PERSPECTIVE

Access to What for Whom? How Care Delivery Innovations Impact Health Equity

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Achieving health equity (where every person has the opportunity to attain their full health potential) requires the removal of obstacles to health, including barriers to high-quality medical care. Innovations in service delivery can inadvertently maintain, worsen, or introduce inequities. As such, implementation of innovations must be accompanied by a dual commitment to evaluate impact on marginalized groups and to restructure systems that obstruct people from health and healthcare. Understanding the impact innovations have on access to high-quality care is central to this effort. In this Perspective, we join conceptual models of healthcare access and quality with health equity frameworks to conceptualize healthcare receipt as a series of interactions between people and systems unfolding over time. This synthesized model is applied to illustrate the effects of telemedicine on patient, population, and system outcomes. Telemedicine may improve or worsen health equity by altering access to care and by altering quality of care once it is accessed. Teasing out these varied effects is complex and requires considering multilevel influences on the outcome of a care-seeking episode. This synthesized model can be used to inform research, practice, and policy surrounding the equity implications of care delivery innovations more broadly.

H ealthcare institutions rapidly implemented care delivery innovations to manage the risks presented by the coronavirus disease 2019 (COVID-19) pandemic. Among the most widespread was a marked increase in the use of telemedicine, which is the practice of medicine using technology to delivery care at a distance. The rapid increased use drew attention to the risks and benefits of this approach.[1] Telemedicine has the potential to improve access for populations historically excluded from high-quality healthcare, but attention must be paid to the context in which it is implemented such that it does not worsen health disparities by exacerbating inequities in access or by introducing inequities in quality.[2–4]

Anticipating and managing these trade-offs requires an understanding of access as a series of interactions between people and care delivery systems embedded within larger sociopolitical structures that disproportionately oppress certain populations.[5] In this Perspective, we describe a synthesized conceptual model of healthcare access that joins Levesque's Conceptual Framework for Healthcare Access[6] with a model from systems engineering (Systems Engineering Initiative for Patient Safety [SEIPS])[7,8] and anti-oppression frameworks (Public Health Critical Race Praxis and the Remove, Repair, Remediate, Restructure and Provide [R4P] Framework).[9–11] Because these frameworks address concepts that are intimately related (access, patient safety and quality, health equity), they cannot be considered in isolation, yet their connections have not been explicitly articulated. We apply the synthesized model to key questions about the use of telemedicine during the COVID-19 pandemic to demonstrate how the model can be used to (1) critically assess the impact of innovations on the provision of equitable care and (2) inform actions to repair, restructure, remediate, and remove systems of oppression to achieve health equity.[9]

IN WHAT CONTEXTS AND FOR WHICH PEOPLE DO INNOVATIONS IMPROVE ACCESS AND OUTCOMES?

Innovative technologies may obscure, deepen, and facilitate oppression against historically marginalized communities.[12] Technology is not neutral. Its creation is shaped by those with power in ways that explicitly and implicitly reproduce inequity.[13,14] For example, the implementation of telemedicine is often shaped by paternalistic expectations of how people should engage in virtual care, including expectations of specific devices, unconstrained wireless connections, and comfort with technology.[15] The potential of telemedicine for good will

not be realized unless equity is centered throughout all phases of its design and implementation. By "centering equity," we mean a commitment to the systematic assessment of the way innovations create or exacerbate disparities coupled with targeted action to redress those disparities.

While increasing attention is paid to the equity implications of telemedicine, most discussions conceptualize the problem as a list of static characteristics of people, technologies, systems, and policy.[16–18] This approach does not fully represent *how* access via telemedicine unfolds over time. We envision access as the intersection of sociotechnical care delivery systems with people embedded in sociopolitical contexts (Fig. 1). In addition to depicting the inputs that lead to outcomes, our synthesized model embeds the responsibility that care delivery systems have to work to eliminate disparities instead of just documenting that they exist, as is called for in anti-oppression frameworks such as Public Health Critical Race Praxis and R4P.[9–11,19] These frameworks, developed by Black scholars

to interrogate the influence of racism on health, emphasize the importance of iterative approaches that actively counter health inequities through a combination of theory, experiential knowledge, rigorous methods, and practice.

HOW CAN WE VISUALIZE THE WAY PEOPLE INTERACT WITH SYSTEMS IN CONTEXT TO GENERATE OUTCOMES?

Our model first brings together Levesque's Framework for Healthcare Access,[6,20] and a model that elaborates the sociotechnical system factors that contribute to safety and quality.[7,8,21] The combination of these two approaches helps us visualize *how* care delivery system elements interact with people in context to generate outcomes. Then, we integrate health equity frameworks to make explicit the need for care delivery systems to act on knowledge of outcomes.[9,10]
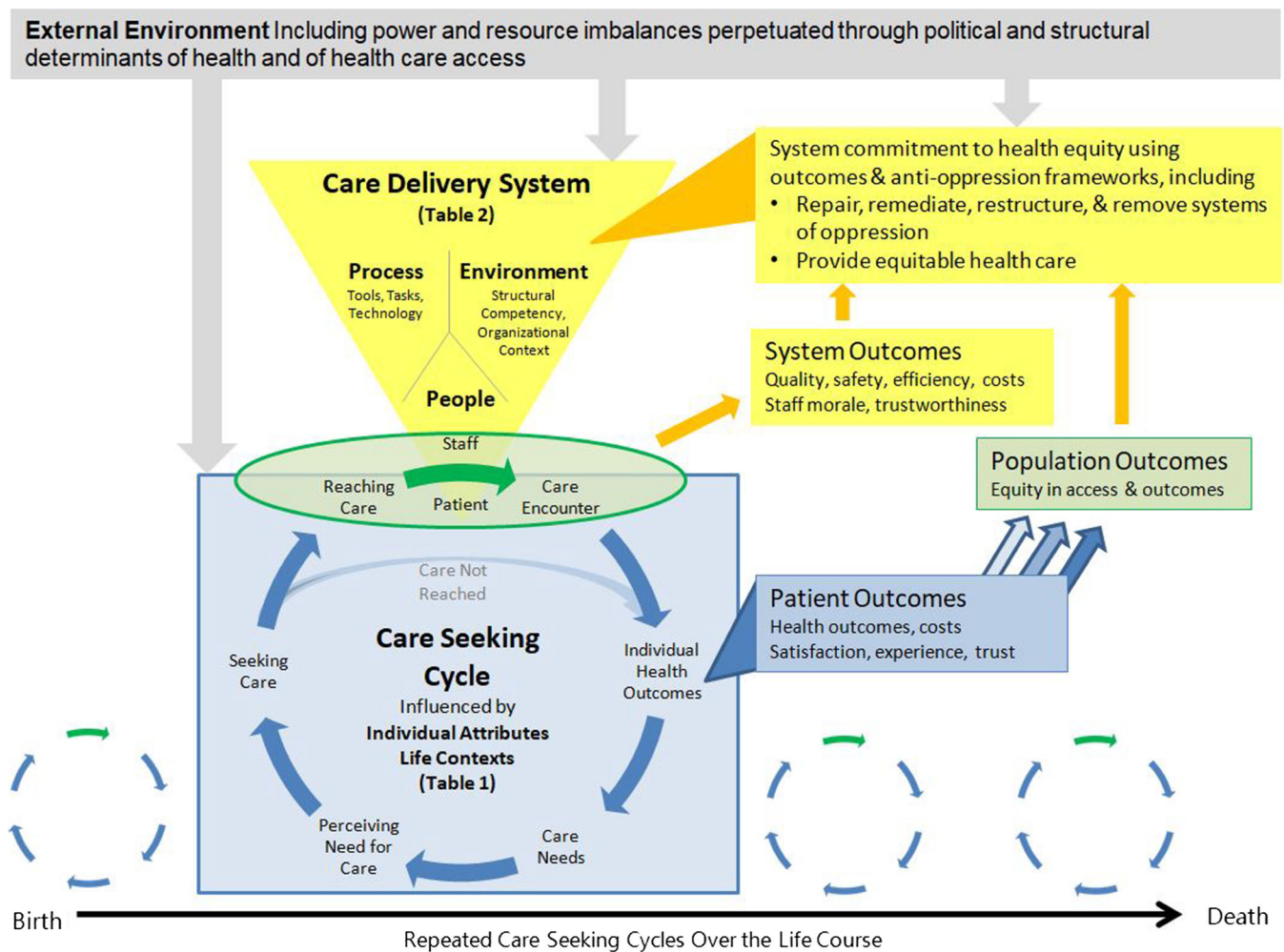
Figure 1 Process model of healthcare access, quality and equity. Legend: Model demonstrating the dynamic relationship of patient care seeking (blue square, including care seeking, care reaching, care encounters, and health outcomes), care delivery systems (yellow triangle, representing system people, processes, and environment), and patient outcomes over the life course. The model also illustrates how systemic commitment to anti-oppression frameworks such as R4P (represented via the yellow rectangles) informed by population outcomes can translate into care delivery system change, which in turn can impact health outcomes through increased care reaching and improved care encounter quality.

Levesque et al. define access as "the opportunity to identify healthcare needs, to seek healthcare services, to reach, to obtain or use healthcare services, and to actually have a need for services fulfilled."[6] They describe five system dimensions of accessibility (approachability, acceptability, availability and accommodation, affordability, appropriateness). These dimensions intersect with a person's ability to produce access through a linear process involving having a healthcare need, perceiving that need, seeking care, and engaging in care. We represent this process as a cycle instead of a linear path to reflect how prior experiences influence current needs, perceptions of need, and care seeking (blue box, Fig. 1). A person's ability to move through each phase is shaped by individual attributes and the sociopolitical contexts in which they are embedded (Table 1).

We join Levesque et al. with the SEIPS 2.0 model,[7] which considers how interactions between people and work system elements embedded in an external environment produce outcomes (yellow triangle, Fig. 1). Incorporating SEIPS elucidates how healthcare work systems activate Levesque's system dimensions of accessibility. The fit between a person's abilities and care delivery system characteristics (Table 2) determines their likelihood of being able to reach and engage in care. SEIPS 3.0 emphasizes the interactions that a person has with different care settings over time, reflected in the repeated cycles on the bottom of our figure.[8] This temporal dimension is an often-overlooked influence on access, as

people form impressions about health and their treatment by care delivery system representatives over a lifetime. A consideration of historical context that shapes a person's life course, inclusive of the intergenerational occurrence of risk factors and the lasting effects of historical trauma,[9] is foundational to creating health equity when implementing care delivery innovations.

We differentiate outcomes measured at the system level (quality, safety, efficacy, healthcare worker morale, cost-effectiveness) from those experienced by individual people (health outcomes, satisfaction, costs, trust). Measuring equity in health outcomes requires comparison of outcomes across groups of individuals who differ in characteristics of interest (e.g., race, ethnicity, language, payer). If a person cannot access care or experiences care that is low quality or alienating, that will lead to poorer outcomes for that individual. If a group of people, when compared to another group, cannot access care or experience low-quality care, this inequity in access or quality across groups will translate into population-level disparities.

Finally, as emphasized in SEIPS 2.0, we depict feedback loops from outcomes back to the system and also to the individual, as a result of adaptations made to decrease the gap between actual versus ideal performance.[7] To meaningfully advance health equity, systems implementing innovations must first prioritize measurement of outcomes across key populations of interest. Measurement, however, is not

Table 1 Individual Attributes and Sociopolitical Contexts that Shape Access to In-Person and Digital Care Throughout the Care-Seeking Cycle

Care-seeking cycle phases	Individual attributes and sociopolitical contexts shaping access
Care needs: Does the person have a need for care?	Physical health Mental health
Perception of needs: Does the person perceive a need for care?	Health literacy Health beliefs Trust and expectations Social network and proxy perceptions
Care seeking: Does the person seek care?	Health system literacy Personal values influenced by group social norms Prior healthcare experiences Prior experiences of racism or marginalization in the healthcare system Perception of options (including no care) and relative costs/benefits (e.g., costs, timeliness, convenience, quality, trustworthiness) **Prior telemedicine awareness/opportunity** **Prior telemedicine experiences** **Perception of telemedicine vs. in-person options and relative costs/benefits (e.g., costs, timeliness, convenience, quality, trustworthiness)**
Care reaching: Does the person reach care?	Living environments Social support *Transport* *Mobility* **WiFi or broadband access** **Devices available to patient** **Care available in primary language** **Computer literacy**
Care encounter: Does the person engage in high-quality care during the visit?	Empowerment Information and understanding Adherence Caregiver support Clinician support of engagement Primary language Confidentiality needs **Private space for video call**

Note: Plain text details system characteristics relevant to in-person and telemedicine care. Italics highlight characteristics traditionally relevant to in-person care but de-emphasized or not relevant to telemedicine visits. Bold indicates additional factors relevant to care delivery via telemedicine

Table 2 Care Delivery System Characteristics that Shape Equitable Access to In-Person and Telemedicine During Care Seeking and the Clinical Encounter

	Care delivery system characteristics		
	People	**Process**	**Environment**
Reaching care	Approachability and flexibility of scheduling personnel Availability of interpreters dedicated to scheduling Patient attributes and life contexts (see Table 1) *Availability of staff who assist with patient transportation* **Availability of staff who assist patients with technology**	Quality and volume of patient outreach activities Flexibility of hours of operation Usability of scheduling processes and technology Flexibility of appointment availability Management of late and no-show patients Language and literacy accessibility of system services *Costs and complexity of transportation to reach care* **Triaging or shared decision-making with patients regarding in-person versus telemedicine visits** **Handling telemedicine technical difficulties** **Usability of patient portal enrollment process** **Outreach activities to promote and support telemedicine use**	Organizational commitment to equity in access Clinic/system teaching status, safety net status Payment policy Emergency preparedness *Physical capacity to offer care—beds, exam rooms* *Ease of navigating physical layout of care facility* *Proximity of care facility to population and to transportation options* *Safety and security of environment surrounding care facility* **System-level requirements and standards for technology, supported devices, and bandwidth** **Telemedicine licensing requirements** **Confidentiality requirements for virtual care** **Equity orientation for virtual care (simple technology design accessible to diverse users)**
Care encounter	Staff and clinician interpersonal qualities Clinician skill, knowledge, experience, expertise Clinician and staff interpersonal racism or implicit/explicit biases Clinician and staff language and cultural humility Meaningful engagement of medical assistants, nurses, social workers Clinician and staff burnout Individual attributes and life contexts (see Table 1) **Clinician skill and comfort with telemedicine technology**	Registration Coordination of follow-up after the care encounter—prescriptions, appointments, linkages to specialists, diagnostic testing Triage to a higher level of care if needed at time of encounter Extent of and approach to clinician delays Attention to patient privacy, confidentiality, comprehension, and shared decision-making during encounters Attention to incorporation of trained interpreters during encounters *Physical rooming of patients* *Flow through the physical waiting area* **Handling technical difficulties**	Volume/throughput pressure Financial incentives related to volume, quality, or other outcomes Organizational engagement and use of quality measures Integration of medical records Regional market pressures Existence of a quality improvement infrastructure Organizational culture Connectedness with regional care networks *Clinical encounter space—noise, light, comfort, privacy, odors, space* **Patient physical and digital environment (device, connectivity) during encounter** **Clinician physical and digital environment during encounter**

Note: Plain text details system characteristics relevant to in-person and telemedicine. Italics highlight characteristics traditionally relevant to in-person care but de-emphasized or not relevant to telemedicine visits. Bold indicates additional factors relevant to care delivery via telemedicine

sufficient. Systems must act to improve these inequities. Specifically, leaders must commit to interventions that seek to repair, remediate, restructure, and remove structures that confer disadvantage in care delivery alongside the implementation of innovation.[9] This work is iterative and requires an ongoing commitment to understanding existing inequities and the lived experiences of community members experiencing them.[22,23]

WHAT DOES IT MEAN TO CENTER EQUITY WHEN IMPLEMENTING INNOVATIONS?

While this synthesized model has general applicability to any care delivery innovation, we present three scenarios that demonstrate its application to our work in telemedicine.

1. Improving access to what?

First, the model makes explicit that *outcomes are influenced both by accessing care and by the quality of care received*. To

this point, the model illustrates within the care-seeking cycle (Fig. 1, blue square) that individual health outcomes can be shaped by the quality of encounter when care is received but also by the absence of care when care is not reached. The need to consider access and quality in tandem on equity is evident in discussions of the relative merit of audio-only telemedicine during the COVID-19 pandemic. During stay-at-home orders, when access to in-person care was restricted, audio-video telemedicine was rapidly adopted. In circumstances where audio-video visits could not be completed, payers and systems endorsed audio-only visits. Subsequent studies illustrated differential use of audio-only versus audio-video telemedicine, with higher rates of audio-only telemedicine for older people, for Black individuals, and for residents of communities with concentrated disadvantage.[24–28]

These observations require consideration of the separate effects of telemedicine on access and on quality when considering the overall impact of an innovation on health equity. For

healthcare needs where audio-only can deliver high-quality care, provision of audio-only care may enhance access for a population that might otherwise forgo care, thereby increasing health and reducing disparities.[29] However, for healthcare needs where audio-only is inadequate, reliance on audio-only may result in sub-par care delivered to excluded populations, thereby worsening inequities. Alternatively, there may be instances where audio-only care, even if of lower quality than audio-video care, may be preferable to foregone care.

In cases where audio-only is demonstrated to be inadequate for specific healthcare needs and used differentially by certain groups with those needs, health systems must act to increase access to video visits. Through systemic commitment to anti-oppression frameworks such as R4P (Fig. 1, yellow rectangle), leaders can take the following actions: (1) assess the need for repair (how have histories of oppression by social institutions, including healthcare, shaped a person's attitudes about seeking care and comfort with video during visits?), (2) restructure (what care delivery system characteristics in Table 2 may be maintaining exclusion of disparity populations?), (3) remediate (what approaches can be used to protect individuals from immediate harm until the system is restructured—such as providing devices, digital literacy training, or more personalized technology support?), (4) remove (what structural barriers specific to race, class, disability, or gender influence the implementation of audio-video telemedicine in the health system?), and (5) focus on alternative strategies of care provision to ensure that the resources and environmental supports needed for successful audio-video telemedicine are attainable for all.

2. Improving access for whom?

Second, the model emphasizes *person factors and system characteristics relevant for achieving equity.* Relevant person factors are represented within the care-seeking cycle in Figure 1 as "individual attributes" and "life contexts" and detailed in Table 1. Table 2 highlights system factors that enable systems to meet the needs of people seeking care.

Consider the case of people with low English proficiency seeking care, where disparities in the use of telemedicine have been reported.[30] As is the case with in-person care, high-quality medical interpreter services are essential during the actual telemedicine encounter. However, language barriers also arise during care seeking and care reaching, which now occurs in the digital landscape of navigating scheduling systems, downloading applications, and launching visits online. As R4P indicates in prioritizing the needs of individuals in the provision of care, the degree to which these barriers are for individual people with specific language needs depends on the degree to which systems have been designed for speakers of multiple languages.[31] Are telephone and online scheduling systems and application instructions available in the person's language? Was the choice between in-person and telemedicine adequately explained to the person when scheduling? Have healthcare systems required telemedicine vendors to provide multi-lingual user interfaces and seamless interpreter integration? Envisioning each step in the care-seeking cycle (Fig. 1, blue square) highlights the many steps in system design (Fig. 1, yellow triangle) where language equity in telemedicine access and use can be prioritized if system commitment exists (Fig. 1, yellow rectangle).

3. Achieving quality in what contexts?

Finally, we affirm that *the impact of innovations on outcomes is determined by the sociotechnical care delivery system* (Fig. 1, yellow triangle) *in which they are used.* To illustrate this, consider guideline-concordant antibiotic prescribing for acute respiratory tract infections (ARTIs) during telemedicine encounters. It has been demonstrated that the quality of care for ARTIs via telemedicine can vary by context (e.g., more unnecessary antibiotics are prescribed in commercial direct to consumer [DTC] versus primary care contexts).[32–36]

Considering the sociotechnical work system allows identification of factors potentially contributing to this variation (Table 2), such as the fit between the expertise and experience of the telemedicine clinician and the person's needs; quality of audio and video connection; use of peripheral devices; access to diagnostic testing; throughput pressures on clinicians; individual clinician incentive or feedback systems based on patient satisfaction scores or quality metrics; a system norm oriented to quality (i.e., antibiotic stewardship); and systems to easily transition to in-person care.[33] Whether clinicians have access to information about the patient, a pre-existing relationship, or the ability to follow-up after the encounter also is a factor of potential importance shaping decisions about antibiotics during in-person and telemedicine encounters, as listed in Table 2. Patient-side factors (Table 1) in context also matter, where the person's understanding of the care context (DTC vs. primary care) and prior care experiences in those settings may shape their perceptions of needing to obtain care, their approach to seeking care, and their expectations of the care encounter once they reach it.

Telemedicine service lines may impact outcomes less through technology and more through the people, processes, and environments surrounding implementation. Systems supportive of high-quality care via telemedicine require resources and infrastructure. Such well-resourced systems may not be available to all people, who may turn to more convenient but lower-quality options. Centering equity when implementing innovations requires (1) assessing structures that exclude, hold back, or privilege some people over others in gaining access to systems that produce high-quality care and (2) taking action to dismantle those structures.

CONCLUSION

Healthcare delivery sits at the intersection of systems and people within complex sociopolitical contexts. Our model

clarifies questions to ask about care delivery innovations, like telemedicine. In what contexts and for which people does the option of telemedicine improve access? Does the mode of telemedicine contribute to the achievement of health equity, and if not, how could it? What is the alternative for people in the absence of telemedicine? If a specific model of telemedicine enhances access for some and quality for some, what is the impact on outcomes and equity? What actions should systems take in implementing telemedicine to repair, remediate, and remove structures that maintain systemic exclusion? While these are complicated questions to answer, they are central to the power that care delivery systems have in recognizing and attenuating (or tolerating and perpetuating) disparities.

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