



# Telemedicine in Cancer Care Beyond the COVID-19 Pandemic: Oncology 2.0?

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## Abstract

**Purpose of Review** This paper summarizes early experiences of telemedicine during the COVID-19 pandemic, the patient and physician experience, limitations in accessibility introduced by telemedicine, and the opportunities and anticipated sustained role of telemedicine for cancer care.

**Recent Findings** Research from a wide range of oncology facilities consistently demonstrates the feasibility of delivering telemedicine services over audio (telephone) and/or video platforms. Emerging work highlights that telemedicine is well suited for a subset of patients and clinical settings and that there are methods by which current disparities could potentially be ameliorated. Several current uncertainties limit the broad applicability of telemedicine longitudinally.

**Summary** Early responses to the pandemic that included rapid introduction of telemedicine demonstrated the feasibility of audio- and video-based platforms that achieved promising utility, while simultaneously demonstrating disparities based on patient characteristics and infrastructural support. Its long-term role will likely depend greatly on reimbursement and regulatory reform.

**Keywords** Telemedicine · Telehealth · Tele-oncology · Remote consultation · Disparities

## Introduction

Despite the availability of hardware and a network capable of supporting telemedicine, prior to the COVID-19 pandemic, telemedicine represented < 1% of care encounters [1]. This pattern was multifactorial, including reimbursement of telemedicine services typically at a lower rate than in-person visits, onerous interstate licensing requirements imposing restrictions on the ability of physicians to provide care for patients living in other states, and long-held assumptions and biases about what medical care should entail [2]. Rather suddenly, in March 2020, in response to the rising threat of COVID-19, the Centers for Medicare and Medicaid Services (CMS) make sweeping changes that temporarily eliminated many of these practical barriers [3, 4], providing

instant parity in reimbursement for audio- and video-based telemedicine visits and enabling physicians to see patients for telemedicine visits across state lines with liberalized requirements for HIPAA compliance and state licensure. These conditions converged to support the testing of the utility of telemedicine, while also concurrently identifying shortcomings for broad and potentially sustained application of telemedicine.

## Early Pandemic Response

One of the most striking findings early in the pandemic was the feasibility of converting to telemedicine-based care. With the closure of in-person clinics in March 2020, there was an immediate and precipitous drop in total visits, [1] accompanied by a concomitant rise in telemedicine-based visits. Princess Margaret Cancer Center in Toronto, Ontario committed to virtual care quickly and was able to offer telemedicine visits within 12 days of the declaration of the pandemic [5•]. Telemedicine comprised 68.4% of visits just weeks after starting, with ambulatory visit volumes back up just a month after deployment. Other health care systems,

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including both academic centers and community-based networks, reported rapid adoption of telemedicine platforms that were able to restore care at levels that were able to deliver over half of the total visits during the most challenging early weeks of the pandemic [6, 7] before declining to a minority of clinical encounters as the acuity of the pandemic de-escalated by June 2020. Over the first 6 weeks of the pandemic starting in March 2020, the proportion of outpatient visits at Cleveland Clinic that were conducted virtually increased from 2 to 75% (up to 90% for primary care visits). [6]

Notably, much of the early telemedicine experience was telephone-based in several of these early reports,[5•, 6] as video-based telemedicine required more infrastructure and technical expertise among both providers and patients. Moreover, the proportion of audio to video varied greatly in different settings, whether as a function of the support within the health care system, differing demographics of the patients seeking care within them, or other factors. Overall, however, while the specifics of how telemedicine was deployed in different health care networks varied, the take-home message of the early pandemic is that audio- and video-based care was able to significantly ameliorate if not completely bridge the gap of in-person care introduced by COVID-19.

## Patient and Physician Experience

The next critical question was whether the care delivered via telemedicine was an acceptable alternative to the principal stakeholders, specifically patients and the health care practitioners delivering this care, with preliminary reports indicating that both patients and practitioners were largely satisfied with the experience. Specifically, 82% of patients and 72% of practitioners in the Princess Margaret Cancer Center program reported satisfaction [5•]. A video-based program run by Houston Methodist Hospital reported that 92.6% of their patients were satisfied with these visits, among whom 83.4% were very satisfied; the vast majority indicated that they would be highly likely (73.2%) or somewhat likely (17.2%) to pursue another video visit in the future. Notably, more than two-thirds favor having most (36.4%) or at least some (31.2%) of their future visits via telemedicine, with nearly 1 in 5 (18.8%) favoring having all of their future visits via telemedicine. A Texas-wide community cancer care practice with 640 practitioners at 221 sites of service reported that patients appreciated the option to mitigate risk and desired to maintain the option in the future, while citing that older patients tended to experience greater frustration, which was particularly true with first-time use. [8]

One interesting assessment of the patient experience with telemedicine for medical oncology was performed

as semi-structured interviews of 20 patients at Thomas Jefferson University [9]. Though such a small sample is clearly of limited utility, the findings highlight the variability of the patient experience, with some interviewed patients cited the favorable experience of longer and more thorough visits, while others perceived that telemedicine visits are less thorough and more rushed. Some cited their comfort, at least after the initial video-based encounter, while others felt that there was less of a personal connection compared to the in-person clinical experience.

Turning to the physician experiences, a survey of 1038 oncologists from within the National Comprehensive Cancer Network (NCCN) found that 93% reported no perceived adverse outcomes from telemedicine [10••]. Respondents had differing views of the value of telephone- vs. video-based telemedicine after the pandemic, with 54% reporting feeling favorably about phone visits, compared with 87% feeling favorably or very favorably about video-based encounters beyond the pandemic. Practitioners within the aforementioned large practice setting in Texas found that 76% were satisfied with a current telehealth platform, including 21% who were very satisfied with it [8]. Among cancer care professionals within the community-based Kaiser Permanente Northern California Network that included medical oncologists, radiation oncologists, breast surgeons cancer navigators, and survivorship clinicians, 76% were either very satisfied or somewhat satisfied with telehealth, and 82% would like for it to be maintained or even increase after the pandemic is over. [11]

This favorable impression notwithstanding, the broader view of telemedicine in oncology is that it is far better suited for some scenarios and patients than for others. The survey of NCCN oncologists revealed that they estimate that 46% of their visits would be well served by telemedicine, varying based on the nature of the encounter [10••]. Dividing cancer care into scenarios ranging from establishing a personal connection with the patient and family to making decisions about cancer-related procedures to reviewing benign findings or reassuring data, oncologists generated a spectrum of settings in which in-person care was felt to be far superior on one side, while telephone and/or video-based interactions were felt to be comparable or even superior on the other side; in general, video was felt to be more suitable than telephone-based communication for complex interactions. Cancer care professionals in the Kaiser-Permanente Northern California Network also noted variability in the appropriateness of telemedicine for the specific setting: specifically, 49% felt only an in-person visit is acceptable for end-of-life discussions, and 35% felt only an in-person visit is appropriate for the review of a new diagnosis [11]. Overall, oncology lies in the middle of a broader universe of medical care in which certain specialties such as psychiatry and endocrinology

have proven to be very well suited to telemedicine, while fields such as orthopedics and ophthalmology have not been as amenable to meaningful adoption of telemedicine. [12•]

One instructive account was provided by the palliative care clinic at the Dana-Farber Cancer Institute (DFCI) in Boston, MA [13]. The authors highlighted that not only was it possible for telemedicine to bring their total number of visits back up to a near baseline total number of visits, but they were able to share effective interpersonal connections with their patients despite the understandably emotionally charged nature of this work. With training of their faculty in how to interact most effectively via video-based encounters, the DFCI palliative care team observed that “patients seemed relatively comfortable to discuss goals of care by phone or over video,” noting that they experienced a sharp increase in the number of conversations they completed about goals of care in April 2020 and that “patients often initiated conversations about their goals and preferences.” While this was likely in large part because the pandemic introduced a sense of urgency, it highlights that it is possible to utilize telemedicine platforms even for aspects of oncology care that one might consider to be uniquely suited for in-person visits.

Along with the inherent lack of ability to examine a patient, the presumed or experienced lack of comparable interpersonal connection in a telemedicine-based encounter has been cited as a leading limitation in structured interviews of both patients [2, 7, 9] and physicians [8, 10••, 11]. In the evaluation of the experience of cancer care professionals in Kaiser-Permanente Northern California [11], the leading challenges were reported to be internet connection (84%) and equipment problems (72%), followed by the lack of ability to pursue a physical exam after that (60%). Not surprisingly, in-person visits were thought to foster a strong patient-clinician connection by 99%, compared to a lower proportion of 77% feeling that video-based visits foster a strong patient-clinician connection. To some patients and physicians, independent of the need for it during a clinic visit, the exam and potential for direct contact in communicating are central to the patient-physician relationship.

## Old Disparities, New Disparities

Telemedicine holds the promise of eliminating geographical disparities in which patients in underserved areas have limited or no access to specialized practitioners or entire fields. However, we have also seen that despite the many successes telemedicine has enabled, it can introduce or magnify other disparities. Supporting the conclusion from many reports that older patients as a clear subpopulation with challenges adopting telemedicine [2, 7, 8, 12•], a cross-sectional study of 4525 community-based adults age

65 or older evaluated subjects for problems with hearing, speaking, dementia, vision, lack of internet-enabled hardware, and lack of use of electronic communications in the preceding months, with “telemedicine unreadiness” defined as a patient being limited by any of these factors [14•]. This analysis revealed that 25% of people 65–74, 44% of those 75–84, and 72% of those people 85 and older were “telemedicine unready,” and that this was also more common in unmarried, less educated, lower income, and less healthy patients.

Studies on disparities have converged to illustrate a consistent theme that many of the patients who have the greatest need for telemedicine support are also those least likely to avail themselves of it. In studies of patients with cancer as well as other medical settings, patients with lower educational levels and socioeconomic status are those most likely to have not pursued telemedicine and/or report lower levels of comfort with this strategy [7, 15]. Some of these barriers are more readily addressed than others. Notably, telephone-based telemedicine has been favored for some of these patients for whom technological skills and/or equipment are in the shortest supply [15]; importantly, however, telephone-based encounters are perceived as more limited in the range of care that can be delivered effectively [10••], and reimbursement for these encounters falls well below that of video-based and in-person clinical care [16, 17]. This establishes a problematic precedent in which practices and physicians providing care for more disadvantaged, sicker, and older patients—those who are prone to have the greatest difficulty accessing better reimbursed video-based telemedicine—suffer a financial disincentive to offer telemedicine in the audio-based format that is accessible to a broader range of their patients.

Physicians also vary in their receptivity to telemedicine for a wide range of reasons. In some surveys, physicians have expressed unease with telemedicine and a lack of infrastructural support, including equipment like a webcam or dedicated location to conduct telemedicine visits with needed privacy, lighting, and fast internet connectivity [6, 7]. Importantly, some assessments of telemedicine workflows have noted that while physicians routinely benefit from an array of schedulers, medical assistants, and nurses to facilitate their live clinic, it has been very common for physicians to be left to conduct telemedicine visits with no support staff at all, potentially requiring physicians to dedicate initial time in the visit to troubleshooting for themselves and/or the patient how to successfully connect online. Facing these headwinds, it is understandable that many physicians consider the challenges of telemedicine to be an unappealing alternative to a more efficient and far better-supported option of managing patients in person in the clinic, even when a telemedicine-based visit would be appropriate.

## Telemedicine Settling In

In the months and years since the immediate and urgent adoption of telemedicine in the early weeks of the COVID-19 pandemic, we have seen a pattern of attenuated use that nevertheless remains far above the level of telemedicine use that preceded the pandemic. Looking broadly at medical practice and not specifically at oncology, claims data illustrate that encounters rose from 1% pre-pandemic to 49% of encounters in April 2020 before settling at an average of 21.5% of encounters for all jurisdictions by October through December 2020; this varied greatly across geographies, from 10.1% in Mississippi to 49.9% in Massachusetts and 53.4% in Puerto Rico [18]. Also notable from these claims data is the fact that in-state claims represent the overwhelming majority of telemedicine during a time when state licensure restrictions were greatly relaxed (93.5% overall, from all jurisdictions). This may argue that current practice is not hobbled by licensing restrictions, though we also interpret that historical restrictions may contribute to a pattern of a low proportion of telehealth claims from out-of-state providers. Looking specifically at more recent data and findings from an oncology-specific network (see Fig. 1) telemedicine use has ebbed and flowed with the varying level of threat of COVID-19, representing a steady minority of approximately 17–20% of encounters after the spring of 2021. The factors contributing to whether a case is likely to be preferentially favored for in-person or telemedicine-based care arise from many dimensions, including those specific to the patient, the disease setting, the physician, and institution, as well as societal issues (see Table 1).

In May 2021, the American Society for Clinical Oncology (ASCO) published a position that articulated recommendations about the potential longitudinal role of telemedicine in oncology practice [19]. This statement supports continuing CMS provisions for telemedicine in cancer care beyond the duration of pandemic, indicating that the benefits of telemedicine should not be limited to a time-sensitive extenuating circumstance. In order to address constraints posed by restrictions on state licensure limiting the ability to provide care for patients across state lines, ASCO offers strong support for all states joining the Interstate Medical Licensure Compact (IMLC) to provide a mechanism for licensed physicians to more readily obtain medical licenses for other states. ASCO maintains a position that the doctor-patient relationship be initiated by an in-person visit before pursuing telemedicine-based care, with the exception that this is not intended to restrict a patient from pursuing a telemedicine-based second opinion. The ASCO position statement also proposes that current medical liability insurance policies should be

expected to cover telemedicine interactions. Addressing a concern that telemedicine could become a platform for increased fraud, the stated position from ASCO is that the Federal Trade Commission has the purview to monitor telehealth practice patterns to prevent unfair practices and fraud so that this concern should not threaten longitudinal adoption of telemedicine for cancer care.

One practical application of a variant of telemedicine has been Project ECHO (Extension for Community Health Outcomes), originating in Albuquerque as a program originating in oversight of the management of hepatitis C [20], has grown into platform employed by the Center for Global Health as a telementoring platform for a wide range of cancer control programs around the world, including cervical cancer screening and prevention, survivorship, palliative care, and other initiatives. As part of Project ECHO, MD Anderson Cancer Center has become a “superhub” for a range of programs providing specialist oversight for underserved rural settings within the US as well as international oncology support programs for international education and patient care, coordinated with local practitioners. [21]

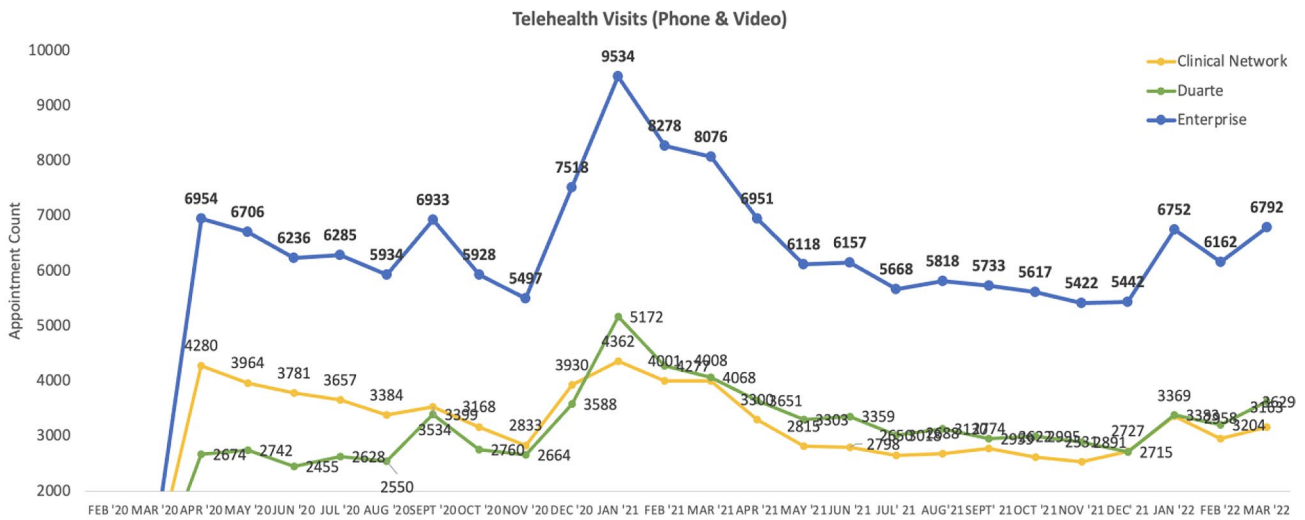
A variant of telemedicine that has also been adopted over this period is remote consultations for complex cancer cases offered as an employee benefit. West and colleagues described their experience of offering asynchronous reviews of case records by subspecialist experts, offering written reports summarizing optimal current and future management options with an intent that most management plans are executed by the primary medical team close to a patient’s home, with the initial description focusing on 110 patients with lung cancer reviewed in the first 19 months of the program [22]. While not representing telemedicine by a typical definition, this platform for remote input from a subspecialist demonstrated rapid growth in case of volumes despite the constraints of the pandemic, offered evidence-based changes or recommendations to improve clinical outcomes in over 90% of cases, and concurrently recommended cost-reducing measures by eliminating low-value interventions that translated to an average projected cost-reduction of just over \$19,000 per patient. This program, which interfaces with the local medical team for the patient and is therefore not delivering telemedicine directly, is growing to now include a multi-institutional network of National Cancer Institute (NCI) designated Comprehensive Cancer Centers offering remote education and support in a novel model of cancer care delivery.

## Looking to the Future: Opportunities and Obstacles

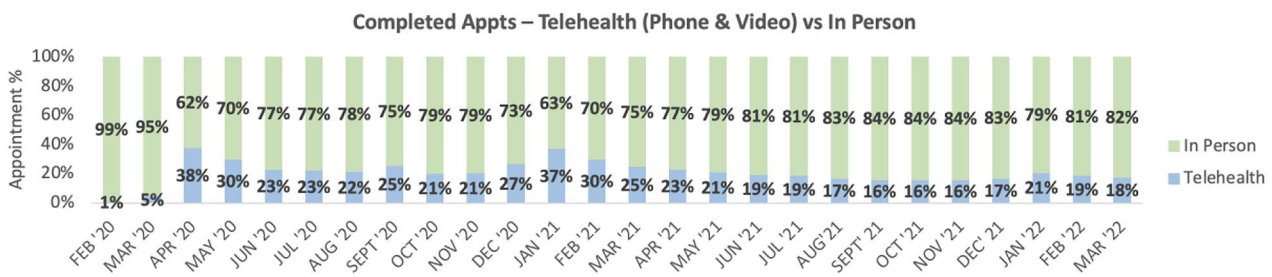
Given the clear signal that telemedicine is feasible in oncology, the looming question remains of whether and how it will be incorporated as a sustained practice beyond the



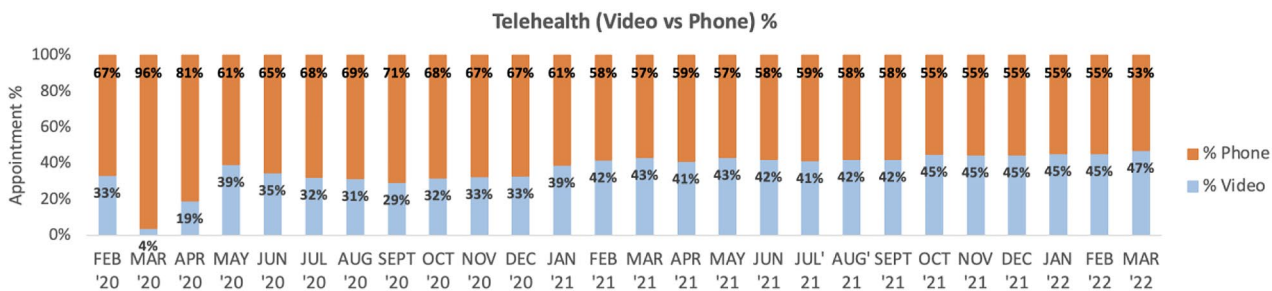
A)



B)



C)



**Fig. 1** Telemedicine volumes in the City of Hope Cancer Center Clinical Network from immediately prior to COVID-19 through March 2022. (Source: unpublished data). Panel A volumes of telehealth visits, including telephone and video, for the network, including the primary campus in Duarte and surrounding network of community-based sites. The volume of telehealth visits has varied based

on the threat of COVID-19 and has moved in parallel for the Duarte campus and community-based sites in the City of Hope network, total reflected in “Enterprise.” Panel B relative proportion of in-person and telehealth visits over this time interval. Panel C proportion of telehealth visits across the City of Hope Enterprise being served by telephone vs. video platform

pandemic. As noted above, the available data illustrate that telemedicine remains far more utilized than it was prior to the spring of 2020; nevertheless, it remains relegated to a

small minority component of broader cancer care. Such encounters likely represent the subgroup of patients who are best suited for telemedicine—patients who are clinically

**Table 1** Key variables in the balance of telemedicine vs. in-person care

Patient	Disease setting	Physician/institution	Societal
Comfort with technology	Acuity vs. stability of illness	Availability of equipment/ setting for telemedicine	Reimbursement of telemedicine at parity or below in-person visits
Ability to communicate effectively virtually	Degree of symptomatology	Ease/difficulty of telemedicine platform,	Inter-state licensure restrictions, cost, time requirements
Availability of required hardware	Treatment: infusion/clinic-based vs. home-based vs. none	Availability of support staff to train patients, guide to virtual platform	Escalated concerns about liability
Availability of fast internet	Need for physical exam	Availability of technical support in real-time for providers and patients	Expectations about what constitutes physician–patient relationship
Travel time to cancer center	Risks of presenting for in-person care (infectious risk, immunosuppression, etc.)	Loss of revenue for facility fees	
Ease/difficulty of time off of work	Need for deeper interpersonal connection	Convenience of transitioning between virtual and in-person clinic visits	
Expectation of exam/in-person evaluation			

most stable, likely not on infusional therapies, comfortable with technology, and without hardware or network barriers.

With the arguable exception of a few unconventional models described above that are not directly reimbursed by federal programs or conventional health care insurance, we have yet to see the implementation of innovative new concepts that could transform cancer care by eliminating the geographic limitation of medical oversight by practitioners within convenient driving distance of a patient's home. There is still the unrealized promise of delivery models that leverage telemedicine as a means of integrating more subspecialized cancer care as oncology becomes increasingly complex. For example, networks that include a large number of general oncologists, as well as a subgroup of more cancer-specific subspecialists could offer patients a treatment plan developed with a subspecialist they see via a telemedicine visit one or a few times per year, then executed by a general oncologist from the same network close to home. Renowned cancer centers have yet to offer services of remote synchronous telemedicine consultations with patients outside of their region, out of state, who might be candidates for clinical trial options there, in large part related to the still cumbersome nature of inter-state license restrictions. And while the pandemic led to a dramatic drop in clinical trial participation in oncology [23–27], the hyper-regulated world of clinical research has yet to adapt on a meaningful scale by permitting patients to pursue trial-required visits to be replaced by telemedicine, thereby restricting trial access to patients within accessible geography. This is despite a “call to arms” to incorporate telemedicine-based medical visits, remote monitoring, and remote laboratory tests as a means of improving the racial and demographic diversity of clinical

trials by reducing required time away from work and family commitments that likely precludes many from traveling to clinical trial sites. [23, 26, 28]

While many barriers to the broad adoption of telemedicine remain, a subset may be ameliorated with deliberate efforts. For those patients limited by a lack of technical skills, needed hardware, or high-speed internet access, interventions that can reduce these barriers include improved broadband through planned government infrastructure, programs of loans, or donations of inexpensive internet-enabled smartphones or tablets, potentially with a ready-made icon that can lead directly to a telemedicine encounter, and implementation of a network of local telemedicine-ready booths, ideally with support on-site, in communities where patients live. For physicians and institutions, there is a need for training in “webside manner,” provision of needed hardware and bandwidth, and a setting with privacy and fast internet to maximize the patient experience. To minimize friction on both sides of the telemedicine interaction, telemedicine interactions would benefit from the dedicated support staff required to prepare patients with guidance and training to get to the telemedicine platform, to give both patients and physicians real-time technical support for connectivity and hardware issues, and to provide physicians with the team of schedulers, nurses, and other employees that can facilitate efficient use of time in a virtual encounter that better mimics the range of support staff routinely enabling efficient use of physician time in an in-person clinic.

Unfortunately, these potential remedies for current challenges are likely to remain unrealized as long as uncertainties loom around telemedicine reimbursement, licensure, and liability concerns, particularly when healthcare institutions

are slow to break from the status quo. While telemedicine removes the bottleneck of limited exam rooms, office space, and computer terminals in clinics, it also eliminates facility fees and other ancillary charges that may be welcomed by institutions. Reimbursement tied to in-person visits, combined with an undefined future regulatory environment that includes the threat or probability of a lack of parity between in-person and telemedicine-based encounters, cultivates a disincentive for institutions to restructure to replace live visits with telemedicine-based care. Recognizing that the US-based health care system practices “reimbursement-based medicine” that incentivizes maximized reimbursement per unit of provider time and institutional resources, any change that reduces anticipated revenue for the same clinical in a given time population is unlikely. Interstate licensing barriers can be addressed through the momentum of the growing IMLC, but this improvement still incurs high costs for each state license, rather than a more practical plan of reciprocal interstate recognition of existing licensure that faces considerable if not insurmountable political hurdles. Physicians also cite a concern about missing important findings, particularly without a physical exam with telemedicine [2, 6–8, 10••, 11], on top of a cultural belief among a subset of physicians and patients that the physician–patient relationship is defined in part by direct examination and “laying on hands.”

In this environment, telemedicine provides a compelling option for institutions only to the extent that it can increase the patient population receiving care and/or creates efficiencies and cost savings from a reduced physical infrastructural requirement. With ongoing uncertainties about reimbursement parity, medical licensing barriers, and malpractice insurance coverage, we must anticipate that telemedicine in oncology is likely to remain an option favored for a minority of patients and clinical settings that is offered alongside traditional, in-person care for the majority of encounters.

## Conclusions

Prior to the COVID-19 pandemic, telemedicine was utilized in only a rare minority of oncology encounters, but the pandemic both created an urgent need for an alternative approach to delivering medical care and profoundly, reduced barriers in a new regulatory environment that facilitated telemedicine, albeit temporarily. These conditions provided the testing ground that provided a clear proof of principle that telemedicine for cancer care is feasible and is associated with acceptable, even promising levels of satisfaction among both patient users and physicians.

Over the subsequent two years, as concerns about infectious risk have waxed and waned while the regulatory conditions supporting telemedicine have begun to recede, telemedicine has continued on a far higher level than previously,

but this still represents only a limited subset of cancer care encounters. The broadened use of telemedicine has demonstrated that its practice is not ideally suited for all patients and/or clinical scenarios, for a wide range of reasons. While some challenges may be addressed to ameliorate these limitations over time, the systemic limitations of reimbursement and inter-state licensing remain the greatest looming threat to telemedicine substantially redefining how cancer care is delivered. In the meantime, specific adaptations, such as asynchronous case reviews and global oncology programs for underserved populations, provide glimpses of new models that may thrive by not relying on traditional payment structures for medical care. Transformative delivery of cancer care that employs telemedicine to overcome geographic limitations awaits an overhaul of entrenched regulatory hurdles that we can expect will remain elusive in the coming years.

## Declarations

**Conflict of Interest** Dr. West provides telemedicine services in the context of his employment by the City of Hope and AccessHope.

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- Of major importance

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