

Telemedicine for diagnosis or treatment during Covid-19: systematic review

Telemedicina para diagnóstico ou tratamento durante a Covid-19: revisão sistemática

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ABSTRACT

Objective: To describe the use of telemedicine by health professionals for diagnosis or treatment of patients during the Covid-19 pandemic. **Method:** This is a systematic literature review of observational studies. Five databases were used. The assessment of the studies methodological quality occurred individually among the revisors and the Joanna Briggs Institute (JBI) tool was used. **Results:** The reviewers selected 22 articles from 6,180 works. The services provided through telemedicine were consultation/screening, consultation/follow-up or monitoring, test reports, medication prescriptions and case discussions. The technological resources used were platforms using video and telephone (audio and video). The use of telemedicine made it possible to reduce their exposure to Covid-19, reduce social panic and anxiety, quickly medical specialties access and the possibility of access to diagnosis and treatment of patients with chronic and acute diseases. **Conclusion:** Telemedicine can be an important tool in healthcare, keeping patients and healthcare professionals safe during the Covid-19 pandemic.

Descriptors: Telemedicine; COVID-19; SARS-CoV-2.

INTRODUCTION

In December 2019, the first news of the new coronavirus SARS-CoV-2 appeared on the TV news. This disease appeared in China as a contagious and potentially lethal respiratory infection that resulted in the greatest health adversity, the coronavirus (Covid-19) pandemic. Countries have been working to contain the spread of the infection using social distancing and stay-at-home orders⁽¹⁾.

Even with vaccines and supporting therapies, social distancing, face masking and quarantine are also giving space to telemedicine health care. Telemedicine is defined as a telecommunication tool to disseminate information about health services^(2,3). It is observed that the rise of this strategy has been growing in recent decades, and the evolution of mobile technology has made health professionals adhere to this tool and to be able to disseminate information about health⁽⁴⁻⁷⁾.

Every pandemic and public health emergency leads to an increase in demand for medical care, which strains local capacities. To prevent increased demand for office visits and the spread of diseases, telemedicine offers a solution to quickly respond to changes in diagnostic and/or treatment options during a health emergency⁽⁴⁾.

Telemedicine is carried out by video conference, webchat, email, via Zoom, phone calls or mixed. And these ways are capable of increasing access to care, continuing medical education and health professionals training⁽⁷⁾. Thus, integrating the health system together with new technological possibilities aimed at bringing a perspective of improvement to clinical care, with the aim of reducing the distance between the health service and the community^(5,6). In this context, when health systems are collapsing and one needs to reduce costs and, at the same time, one needs to ensure the quality, access, completeness and equity of the service, thus, one must use strategies that can

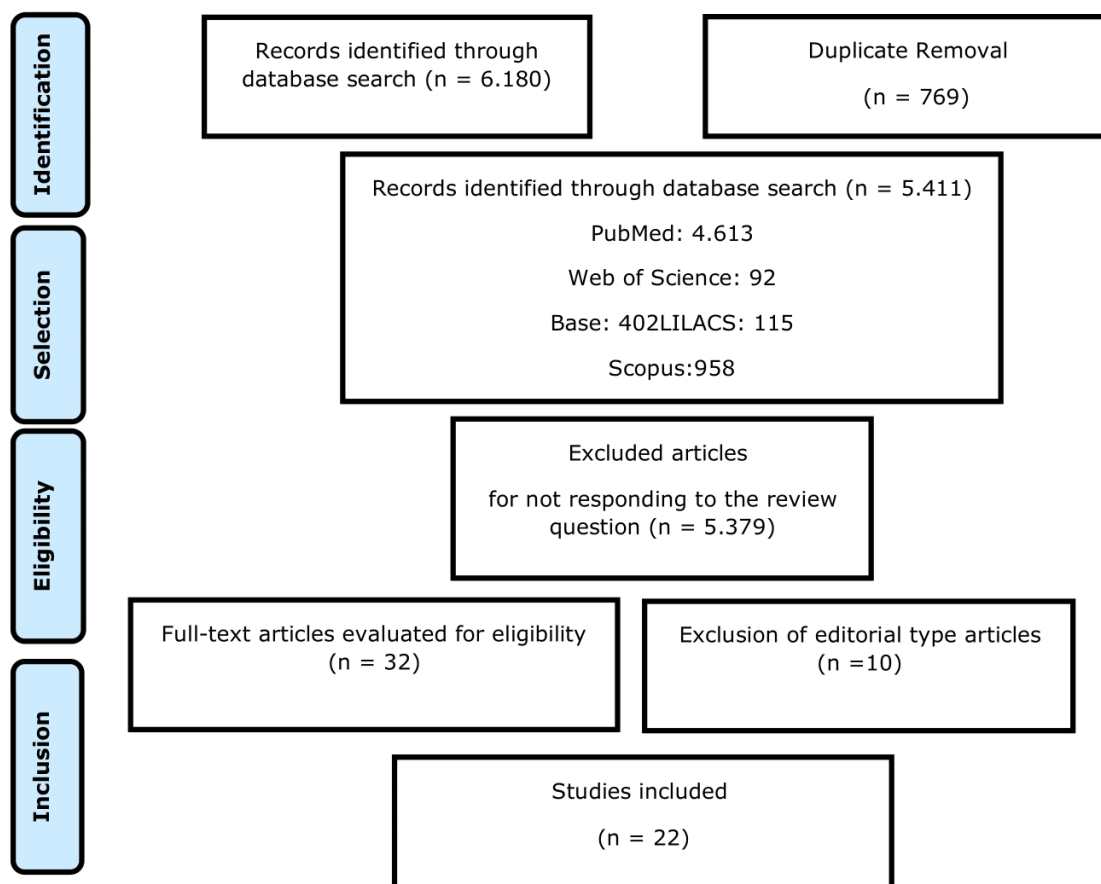
help and improve this scenario⁽⁸⁾. This study aims, through a systematic literature review, to describe the use of telemedicine by health professionals for diagnosis or treatment in patients during the Covid-19 pandemic.

METHOD

This is a systematic literature review with a qualitative approach. The question used to outline the research is "What are the impacts of the use of telemedicine by health professionals for the diagnosis or treatment of patients during the Covid-19 pandemic?". The recommendations were met from the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA-2015 Guidelines)⁽⁹⁾.

The instrument used to assess methodological quality for observational studies was The Joanna Briggs Institute (<https://jbi.global/critical-appraisal-tools>). All the steps were performed by three reviewers independently. A protocol for the review was registered through PROSPERO

under registration number: CRD42020181435. The databases used were: Latin American and Caribbean Literature on Health Sciences (LILACS), EMBASE (Elsevier platform), Web of Science, MEDLINE (via PubMed) and Scopus. A combination of keywords, descriptors and MeSH was used as a search strategy, as follows: "COVID-19"[Supplementary Concept] OR (2019 novel coronavirus disease) OR (covid 19) OR (COVID-19pandemic) OR (sars-cov-2 infection) OR (COVID-19virus disease) OR (2019 novel coronavirus infection) OR (2019-ncov infection) OR (coronavirus disease 2019) OR (coronavirus disease-19) OR (2019-ncov disease) OR (COVID-19virus infection); "Telemedicine"[Mesh] OR (Connected Health) OR (Digital Health) OR (Health 2.0) OR (Health Tele-Services) OR (Health Teleservices) OR (Health, Mobile) OR (Medicine 2.0) OR (Mobile Health) OR (Pervasive Computing) OR (Technologies for Healthcare) OR (Pervasive Health) OR Telecare OR Telecure OR Telehealth OR (Teleservices in the Health Sector)



Source: Flowchart adapted from Peters et al., 2020.

Figure 1 – PRISMA flowchart of the study selection process for inclusion of studies for the systematic review. Santa Maria, RS, Brazil, 2020

OR (Ubiquitous Health) OR eHealth OR mHealth OR (mHealth Alliance) OR u-Health”.

The Population, Intervention, Comparison, Outcome, and Study Design Criteria (PICOS) were used to determine the inclusion and exclusion of articles for this review. The following articles were included: Use of telemedicine by healthcare professionals for diagnosis or treatment of patients during the Covid-19 pandemic; Patients of all age groups without restriction of pathologies treated by telemedicine during the Covid-19 pandemic period; Observational Studies (case report and series, cross-sectional, cohort and case-control) and all languages. Review studies and gray literature were excluded.

Search results were stored using Rayyan for records management by embedding all searches in a library. Duplicate records will be removed. A first screening of all articles will be done at the title and abstract search level based on scope. Inclusion criteria will be applied by three independent reviewers. The reviewers performed the analysis of each full-text article according to the inclusion and exclusion criteria. The selection of articles was carried out between December 2019 and May 2020 (Figura 1).

Data extraction was performed by three authors using a Microsoft Excel spreadsheet. Articles were evaluated for publication date, year, country, target population/health professional, service provided (admission, consultation, meeting, remote patient monitoring, communication and counseling), technology used (asynchronous, synchronous, videoconferencing, mobile and mixed), sample size, study type, and category of findings (quality/technique, implementation, insights, clinical process/outcomes, cost-effectiveness).

The strategy for data synthesis was narrative and descriptive of the findings. The assessment of the methodological quality of the individual studies was performed by three researchers independently using Critical Appraisal Tools from Joanna Brigg’s Institute (JBI)⁽¹⁰⁾.

The JBI is a tool used for methodological analysis of observational and experimental studies. In this aspect, the evaluation was used for observational studies, being a case report with 8 domains, a cohort study with 11 domains, a case series with 10 domains and a case-control study with 10 domains. The domains were answered with “yes”, “no”, “unclear” or “not applicable”. Data were recorded in a Microsoft Excel spreadsheet. This article did not require ethical approval because it is a literature review.

RESULTS

6,180 were found in the five databases and 769 articles were excluded due to duplicity. Of these 5,411 studies, 5,379 were excluded because they did not meet the inclusion criteria and at this stage, the selection was based on reading the title and abstract, totaling 32 studies. The 32 articles were read in full and the final selection was 22 works, according to the Figure 2. Figure 2 shows the following variables: Author, Country, Patient, Healthcare professional Service Provided, Technology Used and Study Design.

The 22 articles were carried out for methodological analysis according to the type of study being case report, case series, cross-sectional, cohort and case-control with the Critical Appraisal Tools tool (Figure 3, Figure 4 and Figure 5).

Figure 3 presents a methodological quality analysis of the type of case report study included.

Figure 4 presents a Methodological quality analysis of the type of case series and cohort study included.

Figure 5 presents a methodological quality of Cross-sectional studies and Case-Controls included.

DISCUSSION

Telemedicine has provided health professionals with a reduction in their exposure to COVID-19, reduction of social panic and anxiety, access to medical specialties quickly and the possibility of access to diagnosis and treatment of patients. There was adherence by patients to the use of telemedicine in ophthalmology, and among the benefits for patients were: reduction of waiting and travel time, but they claim concern about the diagnosis and loss of contact. For physicians, it was a possibility to minimize the transmission of COVID-19 and to use it to check symptoms, screening, ensure adherence to treatment and follow up pre and postoperative patients⁽¹⁾.

Payra Middleton et al.⁽⁴⁾, telehealth needs legislation that ensures this form of care and the possibility of providing health services to people with difficulty accessing health. The telemedicine strategy is favorable for implementing multidisciplinary care as long as it uses appropriate technology and clinically stable patients⁽⁵⁾.

For the adhesion of vulnerable populations, there are some recommended strategies: reduce digital technology disparities; virtual approaches to address social needs and language barriers; Internet privacy and security; and among the challenges are refunds to users and other forms

Author	Country	Patient	Healthcare professional	Service Provided	Technology Used	Study Design
Williams et al., 2020 ⁽¹⁾	USA	Ophthalmology patients.	Doctor/Ophthalmology	Screening, consultation, remote patient monitoring (follow-up, pre and post-operative).	Phone, photo or videos.	Case report/experience
Middleton et al., 2020 ⁽⁴⁾	USA	Stroke, hypertensive, diabetic	Physiotherapist	Telerehabilitation (appropriate exercise program for older adults with functional limitations)	Audio, video and/ or text from participants.	Case report
Compton et al., 2020 ⁽⁵⁾	USA	Cystic fibrosis patients	Multidisciplinary team	Remote monitoring and consultation.	Via internet and telephone.	Case series
Damiani et al., 2020 ⁽¹¹⁾	Italy	Patients with psoriasis.	Multidisciplinary team in dermatology	Video	WhatsApp, Facetime, Skype and Zoom.	Case control
Baidal et al., 2020 ⁽¹²⁾	USA	Obese children.	Multidisciplinary team	Screening, virtual grouping, individual nutrition, physical activity, and mental health support.	Video conference	Case report
Hong et al., 2020 ⁽²⁾	China	Vulnerable groups: the elderly, pregnant women, children and patients with chronic diseases	Multidisciplinary team	Consultations for exams, prescription and delivery of medication.	Real-time video telemedicine system, phone and apps.	Case report/experience
Qualliotine et al., 2020 ⁽¹³⁾	USA	Malignant neoplasm	Doctor	Postoperative guidance	Phone and video	Case report
Daruich et al., 2020 ⁽¹⁴⁾	Argentina	Patients	Doctor	Ophthalmological consultation and follow-up.	Phone and video	Case report
Borchert et al., 2020 ⁽¹⁵⁾	USA	Patients	Doctor	Screening and consultation.	Phone and video.	Cohort
Mann et al., 2020 ⁽³⁾	USA	Patients with respiratory problems	Doctor/ multidisciplinary	Urgent and non-urgent consultations	Video conference	Case series
Garg et al., 2020 ⁽¹⁶⁾	USA	Patients with diabetes.	Doctor	Query and monitoring the diabetes.	Virtual visits, via television, email and phone.	Case report/experience
Patel et al., 2020 ⁽¹⁷⁾	USA	Children and teenagers	Doctor	Non-urgent consultation	Video conference	Case series
Kim et al., 2020 ⁽¹⁸⁾	Korea	Patients with Covid-19.	Not informed	Screening patients with Covid-19.	Telephone	Case report
Ren et al., 2020 ⁽⁷⁾	China	Patient with Covid-19	Not informed	Case discussion among physicians (outpatient and hospital data)	Telephone mobile and video presentation.	Case report
Khairat et al., 2020 ⁽¹⁹⁾	USA	Patient with Covid-19	Doctor	Consultations and monitoring.	Virtual visits. Use the phone or video call.	Cohort
Huang et al., 2020 ⁽²⁰⁾	China	Patient with Covid-19	Multidisciplinary team	Consultation/follow-up	Online consultation	Case report
Rodler et al., 2020 ⁽²¹⁾	Germany	Patients with uro-oncology	Urologist and nursing	Monitoring of patients' signs and symptoms	Phone and email.	Cohort

Davarpanah et al., 2020 ⁽²²⁾	Will	Confirmed and / or suspected patients of Covid-19.	Doctor	Teleradiology	WhatsApp	Case report
Luciani et al., 2020 ⁽²³⁾	Italy	Urology patients	Doctors	Queries	Phone	Transversal
Boehm et al., 2020 ⁽²⁴⁾	Do not inform	Urology patients, being oncological and non-oncological	Doctor	Side dish and consultation.	Phone and videoconferencing.	Transversal
Gong et al., 2020 ⁽²⁵⁾	China	Patients with suspected covid	Doctor	Consultation	Video conference	Cohort
Yang et al., 2020 ⁽²⁶⁾	China	48 public dental hospitals	Dentists	Dental consultations	Web chat and by phone.	Transversal

Figure 2 - Data extraction from the articles selected for the systematic literature review. Santa Maria, RS, Brazil, 2020

Williams et al., 2020 ⁽¹⁾	Middleton et al., 2020 ⁽⁴⁾	Baidal et al., 2020 ⁽¹²⁾	Hong et al., 2020 ⁽²⁾	Qualliotine et al., 2020 ⁽¹³⁾	Daruich et al., 2020 ⁽¹⁴⁾	Mann et al., 2020 ⁽³⁾	Garg et al., 2020 ⁽¹⁶⁾	Patel et al., 2020 ⁽¹⁷⁾	Kim et al., 2020 ⁽¹⁸⁾	Ren et al., 2020 ⁽⁷⁾	Huang et al., 2020 ⁽²⁰⁾	Davarpanah et al., 2020 ⁽²²⁾
1. Were patient's demographic characteristics clearly described?												
No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Was the patient's history clearly described and presented as a timeline?												
No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	No
3. Was the current clinical condition of the patient on presentation clearly described?												
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
4. Were diagnostic tests or assessment methods and the results clearly described?												
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Was the intervention(s) or treatment procedure(s) clearly described?												
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6. Was the post-intervention clinical condition clearly described?												
Unclear	Yes	No	Yes	Yes	Yes	No	Yes	NA	NA	No	Yes	No
7. Were adverse events (harms) or unanticipated events identified and described?												
Yes	No	No	Yes	Yes	NA	No	NA	NA	No	No	No	Yes
8. Does the case report provide takeaway lessons?												
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

Figure 3 - Methodological quality analysis of the type of case report study included. Santa Maria, RS, Brazil, 2020
Not applicable (NA)

of follow-up. An important intervention for adherence to telemedicine, for example, may have been influenced by the presence of family members at home during the pandemic in the treatment proposed to children⁽¹²⁾.

Among the advantages discussed in the studies belonging to this review, there was the possibility of precision in the diagnosis, quick access to specialists for the population with difficulty to travel, cost reduction and reduction in the number of patients and overcrowding in outpatient centers^(2,11,15) and reduce concern among patients with chronic diseases⁽²⁾.

In the area of urology, the use of the telemedicine service provided follow-up, consultations,

guidance and prescription. More than 50% of urology patients were eligible for telehealth care and are in agreement with this type of care, as well as an efficient screening measure and protecting doctors and patients in the face of the COVID-19 pandemic and the disadvantages loss of clinical information and inaccuracies in telephone assistance⁽²³⁻²⁴⁾.

The use of telemedicine in communicable diseases has become useful⁽²⁷⁾ to provide usual care⁽²⁸⁾. With the Covid-19 pandemic being a highly contagious disease, social distancing was recommended, and this led to an increase in the use of telemedicine⁽²⁸⁾. During this period of the pandemic, there was a 50-300-fold increase in

Case Series	Compton et al., 2020⁽⁵⁾	Khairat et al., 2020⁽¹⁹⁾	Rodler et al., 2020⁽²¹⁾	Gong et al., 2020⁽²⁵⁾	Borchert et al., 2020⁽¹⁵⁾
1. Were there clear criteria for inclusion in the case series?	Yes				
2. Was the condition measured in a standard, reliable way for all participants included in the case series?	Yes				
3. Were valid methods used for identification of the condition for all participants included in the case series?	Yes				
4. Did the case series have consecutive inclusion of participants?	Yes				
5. Did the case series have complete inclusion of participants?	Yes				
6. Was there clear reporting of the demographics of the participants in the study?	No				
7. Was there clear reporting of clinical information of the participants?	Yes				
8. Were the outcomes or follow up results of cases clearly reported?	Yes				
9. Was there clear reporting of the presenting site(s)/clinic(s) demographic information?	Yes				
10. Was the statistical analysis appropriate?	Yes				
Cohort					
1. Were the two groups similar and recruited from the same population?		Yes	Yes	Yes	Yes
2. Were the exposures measured similarly to assign people to both exposed and unexposed groups?		No	Yes	Yes	Yes
3. Was the exposure measured in a valid and reliable way?		No	Yes	Yes	Yes
4. Were confounding factors identified?		No	No	No	No
5. Were strategies to deal with confounding factors stated?		Yes	No	No	No
6. Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?		Yes	Yes	Yes	Yes
7. Were the outcomes measured in a valid and reliable way?		Yes	Yes	Yes	Yes
8. Was the follow up time reported and sufficient to be long enough for outcomes to occur?		Yes	No	Yes	Unclear
9. Was follow up complete, and if not, were the reasons to loss to follow up described explored?		Yes	No	Yes	Yes
10. Were the strategies to address incomplete follow up utilized?		No	No	Yes	Yes
11. Was appropriate statistical analysis used?		No	No	Yes	Yes

Figure 4 - Methodological quality analysis of the type of case series and cohort study included. Santa Maria, RS, Brazil, 2020

Analytical Cross Sectional	Luciani et al., 2020⁽²³⁾	Yang et al., 2021⁽²⁶⁾	Damiani et al., 2020⁽¹¹⁾	Boehm et al., 2020⁽²⁴⁾
1. Were the criteria for inclusion in the sample clearly defined?	Yes	Unclear		Yes
2. Were the study subjects and the setting described in detail?	Yes	Yes		No
3. Was the exposure measured in a valid and reliable way?	Yes	Yes		No
4. Were objective, standard criteria used for measurement of the condition?	No	Yes		Yes
5. Were confounding factors identified?	Yes	No		No
6. Were the strategies to deal with confounding factors stated?	Yes	No		Yes
7. Were the outcomes measured in a valid and reliable way?	Yes	Yes		Yes
Case Control Studies				
1. Were the groups comparable other than the presence of disease in cases or the absence of disease in controls?			No	
2. Were cases and controls matched appropriately?			No	
3. Were the same criteria used for identification of cases and controls?			No	
4. Was exposure measured in a standard, valid and reliable way?			No	
5. Was exposure measured in the same way for cases and controls?			No	
6. Were confounding factors identified?			No	
7. Were strategies to deal with confounding factors stated?			No	
8. Were outcomes assessed in a standard, valid and reliable way for cases and controls?			No	
9. Was the exposure period of interest long enough to be meaningful?			Yes	
10. Was appropriate statistical analysis used?			Yes	

Figure 5 - Methodological quality of Cross-sectional studies and Case-Controls included. Santa Maria, RS, Brazil, 2020

the number of patients consulted via telemedicine⁽²⁹⁾. Another data on the use of telemedicine, 50% of physicians adhered to telemedicine and report that virtual consultation was not part of their practice⁽²⁹⁻³⁰⁾.

The adhesion of telehealth technology in this scenario is evident that it is an effective and safe tool which there is a need to promote new incentives, policies and remove old barriers to telemedicine acceptance. It is clear that it is essential to follow guidelines and scientific evidence for the implementation of this system so that it can play a role in standardizing the provision of this service.

Among the benefits of telemedicine, it can reduce patient travel to the office/hospital, also causing a significant reduction in the emission of carbon

dioxide and other atmospheric pollutants. There was no such description regarding pollutant reduction in this systematic review⁽³¹⁻³³⁾.

Regarding the use of telemedicine during the pandemic, 34.2% of the physicians claimed that telemedicine is valid in these circumstances and 42.5% stated that online consultation should be integrated into clinical practice, but 23% of the physicians reported that telemedicine was not important for their professional activity⁽³³⁾.

About the implementation of telemedicine, there are some negative aspects, namely: secrecy and privacy; reimbursement or payment of service bills using remote communication; and the technical or logistical difficulties involved in implementing telemedicine. Among other situations that concerned health professionals about the use

of telemedicine, the issue of the patient's education level and their adherence to this practice and the legalization of prescriptions and virtual medical certificates were also mentioned⁽³⁴⁾.

Regarding the methodological evaluation of the articles, it can be mentioned that the case reports and case series studies present in this work meet the evaluation criteria, only one case report question obtained eight negative responses out of a total of 13 studies related to whether the condition post-intervention clinic was clearly described.

As for the cohort, there was a work of eleven questions and six negative answers. And of the four studies evaluated, the question "were confounding factors identified" all the evaluators' answers were negative. The three cross-sectional studies provided information to obtain a good assessment of methodological quality, but the

cohort study had 80% of the criteria evaluated with negative responses by the evaluators.

The limitation was the lack of studies of randomized trials on the topic of telemedicine, and thus, the studies used for the systematic review were classified with a low level of evidence.

CONCLUSION

Telemedicine can be an important tool in health services in terms of prevention, screening, diagnosis, treatment and follow-up, keeping patients and health professionals safe during the COVID-19 pandemic even though the studies present in this review are observational.

CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

REFERENCES

1. Williams AM, Kalra G, Commiskey PW, Bowers EMR, Rudolph BR, Pitcher MD, et al. Ophthalmology Practice During the Coronavirus Disease 2019 Pandemic: The University of Pittsburgh Experience in Promoting Clinic Safety and Embracing Video Visits. *Ophthalmol Ther*. 2020;9(3):1-9. <https://doi.org/10.1007/s40123-020-00255-9> [included in the review]
2. Hong Z, Li N, Li D, Li J, Li B, Xiong W, et al. Telemedicine during the COVID-19 pandemic: Experiences from Western China. *J Med Internet Res*. 2020;22(5):e19577. <https://doi.org/10.2196/19577> [included in the review]
3. Mann DM, Chen J, Chunara R, Testa PA, Nov O. COVID-19 transforms health care through telemedicine: Evidence from the field. *J Am Med Inform Assoc*. 2020;27(7):1132-1135. <https://dx.doi.org/10.1093/jamia/ocaa072> [included in the review]
4. Middleton A, Simpson KN, Bettger JP, Bowden MG. COVID-19 Pandemic and Beyond: Considerations and Costs of Telehealth Exercise Programs for Older Adults With Functional Impairments Living at Home-Lessons Learned From a Pilot Case Study. *Phys Ther*. 2020;100(8):1278-88. <https://dx.doi.org/10.1093/ptj/pzaa089> [included in the review]
5. Compton M, Soper M, Reilly B, Gettle L, List R, Bailey M, et al. A Feasibility Study of Urgent Implementation of Cystic Fibrosis Multidisciplinary Telemedicine Clinic in the Face of COVID-19 Pandemic: Single-Center Experience. *Telemed J E Health*. 2020;26(8):978-984. <https://doi.org/10.1089/tmj.2020.0091> [included in the review]
6. Anderson MG, Lambert W, Leclair N, Athar D, Martin JE, Bookland MJ et al. Telemedicine utilization in an outpatient pediatric neurosurgical clinic: a prospective survey of patient and family preferences. *World Neurosurg*. 2023;S1878-8750(23)00748-9. <https://doi.org/10.1016/j.wneu.2023.05.102>
7. Ren X, Zhai Y, Song X, Wang Z, Dou D, Li Y. The Application of Mobile Telehealth System to Facilitate Patient Information Presentation and Case Discussion. *Telemed J E Health*. 2020;26(6):725-33. <https://doi.org/10.1089/tmj.2020.0084> [included in the review]
8. Zanotto BS, Etges APBS, Siqueira AC, Silva RS, Bastos C, Araujo AL, et al. Economic evaluation of a telemedicine service to expand primary

- health care in Rio Grande do Sul: Teleoftalmo's microcosting analysis. *Cienc e Saude Coletiva*. 2020;25(4):1349-60. <https://doi.org/10.1590/1413-81232020254.28992019>
9. Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, et al. Chapter 7: Systematic reviews of etiology and risk. In: Aromataris E, Munn Z, editors. *JBIM Manual for Evidence Synthesis*. JBI, 2020. <https://doi.org/10.46658/JBIMES-20-08>
 10. Lockwood C, Porritt K, Munn Z, Rittenmeyer L, Salmond S, Bjerrum M, Loveday H, Carrier J, Stannard D. Chapter 2: Systematic reviews of qualitative evidence. In: Aromataris E, Munn Z, editors. *JBIM Manual for Evidence Synthesis*. JBI, 2020. <https://doi.org/10.46658/JBIMES-20-03>
 11. Damiani G, Pacifico A, Bragazzi NL, Malagoli P. Biologics increase the risk of SARS-CoV-2 infection and hospitalization, but not ICU admission and death: Real-life data from a large cohort during red-zone declaration. *Dermatol Ther*. 2020;33(5):2-7. <https://doi.org/10.1111/dth.13475> [included in the review]
 12. Woo Baidal JA, Chang J, Hulse E, Turetsky R, Parkinson K, Rausch JC. Zooming Toward a Telehealth Solution for Vulnerable Children with Obesity During Coronavirus Disease 2019. *Obesity*. 2020;28(7):1184-6. <https://doi.org/10.1002/oby.22860> [included in the review]
 13. Qualliotine JR, Orosco RK. Self-removing passive drain to facilitate postoperative care via telehealth during the COVID-19 pandemic. *Head Neck*. 2020;42(6):1305-1307. <https://doi.org/10.1002/hed.26203> [included in the review]
 14. Daruich A, Martins D, Bremond-gignac D. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID. *J Fr Ophthalmol* 2020;43(1):389-391. <https://doi.org/10.1053/j.jvca.2020.02.039> [included in the review]
 15. Borchert A, Baumgarten L, Dalela D, Jamil M, Budzyn J, Kovacevic N, et al. Managing Urology Consultations During COVID-19 Pandemic: Application of a Structured Care Pathway. *Urology*. 2020;141:7-11. <https://doi.org/10.1016/j.urology.2020.04.0%2059> [included in the review]
 16. Garg SK, Rodbard D, Hirsch IB, Forlenza GP. Managing New-Onset Type 1 Diabetes During the COVID-19 Pandemic: Challenges and Opportunities. *Diabetes Technol Ther*. 2020;22(6):431-439. <https://doi.org/10.1089/dia.2020> [included in the review]
 17. Patel PD, Cobb J, Wright D, Turer RW, Jordan T, Humphrey A, et al. Rapid Development of Telehealth Capabilities within Pediatric Patient Portal Infrastructure for COVID-19 Care: Barriers, Solutions, Results. *J Am Med Inform Assoc*. 2020;27(7):1116-1120. <https://doi.org/10.1093/jamia/ocaa065> [included in the review]
 18. Kim SW, Lee KS, Kim K, Lee JJ, Kim J. A brief telephone severity scoring system and therapeutic living centers solved acute hospital-bed shortage during the COVID-19 outbreak in Daegu, Korea. *JKMS*. 2020;35(15):2-7. <https://doi.org/10.3346/jkms.2020.35.e152> [included in the review]
 19. Khairat S, Meng C, Xu Y, Edson B, Gianforcaro R. Interpreting COVID-19 and Virtual Care Trends: Cohort Study. *JMIR Public Health Surveill*. 2020; 6(2): e18811. <https://doi.org/10.2196/18811> [included in the review]
 20. Huang S, Xiao Y, Yan L, Deng J, He M, Lu J, et al. Implications for Online Management: Two Cases with COVID-19. *Telemed e-Health*. 2020;26(4):487-94. <https://doi.org/10.1089/tmj.2020.0066> [included in the review]
 21. Rodler S, Apfelbeck M, Stief C, Heinemann V, Casuscelli J. Lessons from the coronavirus

- rus disease 2019 pandemic: Will virtual patient management reshape uro-oncology in Germany? *Eur J Cancer*. 2020;132:136-40. <https://doi.org/10.1016/j.ejca.2020.04.003> [included in the review]
22. Davarpanah AH, Mahdavi A, Sabri A, Langroudi TF, Kahkouee S, Haseli S, et al. Novel Screening and Triage Strategy in Iran During Deadly Coronavirus Disease 2019 (COVID-19) Epidemic: Value of Humanitarian Teleconsultation Service. *Journal of the American College of Radiology*. 2020;17(6):734-738. <https://doi.org/10.1016/j.jacr.2020.03.015> [included in the review]
 23. Luciani LG, Mattevi D, Cai T, Giusti G, Proietti S, Malossini G. Teleurology in the Time of Covid-19 Pandemic: Here to Stay? *Urology*. 2020;140:4-6. <https://dx.doi.org/10.1016/j.urology.2020.04.004> [included in the review]
 24. Boehm K, Ziewers S, Brandt MP, Sparwasser P, Haack M, Willems F, et al. Telemedicine Online Visits in Urology During the COVID-19 Pandemic-Potential, Risk Factors, and Patients' Perspective. *Eur Urol*. 2020 Jul;78(1):16-20. <https://doi.org/10.1016/j.eururo.2020.04.055> [included in the review]
 25. Gong K, Xu Z, Cai Z, Chen Y, Wang Z. Internet Hospitals Help Prevent and Control the Epidemic of COVID-19 in China: Multicenter User Profiling Study. *J Med Internet Res*. 2020;22(4):e18908. <https://doi.org/10.2196/18908> [included in the review]
 26. Yang Y, Zhou Y, Liu X, Tan J. Health services provision of forty-eight public tertiary dental hospitals during the COVID-19 epidemic in China. *Clinical oral investigations*. 2020;24(5):1861-1864. <https://doi.org/10.1007/s00784-020-03267-8> [included in the review]
 27. Cormi C, Ohannessian R, Sanchez S. Motivations of French Physicians to Perform Teleconsultations During COVID-19: A Mixed-Method Study. *Telemed J E Heal*. 2021;27(11):1299-1304. <https://doi.org/10.1089/tmj.2020.0524>
 28. Reicher S, Sela T. TO. Using Telemedicine During the COVID-19 Pandemic: Attitudes of Adult Health Care Consumers in Israel. *Front Public Heal*. 2021;9. <https://doi.org/10.3389/fpubh.2021.653553>
 29. Nouri SS, Khoong EC, Lyles CR, Karliner LS. Addressing Equity in Telemedicine for Chronic Disease Management During the Covid-19 Pandemic. *NEJM Catal*. 2020;1-13. <https://doi.org/10.1056/CAT.20.0123>
 30. Siow MY, Walker JT, Britt E, Kozy JP, Zanzucchi A, Girard PJ, et al. What Was the Change in Telehealth Usage and Proportion of No-show Visits for an Orthopaedic Trauma Clinic During the COVID-19 Pandemic? *Clin Orthop Relat Res*. 2020;478(10):2257-63. <http://dx.doi.org/10.1097/CORR.0000000000001396>
 31. Connor MJ, Miah S, Edison MA. Clinical, fiscal and environmental benefits of a specialist-led virtual ureteric colic clinic: a prospective study. *BJU Int*. 2019;124:1034-1039. <https://doi.org/10.1111/bju.14847>
 32. Vidal-Alaball J, Franch-Parella J, Lopez Seguí F, Garcia Cuyàs F, Mendioroz Peña J. Impact of a Telemedicine Program on the Reduction in the Emission of Atmospheric Pollutants and Journeys by Road. *Int J Environ Res Saúde Pública*. 2019;16(22):4366. <http://dx.doi.org/10.3390/ijerph16224366>
 33. Whetten J, Montoya J, Yonas H. ACCESS to Better Health and Clear Skies: Telemedicine and Greenhouse Gas Reduction. *Telemed JE Health*. 2019;25(10):960-965. <https://doi.org/10.1089/tmj.2018.0172>
 34. Thong HK, Wong DKC, Gendeh HS, Saim L, Athar PPBSH, Saim A. Perception of telemedicine among medical practitioners in Malaysia during COVID-19. *J Med Life*. 2021;14(4):468-80. <http://dx.doi.org/10.25122/jml-2020-0119>

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