

# Utility of telemedicine in the COVID-19 era

Gates B. Colbert<sup>1,\*</sup>, A. Verner Venegas-Vera<sup>2</sup> and Edgar V. Lerma<sup>3</sup>

<sup>1</sup>Assistant Clinical Professor, Division of Nephrology, Texas A&M College of Medicine at Dallas, 75246, USA

<sup>2</sup>Nephrologist, Division of Internal Medicine, Mexican Institute of Social Security, Merida, Yucatan, 97150, Mexico

<sup>3</sup>Clinical Professor of Medicine, University of Illinois at Chicago/ Advocate Christ Medical Center, Oak Lawn, 60453, IL, USA

\*Correspondence: [Gates.Colbert@BSWHealth.org](mailto:Gates.Colbert@BSWHealth.org) (Gates B. Colbert)

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Previously it has been demonstrated that telehealth (TH) could help cover the gaps in health attention in remote locations. Today the expanded capabilities have transformed TH delivery, and from the beginning of the coronavirus pandemic, it has remained one of our biggest allies. Telehealth has become a central piece in patient healthcare delivery during COVID-19 pandemic era. Telehealth allows health care services to reach patients in their homes, keeping other patients safe through social distancing and maintaining self-quarantine. Within this administration of health, TH allows health care providers to focus more resources to pandemic usage and at the same time continue caring for the health of non COVID-19 patients. During this time, clinicians are expanding knowledge about TH capabilities, such as application of forward triage as a tool to avoid patient contact in emergency departments. While previously TH was mainly used for primary care needs, specialized and urgent care health is now being utilized more than ever before. These advantages comes with limitations, some of them include a limited physical exam, lack of access to diagnostic testing or imaging, and many other pitfalls and persistent unmet needs. The 2020 pandemic has led to significant improvements leading into the next generation of telemedicine.

## Keywords

Telemedicine; telehealth; COVID-19; healthcare

## 1. Introduction

Telemedicine is a form of caring for patients using technology as a means of healthcare communication and delivery. This application of care has been around for decades and is as simplistic as a patient calling his or her physician for advice and treatment. In today's world of advancing technology, including live video and text messaging, telehealth has quickly and broadly expanded its scope and capabilities. Prior to the coronavirus disease 2019 (COVID-19) pandemic in the United States, thousands of physicians and health care professionals (HCP) provided care to patients in some way with telemedicine. Previous work has already described the role of telehealth importance during disasters and public health emergencies ([Lurie and Carr, 2018](#)). With

the novel COVID-19 crisis erupting in 2020, and the high uncertainty of spread and infectivity, the urgency for telemedicine quickly became an important way to manage patients' healthcare while keeping them safe through social distancing and maintaining self-quarantine ([Cervino et al., 2020](#)).

In April 2020, healthcare systems in the United States, through the urging of the Centers for Disease Control, encouraged all outpatient clinics, hospitals and ambulatory surgical centers, to limit all non-essential activity. This was implemented with the goal of limiting COVID-19 spread and prevention of personal protective equipment (PPE) depletion ([CDC, 2020](#); [Centers for Medicare and Medicaid Services, 2020](#)). As patients were encouraged to follow stay-at-home orders and clinics were closed to in-person visits, telemedicine quickly became a necessary component for non-emergency healthcare. Synchronous telehealth was enacted, where a HCP and patient interact in real time, as a primary means of healthcare for many clinics and healthcare systems ([Koraishy and Rohatgi, 2020](#)). As physicians and HCPs were instructed to use this form of healthcare delivery, several outcomes were quickly visible on a global scale ([Bashshur et al., 2020](#)). Patients had good outcomes and satisfaction with outpatient follow up and nonurgent condition consultations. Hardware infrastructure with widespread connected devices, dubbed the internet of things (IoT) e.g. tablets, phones, and watches, allowed direct point of care delivery ([Ting et al., 2020](#)). Electronic health records could be maintained by the HCP with diagnostic testing, medication orders, and follow up appointments available by digital creation. As well, the ability for patients to practice physical distancing and self-quarantine were enhanced with decreased needs to present to a crowded waiting room ([Bashshur et al., 2020](#)).

Telemedicine consultations require the same amount of rigorous investigation and astute attention to accurately meet the standard of care. Several components are necessary to complete a meaningful visit for patient treatment. Comprehensive documentation is key to a successful legal, billable, and Health Insurance Portability and Accountability Act (HIPAA) compliant encounter. The assessment, diagnosis, and treatment plan should be well documented to support the HCP plan and any medications or tests that are needed. If a HCP orders a test or imaging, the HCP is responsible for following up on the findings and determining the next steps of care and assumes sole liability. Correct Current Procedu-

ral Terminology (CPT) diagnosis codes must be documented in the encounter as well. Clinicians will be very familiar with these necessary elements to a patient encounter, as they exist in the current standard of care for live physical consultations.

## 2. Previous Telehealth Experience

Patients prior to the pandemic were increasingly using telehealth and smart technology in monitoring their health on a daily or hourly basis. Several reports and studies have demonstrated the success of using telemedicine in managing chronic conditions (Fig. 1), such as Nephrology clinics, while adhering to the techniques suggested above (Lea and Tannenbaum, 2020). In fact, Canadian physicians have been using telemedicine to care for remote patients on dialysis since the 1980s (Bernstein et al., 2010). Another example of telemedicine details the management of kidney disease and dialysis treatments by HCPs to isolated Pacific Islands patients (Michel et al., 2020). A more recent study using a smartphone app in patients with chronic kidney disease showed reductions in systolic and diastolic blood pressure with smartphone intervention (Singh et al., 2019). Many HCPs and Cardiologists are familiar with the Apple Watch heart rate capabilities and KardiaMobile rhythm detection availability, both providing meaningful data that can shape healthcare outcomes (Li et al., 2019). Published cases are now rapidly being reported in the literature describing how different specialties across the world used telemedicine to care for patients during COVID-19 pandemic lock down periods. An Italian cardiology group described how to manage heart failure symptoms using telemedicine through phone calls, video conferencing, and email exchanges to keep patients on goal directed therapy when in person consultation was not available (Salzano et al., 2020). Up to 58% of patients who participated in the study accessed telemedicine services, with 51% of those patients having a clinical decision adjustment performed. No patients in the Italian 103-person study contracted COVID-19 during the three-month period. Patients' choosing telemedicine over in-person care have become visible almost immediately at the beginning of the COVID-19 pandemic. It has been reported in Italy and elsewhere, a decrease in ED presentations for acute coronary symptoms during the early pandemic months. As patients were fearful to go to the ED, a significant decrease occurred in patients seeking in-person care compared to previous time periods (De Filippo et al., 2020; Piccolo et al., 2020).

## 3. Emergency Use of Telehealth

The use of Emergency services must remain available to patients at all times in a modern society. Strategies to triage patients as they enter these services is needed to maintain order in providing emergency care to the sickest quickly. "Forward triage" is a process that sorts these patients before they arrive in the emergency department (Cervino and Oteri, 2020). Telemedicine is a way to help this process and allows patients to be screened before entering the doors of the hospital, potentially exposing themselves and families to contract illness such as COVID-19. Currently over 50 American health systems already have telemedicine triage programs in place and aggressively used the opportunity to initially care for patients virtually (Hollander and Carr, 2020). Outsourcing these services is a way for smaller and less resource rich systems

to care for their patients in order to limit cost and resource utilization. Teladoc Health and American Well both are public telehealth companies that played a role to screen patient's symptoms and provide care before referral to an in-person hospital consultation. Many health systems, such as Jefferson Health in Pennsylvania, used telemedicine to screen patients who were experiencing symptoms of COVID-19 (Hollander and Carr, 2020). Patients already in the system with outpatient established care, were asked to use telemedicine for direct virtual evaluation to determine if testing was necessary. This prevented patients from exposing themselves to other patients without a centralized location, and allowed the clinicians to treat patients without COVID-19 suspicion at home for monitoring.

## 4. Critical Care Use of Telehealth

Inpatient telemedicine services are increasingly being used to care for COVID-19 positive patients admitted to ward units or intensive care units (ICU). Electronic intensive care unit (e-ICU) monitoring programs allow clinicians and nursing staff to monitor and communicate with patients remotely (Hollander and Carr, 2020). This allows for two-way communication, vital status monitoring, well-being of the patient, direct video of a patient's ventilator, and even dialysis treatment machines. With limited direct patient contact, exposure for virus spread is limited from patient to caregiver, and caregivers' virus spread to naïve patients in the hospital. Tele-critical care (TCC) has been pushed to the forefront with COVID-19 positive patients filling up intensive care beds during the first half of 2020 (Singh et al., 2020). Several health systems implemented operational plans to set up ICU rooms with video and audio capabilities for physicians, nursing, and providers to care for patients remotely. To make this model work, teamwork is essential with live communication and feedback highly beneficial. In order to implement these forms of care, heavy investment financially in equipment and training is necessary to perform at the same stand of care as in person.

## 5. Benefits of Telehealth

There are many benefits to telemedicine for both the patient and the HCP outside of a pandemic emergency time frame. The patient has access to a physician or HCP wherever he or she is located and at unpredicted time periods. The patient may live in a rural area with few HCPs, or have a strict schedule and that doesn't allow time to efficiently attend an office visit. There is also less expense for the patient with no travel costs, less time off of work, and potentially lower childcare costs. The encounter may be more private as a patient does not need to be in a waiting room or large hospital setting. As well, the risk of communicable infections is reduced as the patient will have limited exposures. The HCP also benefits from an encounter of telemedicine. Training can be initiated and completed through online modules using the same software that will be used with actual patient encounters. The timing may be more flexible for the HCP to begin and finish their treatment session. Increased efficiency exists without waiting on patients to arrive or rescheduling missed appointments and cancellations. The HCP may be able to take care of patients outside their usual geography or office settings. To the benefit of patient care and promotion of telemedicine spread, the Centers for Medicare and

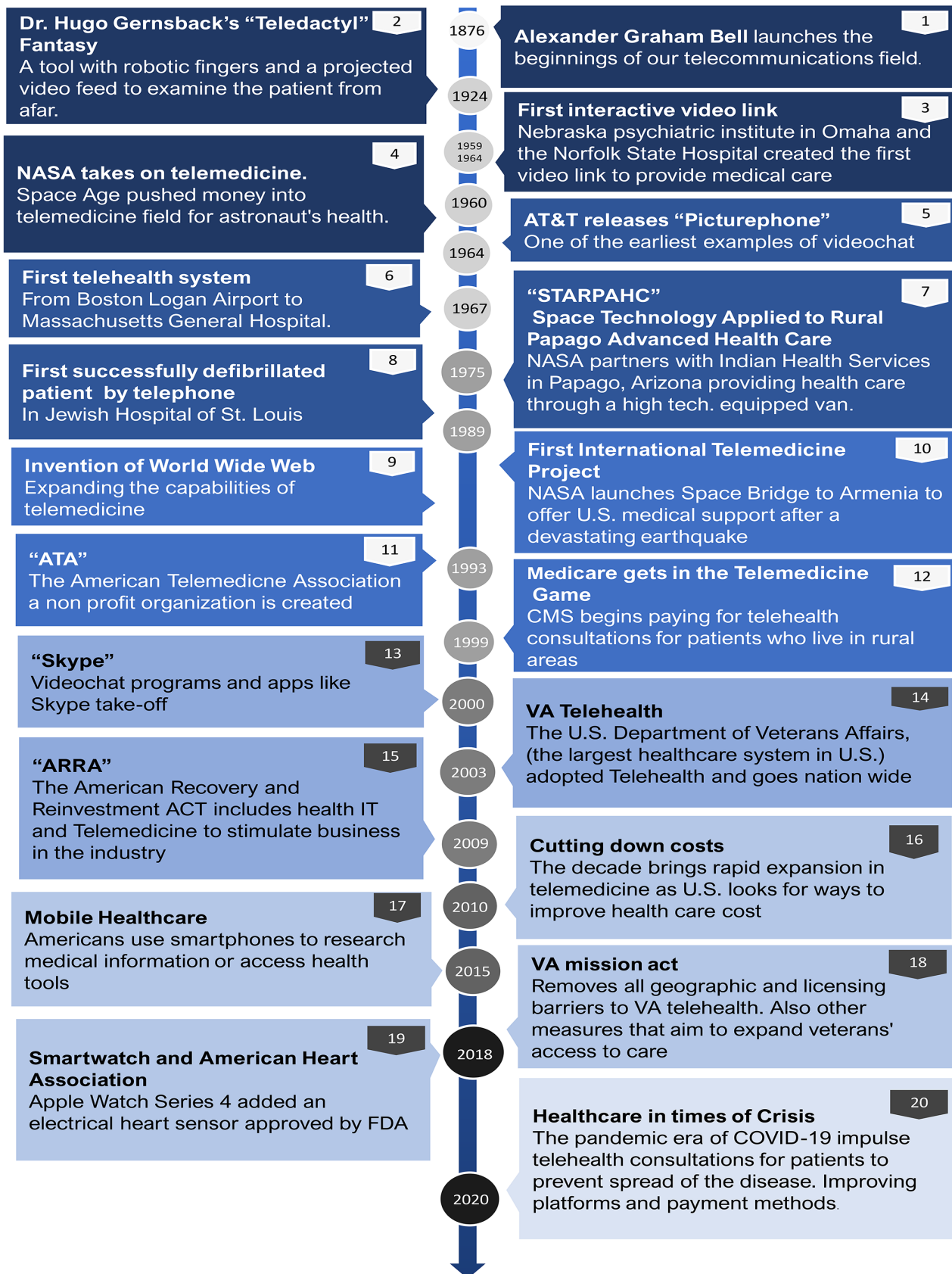


Fig. 1. Timeline highlighting the history of telemedicine from infancy to massive implementation during the COVID-19 pandemic (Zundel, 1997).

Medicaid Services greatly expanded payment policy to allow reimbursement for televisits at the same rates as in person care (Hollander and Carr, 2020). This was enacted during the COVID-19 pandemic to facilitate this opportunity for patients and HCPs, but it remains to be seen if this change in payment models will be a temporary emergency order or a permanent statute of healthcare.

## 6. Limitations

Limitations do exist to providing excellent and medically accurate care with telemedicine. Full data and medical histories may be incomplete if totally relying on a patient's interpretation of their problem. A patient's description of their issue may not be as accurate as an in-person encounter with limitations of non-verbal communication. The physical exam is limited without access to expert clinician evaluation. Quick access to diagnostic testing or imaging may also not be available. Not every patient problem and diagnosis will be able to be determined during a telemedicine visit such as abdominal pain or vision changes. Patients with mental disabilities and those with cognitive impairment may not be candidates for telemedicine given inherent communication limitations (López Reboiro et al., 2020). It is up to the medical judgement and expertise of the HCP to determine when an in-person encounter is required. A recent review on the reliability of 28 smartphone applications to track and manage chronic kidney disease data and symptoms describes many pitfalls and persistent unmet needs (Singh et al., 2019). The liability and safety rests on the shoulders of the HCP, as the patient is looking to an established and educated authority to help with their medical problems. Additional hurdles that need to be overcome include privacy issues, data safety, limited integration of services within health systems, and incorporation with current delivery care models such as pharmacies. Chronic telemonitoring needs to be integrated into the model of care after initial consultations. Ideally patients would be cared for directly in person for subsequent follow up visits or consult. If situations and barriers exist to physical care, monitoring of accurate health data, laboratory values, and vital organ monitoring must be available. While we don't have answers to all of these challenges, solutions will continue to present themselves with ongoing interest and investment to meet the needs of telemedicine into 2021.

## 7. Conclusion

Disasters like the COVID-19 global pandemic produce great strain on healthcare systems, delivery systems, and of course the patients seeking medical care. It is an exciting and revolutionary time for health care via telemedicine. The capabilities to help and treat patients experiencing the COVID-19 virus, as well as routine care, have never been greater and in higher demand. The year 2020 will likely be marked as the time period when the public and governments accepted digital technology use as a part of routine healthcare delivery. The scope and improvement will continue to enable a good clinician to treat effectively through virtual means as we continue to evolve in taking excellent care of our patients.

## Authors' contributions

All authors listed contributed equally to the research, writing, and editing of this manuscript.

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## Conflict of Interest

The authors declare no conflicts of interest statement.

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