Implementation and Usefulness of Telemedicine During the COVID-19 Pandemic: A Scoping Review

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Abstract

Objectives: Identify and summarize the available literature on the acceleration in the use of telemedicine in the midst of the COVID-19 pandemic, with an aim to provide justification and guidance for its implementation to overcome the limitations associated with the pandemic worldwide. Methods: We conducted a scoping review through different search strategies in MEDLINE and Google Scholar to identify the available literature reporting data on implementation and usefulness of various modalities of telemedicine during the current pandemic. We summarized the included studies according to field and mode of implementation in a narrative way. Results: We included 45 studies that fulfilled selection criteria. About 38% of the studies were conducted in the United States of America (USA), followed by 15.5% in India and 15.5% in China. Most studies (73%) were cross-sectional studies based on historical records. All publications were written in English with the exception of 1 studied published in Spanish. The majority of reports focused on use of telemedicine for outpatient care, followed by in-hospital care. Conclusion: The COVID-19 pandemic has promoted the use of telemedicine, a tool that has transformed the provision of medical services. Several modes of implementation are useful to overcome difficulties for patient care during the pandemic. Its benefits are specific to different fields of medical practice. Such benefits, along with the guidance and reported experiences should invite health systems to work for an effective and comprehensive implementation of telemedicine in various fields.

Keywords

telemedicine, telehealth, COVID-19, SARS-CoV-2, pandemic

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Introduction

On March 11, 2020, the emergency committee of the World Health Organization (WHO) declared COVID-19 (coronavirus infectious disease, 2019) caused by SARS CoV-2 virus infection, as a global pandemic that would sooner or later affect all countries of the world.¹ The lack of specific treatments and vaccines has forced management to focus on preventive strategies that reduce viral transmission. In trying to control the spread of the virus worldwide, various public health policies have been implemented, including the use of face masks, correct and frequent hand wash and social distancing, with isolation and quarantine strategies imposed by different governments.¹ This has represented an unprecedented challenge for health services, which have been forced to modify the usual modality of service provision,² and to transform and focus this opportunity towards progress.³⁻⁵ Through this driving force, medical care has migrated from hospitals to the homes of patients by the strengthening of home care and the implementation of telemedicine,⁶ a first-line tool to confront this pandemic.⁷ Telemedicine has been considered an ideal tool to face this emergency. Globally, for approximately a decade, telemedicine

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had been gradually implemented. However, restrictive administrative regulations and missing solid legal frameworks had been the compelling reasons behind the slow growth of this type of care. Other limitations can be added to explain the short expansion of telemedicine. Limited economic investment in technological resources for hospitals, and the reluctance to adopt telemedicine by medical providers and by patients themselves, have also played a pivotal role.\textsuperscript{6,8}

The COVID-19 pandemic has promoted and accelerated the implementation of telemedicine.\textsuperscript{9} The objective of this scoping review was to conduct a comprehensive assessment of the utility of telemedicine during this global emergency and to summarize its achievements, with focus on physicians and patients experience with this tool.

**Methodology**

A scoping review was conducted to identify and summarize the current evidence about the implementation and utility of telemedicine during the COVID-19 pandemic. We selected the methodology of a scoping review because it allows a general and comprehensive approach to the subject.

The search strategy employed is provided in supplemental data Appendix 1. MEDLINE and Google Scholar were the databases used to identify the selected publications. The MESH terms and keywords used to optimize and maximize the search were COVID-19, Telemedicine, SARS-CoV-2, Coronavirus. The final date of the search was May 31, 2020.

**Inclusion Criteria and Selection Process**

The inclusion criteria were applied by 2 obstetrics and gynecology physicians involved in telemedicine research, independently (MH and JG). Disagreements upon the fulfillment of the inclusion criteria were resolved by in-depth discussion until a consensus was reached. The included studies had to directly use, implement or evaluate telemedicine in its different modalities; had to be used as a strategy during the COVID-19 pandemic; and had to report quantitative data on the process of implementation, usefulness and/or evaluation of telemedicine. We limited our search to publications written in English or Spanish, without restriction according to study type or design. We considered published literature and preprint literature given the emerging nature of this topic. The titles and abstracts of all search results were reviewed, and finally, the full texts of the selected studies were obtained to determine inclusion. Study protocols were excluded.

**Data Extraction**

All studies were independently reviewed by the 2 reviewers. After ruling out duplicates, the included studies were reviewed in full text and data was obtained regarding the type of publication, type of study, patient characteristics, and telemedicine modality implemented and/or evaluated. Quantitative results aiming at measuring the usefulness of telemedicine after implementation during the COVID-19 pandemic were extracted. The data was summarized in tables and verified by the reviewers. As part of the analysis, we sought to describe and highlight the rationale for different telemedicine modalities implemented and the different fields of application. Subsequently, we analyzed the benefits, difficulties and limitations described across the studies.

**Results**

The initial search yielded 728 results (MEDLINE, 356; Google Scholar, 372). After eliminating duplicates and applying the selection criteria, 43 articles were included in the review. This process is shown in Figure 1.

Table 1 summarizes the characteristics of the selected articles. A total of 72\% of the studies were cross-sectional studies with collection and retrospective analysis. About 99\% of the publications were written in English, with a single publication in Spanish. All publications were written in the first semester of 2020, during the months of March, April, and May, and only 1 study was a preprint.

**Fields of Implementation**

The majority of published studies focused only on 1 field of telemedicine implementation, as shown in Table 2. Few
researchers explored its use in more than 1 area. The most common application of telemedicine identified was for outpatient care (54%), followed by in-hospital care (24%), where it has been applied in emergency and hospitalization scenarios. Some studies focused on the perceptions of physicians and patients after telemedicine implementation (18%). Finally, studies on the usefulness of telemedicine, focused on education during the COVID-19 pandemic (4%).

Supplemental Table 2.1 displays the 27 studies that focused on the implementation of telemedicine in outpatient clinics. In the majority of these studies, 2 technologies were implemented: video calls and telephone calls for consultations. All of the study results positively evaluated the experience and usefulness of telemedicine. Supplemental Table 2.2 shows the 12 publications that focused on in-patient care, evaluating the use of telemedicine in areas such as emergency triage service (7), inpatient care (4) and interhospital consultations (1). Supplemental Table 2.3 summarizes the studies that addressed the perception of physicians and patients after the implementation of telemedicine in different services. Supplemental Table 2.4 includes the four studies addressed the topic of telemedicine used for education during the pandemic.

### Discussion

Our review identified 43 studies that reported on telemedicine implementation and experience in different fields during the current COVID-19 pandemic, reporting quantitative results that provide objectivity to the analysis. The significant number of articles published in such a short period of the year 2020 and the diversity of the countries that have reported their experiences highlight the massive growth that this tool has had. In this way, telemedicine has become a front-line strategy in the fight against SARS-CoV-2 and the pandemic caused by its massive spread.

### Implementation of Telemedicine in Outpatient Consultation

One of the fields of greatest implementation of telemedicine, even before the pandemic, is outpatient consultation or virtual ambulatory control. In the search for continuity of medical care, without exposing patients or doctors and avoiding transportation to hospitals and unnecessary contact in waiting rooms via consultations, virtual consultations were adopted. This is clearly reflected in the migration that occurred from face-to-face outpatient management to virtual management developed through video calls or phone calls, otherwise known as teleconsultation.

Our review identified 27 publications that evaluated the usefulness of telemedicine in the outpatient setting. Various hospitals in the United States during the months of March and April experienced a massive migration to virtual care, associated with a decrease of more than 80% of in-person visits. In a report from New York City, the epicenter of the pandemic during those months, the growth of teleconsultations was exorbitant, increasing from less than 50/day to more than 1000/day, representing more than 70% of the ambulatory volume they were previously managed in 4 hospitals.

Ambulatory practices of various specialties, in countries such as Italy, the United States and India reported virtual migration percentages between 60% and 95% of their usual practice. Additionally, they reported a satisfactory control of different chronic pathologies, ensuing continuity of care and a quick transition to virtual care through the use of electronic medical.

### Implementation of Telemedicine in In-Patient Care

The benefits of the implementation of telemedicine can be transferred in the same way to in-hospital care, as reported in 12 of the selected publications. In emergency services, so-called “forward triage” is a concept that has been specifically designed for crisis scenarios such as viral epidemics and catastrophes. It is defined as the process of determining...
a patient’s condition before the patient arrives at the emergency department. Through a 24/7 service in which, via video calls—preferably between doctors and patients—symptoms and epidemiological links are evaluated and, according to a medical evaluation, further care is provided. In New York, during the months of March and April in the NYU Langone Health (NYULH) system, emergency forward triage was the first telemedicine service that showed exponential growth. Over the course of 15 days, there was an increase from 82 virtual consultations to 1336, of which 55% involved symptoms suggestive of COVID-19; at 6 weeks, they had more than 16 000 emergency consults related to COVID-19. Through video calls, they determined which patients were at high risk of deterioration and required emergency referral, and which patients could continue remote home management, avoiding unnecessary visits, which reduced the number of individuals in the emergency department and makes resource allocation more efficient.

Another application of telemedicine for in-patient care is as a tool for daily follow-up of hospitalized patients, allowing medical rounds via video calls. To avoid direct contact and nosocomial contagion, patients are isolated with an electronic device. Additionally, the use of personal protective equipment (PPE) was minimized by avoiding direct contact. Likewise, telemedicine allows virtual consultations between hospitals, an especially useful modality when facing a new and unknown entity such as COVID-19, because it allows constant communication between institutions and opens the possibility of contacting experts to guide and counsel medical and/or administrative decisions. This represents an important gain for rural areas, even more so in times of transportation restrictions.

Acceptance of Telemedicine Implementation

The various applications have allowed the implementation of telemedicine in a comprehensive manner in different health services, which translates into multiple benefits for the general community. This has been reflected in the interest of the general population in this form of health care. In the United States, through quantification of the volume of searches on Google, researchers found that as COVID-19 cases increased, the number of searches and interest in telemedicine increased, with a high correlation ($r=0.948$, $P<.001$).

Within the institutions that have implemented telemedicine, this tool has been widely accepted by users and patients, as shown in different evaluations and satisfaction surveys. This shows that the use of telemedicine translates to a high degree of satisfaction by users, even more so when it facilitates consultations for many patients who must travel long distances to receive a medical evaluation by a specialist.

Regarding acceptance, the perception of health personnel should also be measured, for in the case of a low approval rate efficiency could decrease, as would implementation of telemedicine over time. In Ireland, ninety-two percent of the psychiatrists surveyed reported a reduction in diagnostic confidence by not being able to evaluate the patient’s nonverbal language. These important aspects must be taken into account to achieve success in the implementation of telemedicine because the physician plays fundamental role. Transitioning from telephone consultations to video consultations would improve the acceptance of this modality by psychiatrists.

Limitations and Strengths

Our search was limited to articles published until May 31, 2020, and due to the rapid advancement of information on this topic, new useful information may arise for the implementation of telemedicine services in the short term. Furthermore, despite the rigorous search strategy, there may be other unidentified studies. Our search was exhaustive and included gray literature, trying to cover a wide range of evidence worldwide.

Among the strengths of our review is that quantitative results were identified to support telemedicine implementation. By focusing on the 43 studies that reported quantitative data, we guaranteed objectivity in our analyses. Similarly, we classified and analyzed the publications according to the field in which telemedicine was used or evaluated, which allowed us to generate a comprehensive and complete

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### Table 2. Articles Included by Field of Implementation.

| Field of implementation                                      | Number of studies | Countries reporting                                      | Type of telemedicine implemented                           |
|---------------------------------------------------------------|-------------------|----------------------------------------------------------|-----------------------------------------------------------|
| Out-patient consultation                                     | 27                | USA, China, Poland, Spain, Italy, Canada, UK, India       | Video call and phone call                                 |
| Inpatient care: emergency triage, hospitalization, and interhospital consultation | 12                | USA, China, Italy, UK, Iran                              | Multimodal: video call, phone call, and mobile application |
| Patient and physician satisfaction                            | 9                 | USA, Mexico, UK, Ireland, India                          | Video call and phone call                                 |
| Education                                                     | 4                 | USA, Switzerland, China                                  | Video call, video conference                              |

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review of the subject useful for many actors and stakeholders in the healthcare provision sector worldwide.

Conclusion

The COVID-19 pandemic has had a significant global impact on the provision of healthcare. The need for implementation of digital technologies such as telemedicine has never been more relevant. The various applications and benefits presented make telemedicine probably, as discussed in Hollander and Carr, a highly useful, if not essential, strategy to face this pandemic. However, accessing these benefits requires comprehensive logistics to ensure successful implementation. In Latin America, the hospital infrastructure is not as robust and homogeneous at all levels, as is in North America or Europe. Hospitals in low and medium income countries continue to be concentrated in large cities, and few have the comprehensive level of expertise, technology and resources needed, which can hinder telemedicine implementation, mainly in rural areas.

Similarly, to ensure maximum impact and proper functioning of telemedicine, it must be fully integrated into health systems. For this, changes must be generated through regulations and policies that include this new modality of service provision so that it is authorized by insurers. Global Health Intelligence (GHI), in a Webinar conducted on April 23, 2020, reviewed the penetration of telemedicine in Latin America. Among the main obstacles identified, is the lack of political support and the lack of an understanding of the applications and usefulness of telemedicine. This scoping review is also intended as a call to create awareness of the potential solutions that telemedicine provides for many difficult situations in health care provision and community well being during the COVID-19 pandemic.

The COVID-19 pandemic will probably be a landmark for telemedicine history. Our review shows that this pandemic has transformed the provision of medical services, with applications for telemedicine in various fields of medical practice. Health systems are faced with an unprecedented opportunity to learn from the current situation and draw lessons for the future. To enable low and medium-income countries to widely rely on this tool, more information is needed regarding costs and necessary resources to ensure effective implementation.

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Supplemental Material

Supplemental material for this article is available online.

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