Bridging the Digital Divide: How Digital Health Initiatives May Exacerbate Healthcare Barriers

Kymora Scotland, Christopher Jaymes Hernandez, Javier Prieto, Mulun Huang, Olga Idriss Davis, Stanley Frencher, Waheed Baqai, Alvin Kwong

Submitted to: Interactive Journal of Medical Research
on: March 24, 2025

Table of Contents

Bridging the Digital Divide: How Digital Health Initiatives May Exacerbate Healthcare Barriers

Kymora Scotland[1*] MD, PhD; Christopher Jaymes Hernandez[1*] BS; Javier Prieto[2*] BS; Mulun Huang[1*] BS; Olga Idriss Davis[3]; Stanley Frencher[1] MD; Waheed Baqai[4]; Alvin Kwong[4]

[1] University of California, Los Angeles Los Angles US
[2] University of California, Riverside Riverside US
[3] Hugh Downs School of Human Communication Arizona State University Tempe US
[4] Afaya Intelligence Dar es Salaam TZ
[*]these authors contributed equally

Corresponding Author:
Kymora Scotland MD, PhD

University of California, Los Angeles
University of California, Los Angeles
Los Angles
US

Abstract

The rapid rise of technology in healthcare has sparked a wave of interest from venture capitalists and independent investors, drawn by the promise of a trillion-dollar industry. Innovations such as artificial intelligence are poised to revolutionize medicine, offering the potential to transform patient care in ways never before imagined. Yet, while these advancements hold great promise, they highlight a significant challenge: the digital divide. This gap between the speed of technological progress and the widespread adoption of digital tools—especially in medicine—has left many individuals and communities behind. The pace of innovation in healthcare technology has outstripped society's ability to fully integrate these tools into everyday practices, creating a disparity in access to care.

Despite this challenge, several companies within the field of urology are stepping up to bridge this gap. By developing innovative, user-friendly technologies that ensure access to high-quality care for all, these businesses are not only addressing the digital divide but are also providing substantial returns to their shareholders. These efforts underscore an important truth: the most successful healthcare technologies are those that prioritize inclusivity, ensuring that all patients, regardless of background or access to resources, can benefit from the digital healthcare revolution.

(JMIR Preprints 24/03/2025:74432)
DOI: https://doi.org/10.2196/preprints.74432

Preprint Settings

1) Would you like to publish your submitted manuscript as preprint?

✓ **Please make my preprint PDF available to anyone at any time (recommended).**
Please make my preprint PDF available only to logged-in users; I understand that my title and abstract will remain visible to all users.
Only make the preprint title and abstract visible.
No, I do not wish to publish my submitted manuscript as a preprint.

2) If accepted for publication in a JMIR journal, would you like the PDF to be visible to the public?

✓ **Yes, please make my accepted manuscript PDF available to anyone at any time (Recommended).**
Yes, but please make my accepted manuscript PDF available only to logged-in users; I understand that the title and abstract will remain v
Yes, but only make the title and abstract visible (see Important note, above). I understand that if I later pay to participate in <a href="http
No. Please do not make my accepted manuscript PDF available to anyone.

Original Manuscript

Introduction:

Since the onset of the COVID-19 pandemic, venture capital investment in healthcare technologies has reached unprecedented levels, with expenditures surpassing previously recorded benchmarks [1]. Established technology companies and emerging healthcare start-ups increasingly recognize the health technology sector as a multi-trillion-dollar industry, driving significant investment to secure a foothold in this rapidly growing market [2]. However, while technological advancements and internet-based innovations continue to progress at an unparalleled pace within healthcare, patient adoption of these new technologies has not kept pace [3].

This disparity in patient adoption can be attributed in part to unequal access to the digital infrastructure necessary for utilizing health technologies, compounded by the lack of user-friendly and easily comprehensible resources available to marginalized populations. Businesses focused on improving patient satisfaction often design medical technologies with an emphasis on affluent populations, as they represent the target audience able to afford these services [4]. However, this focus on higher-income groups exacerbates existing health disparities, further marginalizing underserved populations.

Prior research has shown that one in five Americans lacks home broadband [5]. Significant racial disparities exist surrounding home broadband as only 65% of the Black and 71% of the Hispanic population has internet access compared to 80% of the White population [6]. Another barrier to the adoption of digital health solutions is the ongoing issue of low health literacy [7]. Only 12% of U.S. adults are proficient in health literacy [8], while 16% lack basic digital skills [9]. These deficits are particularly pronounced among socioeconomically disadvantaged and racially marginalized communities. Approximately 35% of Hispanic and 22% of Black adults face significant digital literacy challenges, exacerbating already substantial healthcare disparities [9]. Health communication strategies that fail to meet the needs of patients and families lacking digital health literacy may lead to poorer health outcomes in the most vulnerable populations, resulting in more hospitalizations, emergency department visits, and higher mortality rates [10-11]. Despite the growing recognition of health disparities among marginalized groups, many medical companies have yet to adequately address these barriers in their designs for the digital age. However, a few corporations have demonstrated a commitment to bridging this gap. Companies such as Afaya Intelligence, Aviation Medical, and Dornier MedTech have made notable efforts to reduce the digital divide in healthcare by developing user-friendly, patient-centered technologies tailored to meet the needs of diverse populations. These initiatives represent important steps toward fostering equitable access to healthcare innovations in the field of urology.

Afya Intelligence: A Case Study in Digital Health Equity

Ensuring equitable access to specialist care remains a significant challenge in modern healthcare, particularly in urology, where timely interventions can dramatically influence patient outcomes. Addressing this issue, an AI-powered digital health platform—Afya Intelligence—was developed to enhance care coordination and streamline access to specialty care. Key features include an AI-driven triage system, intelligent care coordination tools, and virtual care solutions, where clinicians provide real-time, personalized guidance to patients navigating complex healthcare systems.

From July 2023 to September 2024, the Afya Intelligence platform sent over 102,000 care coordination text messages to people from vulnerable groups, demonstrating a 23% completion rate for a campaign asking patients to verify health plan membership and download authorizations—illustrating the potential of personalized digital engagement [12]. For urologists,

this technology represents a critical step toward reducing barriers to specialty care and ensuring equitable access for all patients, particularly those from underserved communities.

The platform also connects patients with community-based organizations and local resources, helping them overcome common barriers like transportation or translation services. By incorporating culturally competent, region-specific solutions, digital health businesses have the potential to transform how consumers engage with healthcare, increasing the likelihood of follow-up with specialty care.

Aviation Medical: Alleviating Overactive Bladder at an Enhanced & Easier Level

While advancements in medical technology have extended beyond clinical settings to improve patient care at home, questions remain regarding the practical value these home devices bring to medicine. Over 100 studies investigating this topic consistently highlight challenges, including such technologies' complexity and usability issues [13-16]. Recognizing these critical issues, companies like Aviation Medical are at the forefront of developing innovative technologies designed to address these shortcomings and improve clinical outcomes in urology. By focusing on user-friendly, patient-centered solutions, these advancements have the potential to bridge the gap between home-based care and clinical efficacy, ensuring that urologists can deliver better, more accessible care to their patients.

In April 2023, Aviation Medical's Vivally, a wearable neuromodulation device targeting urge incontinence and overactive bladder (OAB), received FDA approval. With $22 million in Series C financing, Vivally leverages closed-loop transcutaneous tibial neuromodulation to reduce device complexity, enhance patient compliance, and lower healthcare costs [17].
Recent research demonstrated Vivally's effectiveness, with 97% of participants reporting ease of use and over 90% expressing satisfaction with the device and app [18]. Participants experienced significant reductions in daily voids and incontinence episodes, aligning with evidence that patient-friendly technologies improve outcomes [19]. This innovation sets a benchmark for advancing urological care, highlighting the need for intuitive, patient-centered solutions to enhance clinical outcomes.

Dornier MedTech: Touching on the Importance of Online Readability with UroGPT

Almost 80 million patients in the U.S. are considered to have low literacy, taking into account reading and writing capabilities [20]. Recognizing this disparity, healthcare organizations have long recommended that patient educational materials be written at or below a sixth-grade reading level [21-23]. Despite these guidelines, studies reveal that the readability level of most online patient materials remains at an average of nearly a 10th-grade level [24]. This gap in accessibility has been linked to poorer patient compliance and accelerated disease progression [25-26]. Addressing this issue, Dornier MedTech launched UroGPT on April 30, 2024, an AI-powered educational tool specifically designed for kidney stone patients. Developed in collaboration with the Worst Pain Ever (WPE) and WPE Wellness programs, UroGPT is accessible to nearly 500,000 members within these online communities. The platform aims to simplify the complexities of kidney stone diagnosis and treatment by providing patient-centered, on-demand education [27].

Tailored for both urologists and their patients, UroGPT serves as an educational adjunct for clinicians while offering patients timely, comprehensible guidance during unplanned and often distressing moments.

By combining AI-driven technology with an emphasis on accessibility and readability, UroGPT sets a new standard for patient education in urology, addressing long-standing disparities in health literacy while empowering patients and enhancing clinical outcomes.

Conclusion:

While the healthcare technology sector continues to see unprecedented growth, disparities in patient adoption due to unequal access and low digital literacy remain significant barriers to equitable care. Marginalized populations, disproportionately affected by limited broadband access and complex technology, require tailored solutions to bridge these gaps. Innovative efforts by companies like Afaya Intelligence, Aviation Medical, and Dornier MedTech demonstrate the potential to reduce health inequities through user-centered design and culturally competent tools. By prioritizing inclusivity in technological advancements, the field of urology can lead the way in ensuring that digital health innovations benefit all patients, regardless of socioeconomic status or digital literacy.

References:

1. Deloitte. Healthtech Investment Trends: Tracking US Funding Across the Care Continuum. Deloitte Insights, 2021, www2.deloitte.com/content/dam/insights/articles/6920_Healthtech-investmenttrends/DI_Healthtech-investment-trends.pdf.
2. Webster, P. Big tech companies invest billions in health research. Nat Med 29, 1034–1037 (2023). https://doi.org/10.1038/s41591-023-02290-y
3. Tarnoff, B. (2016, August 3). The Internet should be a public good. Jacobin. Retrieved From https://www.jacobinmag.com/2016/08/internet-public-dns-privatization-icannnetflix/
4. Manocchia A. Telehealth: Enhancing Care through Technology. R I Med J (2013). 2020 Feb 3;103(1):18-20. PMID: 32013298.
5. Michelle Cao. “Switched off: Why Are One in Five U.S. Households Not Online?” Switched Off: Why Are One in Five U.S. Households Not Online? | National Telecommunications and Information Administration, 5 Oct. 2022, www.ntia.gov/blog/2022/switched-why-are-one-five-us-households-not-onlin.
6. Atske, Sara, and Andrew Perrin. "Home Broadband Adoption, Computer Ownership Vary by Race, Ethnicity in the U.S." Pew Research Center, 16 July 2021, https://www.pewresearch.org/short-reads/2021/07/16/home-broadband-adoptioncompute-ownership-vary-by-race-ethnicity-in-the-u-s/.
7. Hasannejadasl H, Roumen C, Smit Y, Dekker A, Fijten R. Health Literacy and eHealth: Challenges and Strategies. JCO Clin Cancer Inform. 2022 Sep;6:e2200005
8. Results from the 2003 National Assessment of Adult Literacy, nces.ed.gov/pubs2006/2006483.pdf. Accessed 15 July 2024.
9. A Description of u.s.Adults Who Are Not Digitally Literate, nces.ed.gov/pubs2018/2018161.pdf. Accessed 15 July 2024.
10. Improving Health Literacy Could Prevent Nearly 1 Million ..., www.unitedhealthgroup.com/content/dam/UHG/PDF/About/Health-Literacy-Brief.pdf. Accessed 15 July 2024.
11. Fan, Zhao-ya, et al. “Association between Health Literacy and Mortality: A Systematic Review and Meta-Analysis - Archives of Public Health.” BioMed Central, BioMed Central, 1 July 2021, archpublichealth.biomedcentral.com/articles/10.1186/s13690-021-00648-7.
12. Afya Global. Internal data on personalized consumer engagement. Published August 2024. [Accessed October 1, 2024].

13. Annica Kristoffersson EK, Loutfi A. Summative evaluation of a sensor-based cognitive assistive technology: impact on quality of life and perceived utility. Gerontechnology. 2019;18(2):59–69. doi: 10.4017/gt.2019.18.2.001.00.
14. Seelye AM, et al. Reactions to a remote-controlled video-communication robot in seniors' homes: a pilot study of feasibility and acceptance. Telemedicine and e-Health. 2012;18(10):755–9. doi: 10.1089/tmj.2012.0026.
15. Alexander GL, et al. Passive sensor technology interface to assess elder activity in independent living. Nurs Res. 2011;60(5):318–25. doi:10.1097/NNR.0b013e318225f3e1.
16. Zsiga K, et al. Home care robot for socially supporting the elderly: Focus group studies in three European countries to screen user attitudes and requirements. Int J Rehabil Res. 2013;36(4):375–8. doi: 10.1097/MRR.0b013e3283643d26.
17. Booth J, Connelly L, Dickson S, Duncan F, Lawrence M. The effectiveness of transcutaneous tibial nerve stimulation (TTNS) for adults with overactive bladder syndrome: A systematic review. Neurourol Urodyn. 2018 Feb;37(2):528-541. Doi: 10.1002/nau.23351. Epub 2017 Jul 21. PMID: 28731583.
18. Goudelocke C, Sobol J, Poulos D, Enemchukwu E, Zaslau S, Dhir R. A Multicenter Study Evaluating the FREquency of Use and Efficacy of a Novel Closed-Loop Wearabl Tibial Neuromodulation System for Overactive Bladder and Urgency Urinary Incontinence (FREEOAB). Urology. 2024 Jan;183:63-69. doi: 10.1016/j.urology.2023.10.007. Epub 2023 Nov 7. PMID: 37944596.
19. Annaswamy TM, Verduzco-Gutierrez M, Frieden L. Telemedicine barriers and challenges for persons with disabilities: COVID-19 and beyond. Disabil Health J. 2020 Oct;13(4):100973–100973. doi: 10.1016/j.dhjo.2020.100973.
20. Hickey KT, Masterson Creber RM, Reading M, Sciacca RR, Riga TC, Frulla AP, Casida JM. Low health literacy: Implications for managing cardiac patients in practice. Nurse Pract. 2018 Aug;43(8):49-55. doi: 10.1097/01.NPR.0000541468.54290.49. PMID: 30028773; PMCID: PMC6391993.
21. Cotugna N, Vickery CE, Carpenter-Haefele KM. Evaluation of literacy level of patient education pages in health-related journals. J Community Health. 2005;30:213–219. doi: 10.1007/s10900-004-1959-x.
22. Weiss BD. Health Literacy: A Manual for Clinicians. Chicago, IL: American Medical Association, American Medical Foundation; 2003.
23. National Institutes of Health. How to Write Easy to Read Health Materials. National Library of Medicine Website. Available at: http://www.nlm.nih.gov/medlineplus/etr.html. Accessed Feb 1, 2009.
24. Graber MA, Roller CM, Kaeble B. Readability levels of patient education material on the World Wide Web. J Fam Pract. 1999 Jan;48(1):58-61. PMID: 9934385.
25. Juzych MS, Randhawa S, Shukairy A, Kaushal P, Gupta A, Shalauta N. Functional health literacy in patients with glaucoma in urban settings. Arch Ophthalmol. 2008;126:718–724. doi: 10.1001/archopht.126.5.718.
26. Friedland R. Understanding Health Literacy: New Estimates of the Cost of Inadequate Health Literacy. Washington, DC: National Academy on an Aging Society; 1998.
27. "Dornier MedTech Launches UroGPT: The World's First AI Tool Dedicated to Kidney Stone Patients." Dornier MedTech, Dornier MedTech, n.d., https://www.dornier.com/news-plugin/dornier-medtech-launches-urogpt-the-worlds-firstai-tool-dedicated-to-kidney-stone-patients/. Accessed 8 Jan. 2025.