Digital Differences*. Washington, DC: Pew Internet and American Life Project, Pew Charitable Trusts; 2012.