

A Review of Telemedicine in time of COVID-19

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Abstract— Telemedicine plays an increasingly important role in global healthcare. In this study, we summarized the latest developments related to telemedicine and discussed the obstacles and challenges to its wide adoption with a focus on the impact of COVID-19.

Keywords—telemedicine, COVID-19, healthcare

I. INTRODUCTION

Telemedicine uses information and telecommunications technologies to facilitate the electronic transmission of medical information and enable healthcare delivery remotely [1]. From January 20, 2020, when the United States confirmed the first case of Coronavirus Disease 2019 (COVID-19) to March 11, 2020, when the WHO declared COVID-19 a global pandemic [2,3], COVID-19 changed the practice of palliative care and clinical medicine as the medical staff knew it within several months. Due to the rapid spread of the virus, millions of people worldwide, including healthcare workers, were infected and more than one million died as of Nov. 2020. Many countries have introduced social distancing and mask mandate to limit the spread of COVID-19.

II. TELEMEDICINE SERVICES DURING COVID-19

Healthcare organizations worldwide resorted to telemedicine to help medical staff remotely triage, evaluate, and care for patients while minimizing the risk of viral infection for both healthcare providers and patients and conserving limited healthcare resources. During COVID-19, many medical institutions have begun to provide telemedicine services to their patients. The Centers for Disease Control and Prevention (CDC) published statistics on two rounds of surveys on telemedicine visits and usage during COVID-19. The first round of data collection took place from 9 June, 2020 to 6 July, 2020 and there are 14.1% of healthcare providers (standard error: 0.5, total sample size: 6776) offered telemedicine before the pandemic versus 36.6% (standard error: 0.8, total sample size: 6786) after. In the second round of data collection (occurred between 3 August, 2020 and 20 August, 2020), there are 14.1% of healthcare providers (standard error: 0.7, total sample size: 5959) offered telemedicine before the pandemic and 37.1% (standard error: 0.7, total sample size: 5972) after [4]. In both surveys, there were over 20% increases in the number of providers using telemedicine after the pandemic started.

The CDC has also proposed telemedicine to be used for areas with limited medical resources during COVID-19. The potential uses of telemedicine in low resource non-U.S. settings include 1) Triage and screening for COVID-19 symptoms, 2) Contact tracing, 3) Monitoring COVID-19 symptoms, 4) Providing professional care for hospitalized COVID-19 patients, 5) Providing basic healthcare services

for non-COVID-19 patients, and 6) Monitoring recovered COVID-19 patients [5].

Figure 1, adapted based on Figure 1 of [6], provides a comprehensive workflow for implementing telemedicine services during COVID-19. As the first step of each telemedicine visit, patient identity is verified and patient consent needs to be obtained. Then the doctor starts consultation, makes initial diagnosis, and decides if the patient needs acute care. If yes, the doctor recommends for an immediate referral and provides instructions for the next step. Otherwise the doctor provides care accordingly.

A group of doctors from the department of orthopedic surgery, Johns Hopkins University School of Medicine, pointed out that patient triage, technical resources, credentialing, education of providers and patients, schedules, and regulatory considerations need to be taken into consideration while implementing telemedicine [7]. Patient triage can be done by doctors or nurses through telephone or online consultations or even by the patients themselves. To improve triage efficiency and prevent unnecessary visits to hospitals, the University of California San Francisco (UCSF) Department of Medicine implemented an online patient self-triage and self-scheduling tool for potential COVID-19 cases. The tool is accessible through the patient portal and integrated with the electronic healthcare record system (EHR). The self-triage workflow is summarized in Figure 2. Patients are classified into four categories (Emergent, Urgent, Non-Urgent, and Low risk) based on their answers to a series of questions about exposure and symptoms. According to their assigned categories, patients are given action instructions ranging from seeking immediate medical care to self-care at home. The tools were welcomed by patients, and the approach is being adopted by other healthcare systems [8].

III. OBSTACLES TO WIDE ADOPTION OF TELEMEDICINE

The following common barriers (sorted in descending order of their frequencies) to the widespread adoption of telemedicine were identified based on a literature review and analysis of 30 papers on telemedicine [9]:

- technically challenged staff
- Resistance to change
- Cost
- Reimbursement policies
- Patient's age
- Patient's education level

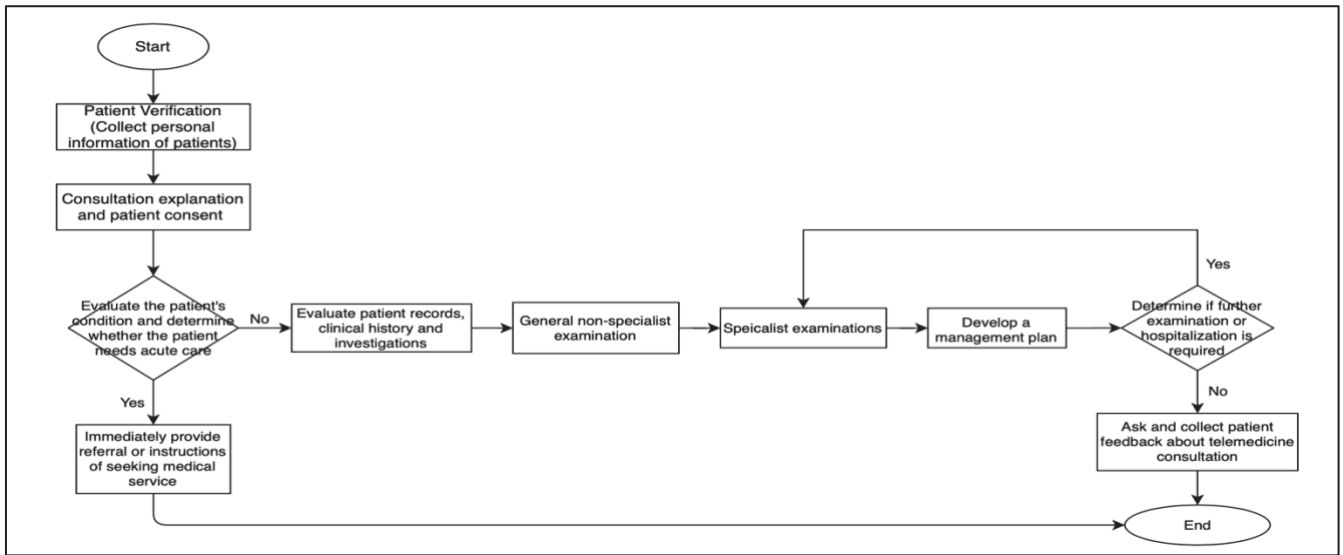


Figure 1: Recommended workflow of Telemedicine for COVID-19 [6].

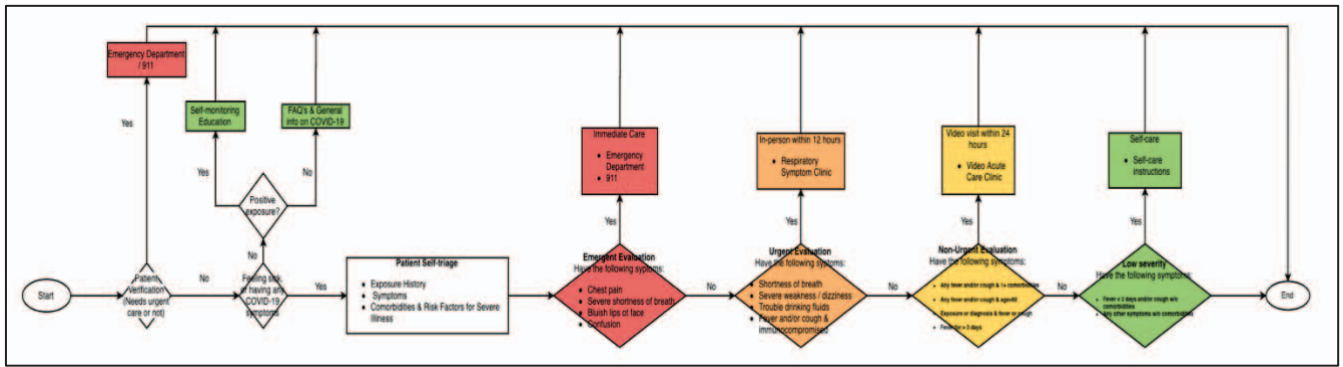


Figure 2: UCSF's Patient self-triage workflow for Adult COVID-19 patient [8]

Policy restrictions are one of the top factors impeding the broad adoption of telemedicine. We excluded teleradiology, the most advanced type of telemedicine services in the United States, when discussing telemedicine reimbursement policies. Teleradiology services are reimbursed in the same way as “traditional” radiological services. The telemedicine parity legislations require private payers to reimburse telemedicine services in the same way as they do for in-person care. However, not every state passed telemedicine parity legislation. Even among those states with parity legislation, they often have different requirements for telemedicine reimbursement and subsidies. The Medicaid programs in different states often have different limitations of reimbursement on the rural areas that can employ the telemedicine [10]. Some states only allow Medicaid telemedicine services to be provided in rural areas, while others allow telemedicine services in non-rural areas as well. Some states specifically link Medicaid telemedicine reimbursement to permissible reimbursement under Medicare [11]. Difficulties in getting reimbursed is a significant obstacle to the development and adoption of telemedicine.

IV. REGULATORY CHANGES DURING COVID – 19

The COVID-19 outbreak has accelerated the promotion of telemedicine by various organizations. The Center for

Medicare and Medicaid Services (CMS) took measures to support telemedicine reimbursement, including adding more than 80 new CPT (Current Procedural Terminology) codes as shown in Table I [12].

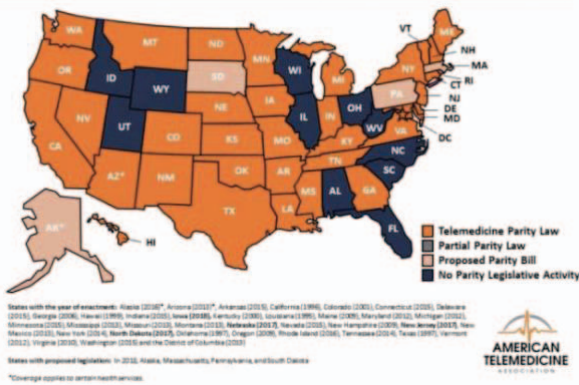
The federal government is also actively promoting telemedicine services by relaxing restrictions. The Department of Health and Human Services (HHS) stated on March 17, 2020 “..., effective immediately, that it will exercise its enforcement discretion and will waive potential penalties for HIPAA violations against health care providers that serve patients through everyday communications technologies during the COVID-19 nationwide public health emergency” [13]. This change helped take some pressure off healthcare providers who plan to implement telemedicine services.

During the pandemic, all states in the United States issued temporary administrative orders regarding telemedicine access, and at least 22 states have implemented subsidy policies and telehealth parity laws [14]. American Telemedicine Association (ATA) and the Center for Connected Health Policy (CCHP) summarized the status of the telemedicine parity law across the country before and after the COVID-19 outbreak as shown in Figure 3. In 2018, there were 11 states without parity legislative activities. In 2019 and 2020, four states among the 11, Utah, Illinois, Ohio, and Florida, have enacted private payer laws on telemedicine.

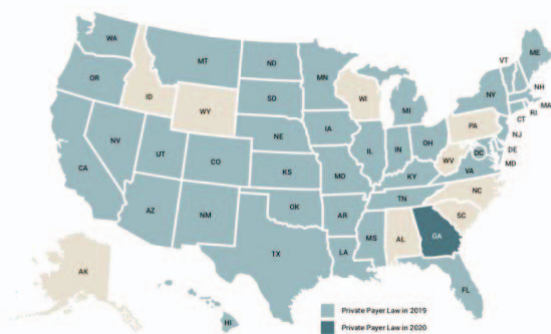
TABLE I. NEW CMS 2020 CPT CODE [12]

CPT Codes	Description
99421	For up to 7 days cumulative time during the 7 days; 5-10 minutes
99422	For up to 7 days cumulative time during the 7 days; 11-20 minutes
99423	For up to 7 days cumulative time during the 7 days; 21 or more minutes
98970	For up to 7 days cumulative time during the 7 days; 5-10 minutes
98971	For up to 7 days cumulative time during the 7 days; 11-20 minutes
98972	For up to 7 days cumulative time during the 7 days; 21 or more minutes
99453	Remote monitoring of physiologic parameters, initial; set-up and patient education on use of equipment
99454	Devices supply with daily recordings or programmed alerts transmission, Each 30 days
99457	Remote physiologic monitoring treatment management services, clinical staff/physician/other qualified health care professional time in a calendar month requiring interactive communication with the patient/caregiver during the month; first 20 minutes
99458	Each additional 20 minutes
99091	Collection and interpretation of physiologic data digitally stored and/or transmitted by the patient and/or caregiver to the physician or other qualified health care professional, qualified by education, training, licensure/regulation
99441	Telephone evaluation and management service by a physician or other qualified health care professional who may report evaluation and management services provided to an established patient, parent, or guardian not originating from a related E/M service provided within the previous 7 days nor leading to an E/M service or procedure within the next 24 hours or soonest available appointment; 5-10 minutes of medical discussion
99442	11-20 minutes of medical discussion
99443	21-30 minutes of medical discussion

States with Parity Laws for Private Insurance Coverage of Telemedicine (2018)



A) Private Payer Law Map in 2019:



B)

Figure 3: States with Telemedicine Parity Laws in A)Year 2018; and B) Year 2019 & 2020 [15, 16]

V. CONCLUSION

Before the COVID-19 outbreak, the adoption of telemedicine had been slow. During the pandemic, to control the spread of the virus, medical institutions have been increasingly using telemedicine to provide care to patients. State and federal governments and regulatory bodies made necessary policy and regulation changes to support telemedicine services. This rapid large-scale adoption of telemedicine poses an opportunity for development and strengthen. We predict telemedicine will play an increasingly significant role in healthcare delivery even after the pandemic is over.

REFERENCES

- [1] Akhlaghi, Hamed, and Hamed Asadi. Essentials of telemedicine and telecare. Chichester: Wiley, 2002.
- [2] Stokes, Erin K., et al. "Coronavirus disease 2019 case surveillance—United States, January 22–May 30, 2020." Morbidity and Mortality Weekly Report 69.24 (2020): 759.
- [3] Cucinotta, Domenico, and Maurizio Vanelli. "WHO declares COVID-19 a pandemic." Acta bio-medica: Atenei Parmensis, 91.1 (2020): 157-160.
- [4] The National Center for Health Statistics. Telemedicine: RANDS during COVID-19. <https://www.cdc.gov/nchs/covid19/rands/telemedicine.htm>. Accessed on 17 Nov, 2020.
- [5] CDC. Uses of Telehealth during COVID-19 in Low Resource Non-U.S. Settings, <https://www.cdc.gov/coronavirus/2019-ncov/global-covid-19/telehealth-covid19-nonUS.html>. Accessed on 21 July, 2020.
- [6] Bhaskar, Sonu, et al. "Telemedicine as the New Outpatient Clinic Gone Digital: Position Paper From the Pandemic Health System RESilience PROGRAM (REPROGRAM) International Consortium (Part 2)." Frontiers in public health 8 (2020).
- [7] Loeb, Alexander E., et al. "Departmental experience and lessons learned with accelerated introduction of telemedicine during the COVID-19 crisis." The Journal of the American Academy of Orthopaedic Surgeons (2020).
- [8] Judson, Timothy J., et al. "Rapid design and implementation of an integrated patient self-triage and self-scheduling tool for COVID-19." Journal of the American Medical Informatics Association 27.6 (2020): 860-866.
- [9] Scott Kruse, Clemens, et al. "Evaluating barriers to adopting telemedicine worldwide: A systematic review." Journal of telemedicine and telecare 24.1 (2018): 4-12.
- [10] Weinstein, Ronald S., et al. "Telemedicine, telehealth, and mobile health applications that work: opportunities and barriers." The American journal of medicine 127.3 (2014): 183-187.
- [11] Horton, Katie, Mary-Beth Malcarney, and Naomi Seiler. "Medicare payment rules and telemedicine." Public Health Reports 129.2 (2014): 196-199.
- [12] Lin, Judith C., et al. "Telemedicine platforms and their use in the coronavirus disease-19 era to deliver comprehensive vascular care." Journal of vascular surgery (2020).
- [13] US Department of Health and Human Services. "OCR announces notification of enforcement discretion for telehealth remote communications during the COVID-19 nationwide public health emergency." US Department of Health and Human Services. HHS.gov Accessed at www.hhs.gov/about/news/2020/03/17/ocr-announcesnotification-of-enforcement-discretion-for-telehealth-remote-communicationsduring-the-covid-19.html (2020).
- [14] Kim, J., Eesha Desai, and Megan B. Cole. "How The Rapid Shift To Telehealth Leaves Many Community Health Centers Behind During The COVID-19 Pandemic,." Health Affairs Blog, 2 June (2020).
- [15] Ortholive. "Insurance Carriers Embrace Telehealth Part 2 – Private Payers". (2018)
- [16] Center for Connected Health Policy. "State Telehealth Laws and medicaid program policies: A comprehensive scan of the 50 states and District of Columbia: Findings and Highlights." (2019).