



# Disparities in Health Care and the Digital Divide

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Accepted: 25 June 2021 / Published online: 23 July 2021

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## Abstract

**Purpose of Review** Disparities in health outcomes are a well documented and worrisome part of our health care system. These disparities persist in spite of, and are occasionally exacerbated by, new technologies that are intended to improve health care. This results in a “digital divide” in which populations that have poorer health outcomes continue to have poorer health outcomes despite technological improvements.

**Recent Findings** In many ways, the digital divide is already shrinking via improved access to internet and technology/process improvements. For example, people with schizophrenia, PTSD, and bipolar disorder have had their care successfully augmented by new technology. However, problems persist- being impoverished, female, and black all correlate with decreased probability of completing a telehealth visit, and millions of americans have insufficient internet access to complete telehealth visits.

**Summary** We must continue to utilize new technology in health care to improve outcomes, but we must also be wary to ensure those outcomes are equitable across different populations.

**Keywords** Digital Divide · Telehealth · Telepsychiatry · Health information technology · Health Disparities · Social determinants of health

## Introduction

Racial and ethnic disparities in health care have been consistently documented in the diagnosis, treatment, and outcomes of many common disorders and clinical conditions, including psychiatric disorders. Disparities are defined as “differences in treatment between racial, ethnic or other demographic groups that are not directly attributable to variation in clinical needs or patient preferences and persist even after adjustment for socioeconomic factors [1].” Almost two decades ago the

Institute of Medicine’s report *Crossing the Quality Chasm* highlighted equity—the absence of disparities—as a key pillar of quality [2]. Studies show that many poor, uninsured, and minority patients routinely receive inferior care. They also tend to have higher rates of chronic illnesses like diabetes and hypertension, conditions that some research has shown digital technology can help address. In 2009, *AHRQ National Healthcare Disparities Report* documented persistent health care disparities in quality and access [3]. The report also documented that these disparities varied in magnitude and pattern within minority subpopulations. The causes of these health care disparities are varied and multidimensional. These include patients having difficulty navigating the health care system; doctor-patient communication difficulties due to language barriers or cultural beliefs; provider stereotyping of patients; patient mistrust of providers; family structure impacting patients’ ability or desire to seek health care services; and beliefs about benefits of alternative or folk medicine that differ across racial and ethnic groups and impact upon health care utilization [1, 4]. Quality improvement (QI) has been proposed as an important strategy to reduce or eliminate health care disparities [5, 6]. Disparities in health care outcomes are also well documented to be influenced by social determinants of health. Examples of these determinants include income, age, gender, English proficiency, zip code,

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This article is part of the Topical Collection on *Psychiatry in the Digital Age*

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and race. They effect many aspects of health, from birth outcomes [7••] to the risk of developing diabetes [8•].

Health Information Technology (HIT) offers a potential to expand access to healthcare, enhance clinical outcomes, and improve quality of health care [9–11]. However, because of these long-standing financial, social, and other socioeconomic disparities, the promise and potential that HIT offers has not been materialized and there continues to exist a “digital divide,” in which technology and internet utilization patterns differ by race/ethnicity and socioeconomic lines.

It was thought that health information technology might do much to alleviate inequitable health outcomes caused by these determinants. Telehealth and patient portals, for instance, offer seemingly quick and available means of accessing the health care system. However, poor relative health outcomes due to social determinants persist in spite of implementation of new technologies; sometimes, they are even worsened by them. The COVID-19 pandemic is demonstrating the interconnected nature of the challenges we face and is emphasizing how digital technology is central to almost every aspect of the response to the pandemic, including providing acute care via telemedicine; remote monitoring of chronic diseases; vaccine research; online learning; and tools that are enabling hundreds of millions of people to work and study from home. Here is how UN Secretary-General António Guterres’ summarized this in his remarks in a virtual high-level meeting in New York [12]:

“the digital divide is now a matter of life and death for people who are unable to access essential health-care information. It is threatening to become the new face of inequality, reinforcing the social and economic disadvantages suffered by women and girls, people with disabilities and minorities of all kinds.”

There has been an acceleration of HIT implementation in the United States, with health care reform legislation including multiple provisions for collecting and using health information to improve and monitor quality and efficiency in health care. Despite an uneven and generally low level of implementation, research has demonstrated that HIT has the potential to improve quality of care and patient safety. If carefully designed and implemented, HIT also has the potential to eliminate many disparities. Telehealth in particular is a good example of a technology with great promise that also has a susceptibility to contributing to the digital divide. It has been invaluable for allowing patient visits in the time of the COVID-19 pandemic; it enables full visits and quick check-ins with patients to occur while also following social distancing guidelines.

Telehealth’s value is also apparent regardless of a pandemic. For example, brief telemedicine check-ins by nurses have been strongly associated with improved medication adherence in patients with schizophrenia and bipolar disorder [13•].

Telepsychiatry visits for managing PTSD have also been identified as equally as effective as face-to-face visits [14•]. Satisfaction rates and doctor-patient relationship quality also remained high despite the lack of in-person contact [14•].

Telehealth has thus been proven to augment or improve care in certain scenarios, and it has other advantages for patients as well. It removes the barrier of lack of transportation and enables access to providers that may be normally geographically distant. Those are tremendous barriers to access that seemingly vanish with telehealth. Telehealth also provides expediency for those without physical access issues who instead have time constraints.

How could that possibly be anything but helpful for our marginalized low income/rural patients who are disproportionately affected by these access issues? Telehealth and other health information technologies require adequate internet access, sufficient devices, and a private space to have discussions with providers. They also require a certain level of health and digital literacy in order to be utilized well. This is a concern for mental health patients especially, who have been shown to have generally lower levels of health literacy [15••].

Furthermore, it is a worry that perhaps patients without the aforementioned access issues will preferentially schedule these telehealth appointments, reducing the number of appointments available for others.

The COVID-19 pandemic has caused a rapid expansion of telehealth services. These implementations, effected by policy and infrastructure created during the pandemic, will likely persist to a degree after the pandemic. It is therefore important to understand which groups will be most negatively affected by these changes and why it is they are negatively affected in the first place.

## Potential Causes of Digital Divide

Several factors have been reported to contribute to the digital divide. These include poverty, low literacy, lack of interest or motivation to use technology, and lack of access to technology. These issues are present in all nations, making the digital divide a global issue. Lack of access to technology occurs due to cost of technology, insufficient broadband access, worse access for the disabled, and the use of lower performing devices (such as computers or tablets). A 2016 study reported that compared to 2011 there has been a reduction in this digital exclusion. However, the same study also reported that older individuals with more chronic conditions (eg, psychosis) had higher rates of digital exclusion [16•].

In addition, low income, female sex, and being black all correlated with decreased probability of completing a telehealth visit [17••]. It is possible that the very same barriers that would prevent a patient from completing an in-person visit are at play here. For example, female patients may be

burdened by childcare and so are unable to make an in-person or telehealth visit. While low-income patients may not have the same issues with transportation to an appointment, they may have access issues in the form of no internet access or inadequate internet access.

Promisingly, as of year-end of 2016, a 2018 FCC report indicated that 92.3% of Americans had access to broadband internet at speeds of 25mbps/3mbps [18•]. This 25mbps/3mbps speed is the speed the FCC has deemed necessary for advanced telecommunication capabilities. Larger homes and people with higher internet utilization require faster speeds for efficient use. At a minimum, that means that about 24 million Americans at the time of the report did not have adequate internet for utilizing services like video telehealth. Rural areas, tribal lands, and areas with higher levels of poverty were disproportionately affected [18•].

People below the \$30,000 threshold are also more likely to be reliant on a smart phone, as opposed to a tablet or laptop, for internet usage [19•]. One report suggests that about 25% of people below that income threshold are “smart-phone dependent” when it comes to utilizing the internet, meaning they have to use the LTE services on their smart phone to access the internet [19•].

The internet availability and smart phone availability in America are encouraging, but they can be misleading. Anyone who has tried to FaceTime via phone with a loved one using just LTE has experienced the frustrations that come with poor connectivity. Anyone who has roommates who use more than their fair share of bandwidth understands the minimum recommended internet package might not be enough to handle web-based tasks in an expedient manner. These frustrations and impediments are magnified when we apply them to health care visits that are already filled with anxiety, confusion, and a desire for clear communication from health care providers.

Quality of device and connection matters. A psychiatric interview, for example, is heavily reliant on good interpersonal communication. Freezing of the video or audio capability might cause misunderstandings when a mental status examination is crucial to understanding the patient’s condition. It could likewise be unnerving for the patient to have to repeat accounts of traumatic events, or to say twice something they spent all day mustering the courage to say once. This issue is hardly limited to psychiatry. Take for example the evaluation of dermatological conditions, which requires high quality video conferencing for diagnosing lesions [20•].

Even with access to the appropriate tools, the tools themselves may have inherent racial bias. For example, it was discovered that the algorithm for calculating estimated glomerular filtration rate from serum creatinine (eGFRcr) may factor race in an inappropriate manner [21••]. By entering patient’s race as “black”, the current calculator used by many physicians will overestimate eGFRcr relative to a white patient. This can be an issue because it might artificially show a

black persons kidney function to be healthier than it actually is, delaying treatment, referrals, and insurance coverage [21••]. Other computer algorithms used to aide in diagnosis of certain illnesses are also susceptible to biases. Agostina and colleagues make the case that databases that are skewed toward one gender significantly over another are worse at diagnosing disease in the under represented population [22•]. Of note, per the study, “diverse (and balanced) dataset(s) achieved the best performance for both genders” [22•]. It is therefore important to make sure that databases used to inform computer algorithms have enough data points to not be exclusive of populations. Computer algorithms at present are only as good as their inputs, and being aware of this fact could protect under represented populations from bias by these algorithms.

In the field of mental health, Google presents an interesting case study in this regard. Google developed a “Suicide-Prevention Result”, or SPR, that is triggered by keywords related to suicide such that the top result of such a search will provide telephone numbers for a preventative hotline [23•]. This adaptation, by Google’s accounting, led to about a 9% increase in utilization of the suicide prevention hotline in the USA [23•]. While Google’s efforts here are admirable, Scherr and colleagues found it may inadvertently have contributed to the digital divide. Depending on what country the search was performed in, and what language was used for the query within that country, the SPR appeared less frequently or sometimes not at all [23•]. While the tool was beneficial on the whole, it seemingly left something to be desired for in terms of equity.

Some of these difficulties with telehealth are intuitive, but some are not so intuitive. Likewise, the solutions to them can be simple or challenging. Many of these difficulties and solutions alike can be expanded and applied to health information technologies broadly.

## HIT Interventions to Address Digital Divide

The 2016 AHRQ systematic review of effective interventions to reduce disparities in patients with Severe Mental Illness (SMI) found that interventions largely target disparities among individuals with major depression, bipolar disorder, schizophrenia, personality disorders, and severe anxiety disorders [24]. Several root causes for disparities, as identified above, can be amenable to HIT interventions, particularly innovations in electronic health records, as well as strategies for chronic disease management. Recommendations regarding health care system, provider, and patient factors can help health care organizations address disparities as they adopt, expand, and tailor their HIT systems.

Telehealth provides a good subject for examination when it comes to causes of the digital divide. Telehealth is also a useful subject for appraisal when it comes to solutions to the digital

divide. Some of these solutions are telehealth specific, but others can be broadly applied. For example, until Covid-19, reimbursement has only been provided for the live, interactive, videoconferencing (and not for the phone visits); temporary regulatory updates improved reimbursement for telephone calls [17]. As previously mentioned, the technology needed for video visits can be beyond the grasp of some. Reimbursing similarly for both incentivizes seeing patients despite their internet and device capabilities. At the very least, it does not penalize providers for making sure their patients receive some form of care. However, it should be noted there are drawbacks to this approach. The efficacy and quality of telephone visits versus video visits may be different. Virtual visits via video already sacrifice elements of human interaction, and even more of that interaction is forfeited by telephone-only visits. Ensuring some form of communication seems like the better option during the Covid-19 pandemic, but it is yet unclear if that policy should persist beyond the pandemic.

Other solutions for addressing the digital divide can be applied more broadly. For example, one study focused primarily on “suboptimal” usage of patient portals [25•]. The primary solutions they proposed included improving institutional buy in, providing information technology support, and marketing aggressively [25•]. Improving institutional buy-in and providing IT support involve health systems building sufficient foundations of HIT at an organizational level. Ensuring equipment and staff are in place, along with clear operating procedures and guidelines, helps patients feel more comfortable working with said technology. Marketing aggressively makes sure they utilize these capabilities by increasing familiarity and comfort level.

These ideas can readily be applied to other health information technologies such as telehealth. For example, if an organization wanted to use more telehealth capabilities, they should have private, HIPAA-compliant, video conferencing platforms. Dedicated IT staff would need to be available to acquaint providers and patients alike with the technology so that there are less “hiccups” when it is time for a patient encounter.

Further research on electronic health (e-health) literacy and e-health interventions is also a possible avenue for battling the Digital Divide [26•]. Current e-health literacy assessments and interventions have not been widely implemented and so evidence on either is thus far inconclusive [26•]. Simple ways of improving literacy involve distribution of educational materials so that patients understand how to access certain technologies and so that they can interpret the information those technologies provide.

Lopez et al. have identified several recommendations relevant to health care system, including, (1) automating and standardizing the collection of race, ethnicity, and language data, (2) prioritizing the use of the data for identifying disparities and tailoring improvement efforts, (3) focusing HIT efforts to address fragmented care delivery for racial/ethnic minorities

and limited-English-proficiency patients, (4) developing focused computerized clinical decision support systems for clinical areas with significant disparities, and (5) including input from racial/ethnic minorities and those with limited English proficiency in developing patient HIT tools to address the digital divide [27].

Among the simplest ways to improve the digital divide is better training for future practitioners so that they can ensure they wield HIT in a way that is equitable and efficacious. Some training for future psychiatrists should thus be geared toward teaching interpersonal skills to help “decrease the interpersonal distance” that telepsychiatry visits impart [28•]. Telehealth specific training for ancillary staff might also prove useful.

Hopefully, some HIT will work so well that it does not contribute to the digital divide. For example, the FDA recently approved a smart phone application intended to provide CBT for patients with substance use disorder [28•]. Similar technologies that only increase touch points between patients and the health care system may have few downsides when their role is only supplementary. Technology like AI that improves decision making capabilities of physicians will also be a rising tide that lifts all boats [28•].

## Conclusions

The same social determinants that we have always known affect health outcomes similarly affect the use and implementation of HIT. Poor digital/health literacy, internet access issues, lack of IT assistance, and wariness of new technologies seem to be the main culprits contributing to the digital divide. However, each specific technology has its own set of unique implementation issues.

Solutions to these issues thus come in broad-stroke form but also require technology-specific action. The broad stroke solutions include advocating for improved internet access, providing IT support, advertising technologies to patients, and educating patients on the benefits of these technologies. We can also continue to perform research on things like patient portal utilization and telehealth so that we can ensure they remain useful diagnostic and treatment facilitators. Research on efficacy is especially important so that we can recognize which illnesses can be dealt with in the digital world and which need in-person interaction.

Some things are beyond the scope of health care providers. We are not poised as a group to improve internet access for America, but we can continue to advocate for it and explain its necessity.

Of course, many challenges and solutions in the HIT realm have yet to be identified. The only certainty is that these HIT advancements will continue to occur and become more integrated into the fabric of how we manage patient care because of the ways they vastly improve that care. Hopefully some of



these technologies, like AI and simple smart phone applications, are so “disruptive” that they do nothing but improve healthcare. However, as we continue to advance technologically, as it behooves us to do, we must always remember to be as conscientious of the disadvantages of these technologies as we are of the advantages; we must remember not to leave people behind.

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