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A Process for Developing a Telehealth Equity Dashboard at a Large Academic Health System Serving Diverse Populations

Helen K. Hughes, MD, MPH

Brian W. Hasselfeld, MD

Lisa A. Cooper, MD, MPH

Rachel L. J. Thornton, MD, PhD

Yvonne Commodore-Mensah, PhD, MHS, RN

Abstract: Johns Hopkins Medicine (JHM) rapidly implemented telehealth system-wide as part of its COVID-19 pandemic response. In a four-month period (January–May, 2020), video visits across the system increased more than 1,000-fold (from approximately 80 to 80,000 per month). For vulnerable populations, telehealth may reduce or exacerbate disparities in access to and quality of care. To enhance equity in telehealth access, we must assess, in the moment, how system-wide digital health strategies affect vulnerable populations. In this commentary, we describe how we are developing a telehealth equity dashboard and our plans to apply the data for system-wide improvement in telehealth access. We describe key elements of this process including the composition of the team involved in dashboard creation, how a telehealth impact assessment tool can be used to determine which measures to track, and how dashboard data will inform action across the system to advance equity in telehealth.

Key words: Telemedicine, telehealth, health equity, health care disparities, data analytics.

The COVID-19 pandemic has completely restructured the digital health care delivery landscape across the United States. Like other health care delivery systems, Johns Hopkins Medicine (JHM) transitioned from mostly in person, face-to-face visits

HELEN K. HUGHES is affiliated with the Department of Pediatrics and the Office of Telemedicine at The Johns Hopkins University School of Medicine. **BRIAN W. HASSELFELD** is affiliated with the Department of Medicine, the Department of Pediatrics, the Office of Telemedicine, and Johns Hopkins Community Physicians at The Johns Hopkins University School of Medicine and the Johns Hopkins Health Systems. **LISA A. COOPER** is affiliated with the Department of Medicine at The Johns Hopkins University School of Medicine and the Johns Hopkins Center for Health Equity at The Johns Hopkins University. **RACHEL L. J. THORNTON** is affiliated with the Department of Pediatrics at The Johns Hopkins University School of Medicine, the Department of Health, Behavior, and Society at the Johns Hopkins Bloomberg School of Public Health, and the Johns Hopkins Center for Health Equity at The Johns Hopkins University. **YVONNE COMMODORE-MENSAH** is affiliated with the Johns Hopkins Center for Health Equity at The Johns Hopkins University and The Johns Hopkins University School of Nursing. Please address all correspondence to Helen K Hughes, Division of General Pediatrics, Rubenstein Child Health Building, 200 N Wolfe Street, Room 2053, Baltimore, MD 21287; email: hkinsma1@jh.edu, phone: (410)-502-8332.

to a large volume of synchronous telehealth visits to reduce the risk of transmission of COVID-19. Comparing January with May 2020, there was a 1,000-fold increase in synchronous telehealth visits per month across the system (from approximately 80 telehealth visits in January to more than 80,000 in May). Prior to the pandemic, digital health tools, including telehealth, were seen by many nationally as promising for increasing access to care and improving health outcomes for populations of vulnerable patients.¹ However, if patient-level barriers such as broadband access and digital literacy are not addressed in the setting of rapid deployment during the pandemic, differential access to telehealth will likely exacerbate rather than improve disparities in outcomes.

Static performance monitoring systems have limited usefulness in health care where decisions must be made frequently to ensure the delivery of safe and high-quality health care. An ongoing, system-wide assessment describing how telehealth strategies may be affecting different patient populations in disparate ways is necessary. In health care, analytics dashboards are tools used to visualize key performance and operational measures easily and dynamically. Often dashboards are created using interactive data visualization software. Dashboards enable leaders to access important statistics on demand to facilitate informed decision-making. In this commentary, we describe how we are responding to this institutional imperative by developing a *JHM Telehealth Equity Dashboard* and using our findings to propel system-wide improvement in telehealth access.

Telehealth Transformation at Johns Hopkins

The Johns Hopkins University School of Medicine and The Johns Hopkins Health System aim to improve the health of the community and the world by setting the standard of excellence in medical education, research, and clinical care. The hospital was founded to be one of the highest quality in the world and also to serve the local community.^{2,3}

In mid-March of 2020, the national health care landscape rapidly evolved in response to COVID-19. Almost overnight, it became possible to provide—and be reimbursed for—care provided to families in the comfort of their own homes across all payors. Before the pandemic, Medicare and most state Medicaid programs only covered synchronous telehealth visits when patients were located in specific sites (e.g., federally qualified health centers, private practices, and hospital facilities) and Medicare also generally restricted coverage to patients located in geographic health professional shortage areas (HPSAs).^{4,5} In March 2020, the Centers for Medicare & Medicaid Services (CMS) and the U.S. Department of Health and Human Services (HHS) instituted some temporary measures and waivers linked to the federal Public Health Emergency declaration, which significantly expanded telehealth services.^{6,7} Most states, including Maryland, issued similar measures for Medicaid through state-wide Executive Orders.⁸ Together, these changes enabled a patient's home to be an approved location for a telehealth visit, for additional provider types to participate in telehealth (e.g., physical therapists), and for providers to use various video conferencing platforms due to Health Insurance Portability and Accountability Act (HIPAA) flexibility.

For many vulnerable populations served by JHM, relaxation of federal privacy regulations and expansion of payment policies broadened access to telehealth services and potentially reduced barriers to care such as transportation and childcare needs.

Since the start of the pandemic, telehealth has become a tool to provide care for many different patient populations. Since March 2020, JHM providers have conducted over 650,000 telehealth visits, which represents approximately 23% of total ambulatory care. Of these visits, approximately 18% were with Medicaid-enrolled patients, and over 25% were with patients over age 65 (for comparison, among JHM in-person ambulatory visits in 2019, 20% were with Medicaid-enrolled patients and 32% were with patients over age 65).

Despite enhanced access to telehealth for publicly insured patients compared with before the pandemic, there is a concern that there are sub-populations who cannot easily participate in care via telehealth. Although Johns Hopkins telehealth visits are most easily accessed through our electronic health record patient portal (MyChart), only 50% of our patients were actively enrolled in this service at the start of the pandemic and the portal is currently only available in English and Spanish. Telehealth is intended to improve access to care and reduce the risk of exposure to COVID-19. Yet, it has the potential to exacerbate health disparities disfavoring vulnerable populations, including patients with poor health or digital literacy, patients with limited English language proficiency, and patients with limited access to smartphones, computers, and Internet access.

Johns Hopkins Medicine currently uses the following digital tools for delivery of telehealth: 1) electronic health record (EHR) patient portal (Epic MyChart); 2) EHR-embedded video visit platform; 3) ability to text or email video visit links directly to patients who do not have MyChart access; 4) an additional video visit platform that can be used if the patient or provider experiences difficulty with the EHR-embedded version. Interpreters can join telemedicine on our EHR-embedded platform. Outside of these approved pathways, providers currently have the flexibility to use additional video platforms due to the HIPAA non-enforcement waiver.⁷

The Digital Divide and Telehealth

The “digital divide,” defined as the economic, educational, and social inequalities between those who have computers and online access and those who do not,⁹ is a persistent threat to achieving equity in telehealth access. Disparities in broadband access mirror health disparities in the U.S. where racial and ethnic minorities and low-income people have less access to broadband.^{10,11} Although 30% of households in the U.S. lack broadband access, 59% of homes with a household income below \$20,000, 46% of African American households, 50% of Hispanic/Latinx households, and 55% of older adults lack Internet access.¹² These vulnerable populations have also been hardest hit by the COVID-19 pandemic.^{13,14} Given the higher morbidity and mortality from COVID-19 and baseline chronic conditions among racial/ethnic minorities, understanding and addressing the digital divide is paramount.

In Baltimore City, 31.5% of households lack a computer (compared with 22.5% nationally), 40.7% lack broadband Internet (compared with 30.4% nationally), and most low-income residents rely on their mobile phones for Internet access. Notably, 62.4% of Baltimore City residents are Black/African American.¹⁵ Baltimore City has a growing Latino population, with 5.7% of the population identifying as Hispanic or

Latino.¹⁶ Additionally, 37% of Latinos in Baltimore City who are five years or older speak mostly Spanish at home while 41% speak Spanish and are also proficient in English.¹⁷

As the COVID-19 pandemic thrust JHM and its providers into using telehealth for care delivery, the rapid implementation did not permit adequate assessment of patient-level barriers (e.g., broadband Internet access, digital literacy) or system-level barriers (e.g., inadequate support services to enroll patients in MyChart), nor did it permit time to prepare a comprehensive plan to address these barriers. A *JHM Telehealth Equity Dashboard* will allow JHM to assess the impact of the rapid implementation of telehealth, identify ways to mitigate the negative impacts, monitor access to telehealth across clinical settings within our institution, and disseminate data to the relevant stakeholders to inform strategies aimed at optimizing access to telehealth and advancing telehealth equity.

An Overarching Framework: Telehealth Equity Impact Assessment (TEIA) Tool

We are using a Telehealth Equity Impact Assessment (TEIA) Tool (Box 1), which our team has adapted from the Health Equity Impact Assessment (HEIA) Tool¹⁸ to inform the development of the *JHM Telehealth Equity Dashboard*. The original HEIA tool is a flexible and practical assessment tool that can be used to identify unintended potential impacts (positive or negative) of a policy, program, or initiative on vulnerable or marginalized groups.¹⁸ The HEIA tool is accompanied by a workbook that describes how to implement the tool.¹⁸ The HEIA tool was developed by the Ontario Ministry of Health in collaboration with other public health agencies in Ontario, Canada after an extensive literature review, interjurisdictional scanning, and conduct of key informant interviews.¹⁸ The purpose of this tool is to reduce disparities that stem from barriers in access to health services and to enhance positive health outcomes by identification and mitigation of the *unintended* impacts of a program or initiative. Although the tool may be applied during the pre-implementation phase of an initiative, it is also intended to be used retrospectively to review and evaluate decisions related to expansion, realignment, or closure of services or programs. Thus, this tool is well-suited for the comprehensive assessment of JHM's recent rapid telehealth expansion. We evaluated components of the HEIA tool that were relevant to telehealth and adapted the tool to the U.S. context. For instance, we removed references to Aboriginal peoples and Francophone communities and included Payor (e.g., private, Medicaid) and immigrant communities as additional vulnerable populations.

Process of Telehealth Equity Dashboard Development

Identify telehealth equity team members. The first stage in dashboard development has been to identify the relevant team members at our institution who have the expertise and operational skillset to create a meaningful and useful product. Our team has included members of the JHM Office of Telemedicine team, research experts from the Johns Hopkins Center for Health Equity, technical experts from JH Health Information Technology, and members of the Office of Johns Hopkins Physician's Decision Support

Box 1.

TELEHEALTH EQUITY IMPACT ASSESSMENT (TEIA) TOOL TEMPLATE*

Step 1. SCOPING		Step 2. POTENTIAL IMPACTS			Step 3. MITIGATION	Step 4. MONITORING	Step 5. DISSEMINATION
	b) Determinants of Health: Identify determinants of telehealth disparities	Unintended Positive Impacts	Unintended Negative Impacts	More Information Needed	Identify ways to reduce potential negative impacts and amplify the positive impacts	Identify ways to measure success for each mitigation strategy identified	Identify ways to share results and recommendations to address telehealth equity
a) Populations*							
Age-related groups (e.g., children, youth, seniors, etc.)							
Disability (e.g., physical, hearing, visual)							
Ethnic minority groups (e.g., Hispanic/Latino)							
Ethno-racial communities (e.g., racial/racialized or cultural minorities, immigrants and refugees)							
Immigrant communities (U.S.-born vs. foreign-born)							
Inner-urban populations (e.g., socio-economically deprived neighborhoods)							

(continued on p. 203)

Box 1. (continued)

Step 1. SCOPING		Step 2. POTENTIAL IMPACTS			Step 3. MITIGATION	Step 4. MONITORING	Step 5. DISSEMINATION
	b) Determinants of Health: Identify determinants of telehealth disparities	Unintended Positive Impacts	Unintended Negative Impacts	More Information Needed	Identify ways to reduce potential negative impacts and amplify the positive impacts	Identify ways to measure success for each mitigation strategy identified	Identify ways to share results and recommendations to address telehealth equity
a) Populations*							
	Linguistic communities (e.g., non-English speakers, low literacy, low numeracy)						
	Low-income populations (e.g., Medicaid insurance)						
	Payor (e.g., Private, Medicaid)						
	Racial minority groups (e.g., African Americans, Asian Americans)						
	Sex (e.g., men, women, other)						
	Sexual orientation, (e.g., lesbian, gay, bisexual)						

Note:

*Adapted from the Health Equity Impact Assessment Tool¹⁸

and Analytics Team. We have also received early input from key institutional leaders whose expertise has informed initial stages of dashboard development.

The Office of Telemedicine manages the coordination and strategic deployment of all Johns Hopkins Medicine programs that deliver clinical services using electronic communications and technology. The Johns Hopkins Center for Health Equity seeks to advance effective health system and community practices and policies that will achieve health equity in the U.S. through promoting scientific knowledge, educating and training scholars, engaging and working with communities, raising public awareness of health inequities, and advocating for changes in clinical practice and policy. Johns Hopkins IT staff within the JHM Office of Telemedicine are experts in data availability within the EHR.

The Lead Business Intelligence Analyst and Director of Decision Support and Analytics for the Office of Johns Hopkins Physicians have provided expertise related to health care analytics and dashboard visualization. These team members create analytics dashboards using an interactive data visualization software platform (Tableau).¹⁹ The platform enables dynamic data visualizations that are updated immediately based on data pulled daily from an EHR data warehouse. This platform is available to all JHM community members for local clinical, operational, and quality optimization.

We have also consulted with leaders in quality and safety who have employed equity-related dashboarding in system-wide efforts for ambulatory primary care outcomes. The core team set regular biweekly meetings beginning summer of 2020 to develop a dashboard creation plan.

Identify a shared vision for telehealth equity. The *JHM Telehealth Equity Dashboard* will allow our institution to retrospectively and prospectively assess disparities in telehealth access and quality across various strata and enable us to implement solutions to achieve health equity. Our goal is to ensure that all patients, regardless of economic, demographic, geographic, or other stratification, have access to high-quality and timely telehealth to attain their full health potential. The vision is aligned with JHM's Strategic Plan as well as the American Telemedicine Association Policy Principle of "expanding access for underserved and at-risk populations."²⁰ The objective of using the TEIA tool is to determine opportunities to enhance equity in access to telehealth among vulnerable populations and create a telehealth equity dashboard to monitor and address access to telehealth across JHM.

Create draft structure of Telehealth Equity Dashboard. The team members described above will use the TEIA Tool (Box 1) to inform the creation of the *JHM Telehealth Equity Dashboard*. A *JHM Telehealth Equity Dashboard* will allow health care providers and administrators to monitor telehealth access across JHM practices, within a single frame of view, and across populations specified in the TEIA Tool. The dashboard will create JHM situational awareness and provide opportunities for intervention.

In Step 1 (Scoping), we are identifying the relevant populations within our health system, including racial and ethnic minority groups, age-related groups, disability groups, linguistic communities, low-income populations, and neighborhoods with higher deprivation, among others. We are also identifying the relevant determinants of health that apply to the respective populations. Based on data availability and our local clinical populations, we will prioritize preferred language, race/ethnicity, age, payor, and ZIP code in our initial dashboard. In Step 2 (Potential Impacts), we are examining the

unintended positive and negative impacts of telehealth expansion and identifying areas where more information is needed. In Step 3 (Mitigation), we are identifying ways to reduce the negative impacts and amplify the positive impacts of telehealth expansion. In Step 4 (Monitoring), we are identifying ways to measure success for each mitigation strategy identified and to regularly monitor our progress towards our goals. In Step 5 (Dissemination), we are identifying ways to share results and recommendations to address telehealth equity both within our institution and nationally.

Our *JHM Telehealth Equity Dashboard* will track the following telehealth measures; patient portal (MyChart) access and use, telemedicine modality (video, phone); provider specialty, and location. We will examine these measures stratified by the vulnerable populations identified through the TEIA tool (Box 1) based on the data available through our EHR. After completing the TEIA tool, we will work with our IT and analytics teams to visualize the data in real-time using Tableau.¹⁹

Box 2 provides an example application of the TEIA Tool to address disparities in telehealth access patients with limited English proficiency. This process was guided by use of the HEIA workbook.¹⁸ Figure 1A shows the percent of total telehealth visits conducted by either video or phone, stratified by patient preferred language in May 2020. These are preliminary data collected from our institution from the early phase of the pandemic. With the data visualized in this manner, it is evident that patients whose preferred language is English had the lowest rates of phone visits (19%) while Spanish-speaking patients had the highest rate of phone visits at 40%. These data suggest a disparity with Spanish-speaking patients using video-based telehealth less frequently than other groups. Figure 1B shows telemedicine modality stratified by race for the same month, showing that patients self-identifying as American Indian/Alaska Native, Black/African American, and Other had higher rates of phone use than other populations. Further stratifying these data by clinic location or specialty could enable us to target support to sites that are experiencing challenges with delivering video telemedicine services to populations of patients experiencing telehealth access disparities.

Solicit feedback from institutional stakeholders. As the *JHM Telehealth Equity Dashboard* is being developed, draft measures, outcomes, and plans for visualization will be reviewed iteratively by institutional stakeholders, including leadership in ambulatory operations, quality and safety, health equity, community engagement, and patient and community advisory boards. We will solicit diverse stakeholder representation from across various sectors of our organization and provider types (including allied health providers such as pharmacists). We will use the advice of these groups to ensure that the dashboard is maximally effective and in sync with our institution's strategic plan.

Develop action plan informed by Telehealth Equity Dashboard. We will form a taskforce consisting of the stakeholders described above and senior leaders, key staff, and patient and community representatives across JHM with expertise in quality and safety, digital and telehealth, clinical operations and finance, information technology, and health equity. The taskforce will review and synthesize findings of the *JHM Telehealth Equity Dashboard*, produce recommendations for improvements in access to telehealth, and lead efforts to execute improvement initiatives derived from taskforce recommendations. To ensure impact and sustainability, the taskforce will start by developing a small number of Specific, Measurable, Attainable, Realistic, and Time-bound (SMART²¹) aims to target improvements in identified disparities based on pilot

Box 2.**EXAMPLE APPLICATION OF TEIA TOOL TO ADDRESS TELEHEALTH EQUITY IN PATIENTS WITH LIMITED ENGLISH PROFICIENCY (LEP)***Step 1: Scoping*

- Identify linguistic communities (e.g. Spanish-speaking patients) that may be impacted by telehealth expansion
- Gather evidence on disparities in telehealth access across linguistic groups from existing organizational data
- Solicit feedback from patients and families from different linguistic communities
- Analyze data and identify disparities
- Identify determinants of telehealth access such as device/internet access, digital literacy, ease of scheduling, lack of instructions in preferred language

Step 2: Potential Impacts

- An unintended potential positive impact of telehealth expansion for patients with LEP is for caregivers or family members who are English-speaking to participate in telehealth visits
- An unintended potential positive impact of telehealth expansion is the availability of remote translation services embedded into the EHR platform
- An unintended potential negative impact of telehealth expansion for patients with LEP is that they may have difficulty navigating new technologies that are accompanied by instructions in English
- Need to collect more information to understand disparities in device and broadband access across linguistic communities

Step 3: Mitigation

- Invest in readily available remote interpretation services and embed seamlessly into telehealth visit workflows
- Invest in non-English language instructional videos and written materials
- Invest in improved telehealth visit support workflows, including assistance with patient portal access for patients with LEP
- Explore standardizing workflows related to visits support across practices, especially those serving populations with LEP
- Continue to offer audio-only (phone) care and advocate for sustained coverage of these services
- Leverage patient and community advisory boards to solicit input into adaptation and modification of workflows for linguistic communities experiencing disparities
- Bring recommended mitigation strategies to telehealth equity taskforce for prioritization and development of action plan

Step 4: Monitoring

- Create baseline assessment with data visualization stratified by preferred language
(continued on p. 207)

Box 2. (*continued*)

- Develop a Specific, Measurable, Attainable, Realistic, and Time-bound (SMART) aim²¹ to reduce disparities (e.g. increase percent of telehealth visits conducted by video with JHM patients whose preferred language is not English by 10% in the next six months).
- Reanalyze data monthly and examine trends in disparities to understand impact of mitigation steps and progress towards aim

Step 5: Dissemination

- Generate reports describing monthly data trends and improvements for discussion at quarterly telehealth equity taskforce meetings
- Disseminate nationally through scientific conferences and manuscript submissions
- Present data at patient and community advisory group meetings and solicit feedback

dashboard data. The taskforce will meet quarterly to review dashboard and iteratively refine a telehealth equity action plan.

In addition to developing an institutional action plan, we will use the dashboard to facilitate local, state, and federal advocacy efforts. Preliminary dashboard data have already been used during the pandemic to support advocacy with state legislators and federal staff members with an emphasis on the importance of audio-only (phone) care as a point of access for vulnerable populations (e.g., the elderly).

Considerations for Low Resource Settings

This work is taking place in the context of a large academic health system serving diverse populations. Thus, our experience, resources, and infrastructure may not be generalizable to all settings. Our dashboard development experience relies on the availability of local expertise in various domains and IT and analytics infrastructure. However, we feel that the framework described above could be adapted for lower resource settings. For example, we are collaborating with our institution's Center for Health Equity. Institutions without existing health equity-focused centers could instead leverage national professional organizations (e.g., American Telemedicine Association,²² American Medical Association²³) as well as national resources for the promotion of equity in health care (e.g., The National Academies of Sciences Engineering and Medicine's report on Integrating Social Care into the Delivery of Health Care²⁴).

Although our institution has invested in a robust data visualization platform (Tableau), institutions with fewer data analytics resources may explore other methods of regularly visualizing stratified EHR data to assess disparities in access to telehealth among vulnerable populations identified in the TEIA tool (e.g., spreadsheets).

Conclusions. The COVID-19 pandemic has prompted an unprecedented rapid evolution in digital health care delivery. Although these changes have improved care access for some, concerns remain that vulnerable populations will face even greater gaps in access to high-quality telehealth care if their unique needs are not considered

Figure 1A. Example of data visualization of telehealth modality with stratification by preferred language

Note:
This figure visualizes the percent of total telehealth visits conducted by video (black) versus phone (gray), stratified by patient identified preferred language. These data are from May 2020 across Johns Hopkins Medicine ambulatory sites.

Figure 1B. Example of data visualization of telehealth modality with stratification by patient race

Note:
This figure visualizes the percent of total telehealth visits conducted by video (black) versus phone (gray), stratified by patient race. These data are from May 2020 across Johns Hopkins Medicine ambulatory sites.

and measures are not implemented to reduce known disparities. We have outlined our process for the development of a *JHM Telehealth Equity Dashboard* and an action plan. The process outlined here, including the use of the Telehealth Equity Impact Assessment Tool, can be adapted for various care delivery settings to address the needs of local populations experiencing disparities. Many have proposed that the rapid changes we have experience related to telehealth are here to stay.²⁵ Although there are benefits to these changes, we must act quickly to ensure that the most vulnerable and underserved groups are not left behind in this unprecedented telehealth revolution.

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