

Evolution and challenges of telemedicine in children's health: An integrative review



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ABSTRACT

Introduction: The World Health Organization (WHO) recognizes telemedicine as a technological strategy to reach patients, as it is an effective tool, especially in countries with deficient infrastructure and insufficient number of health professionals. Thus, this study aims to analyze the acceptance of

telemedicine in children's health. **Methods:** This is an integrative review, through the PICO strategy, covering studies published in the period of 2014 and 2023, which were included in the SciELO and LILACS databases. **Results:** There are 12 articles that meet the proposed objective of this study. In these reviews, there is a predominance of qualitative methods, which indicates an exploratory approach to the understanding of child telemedicine. The research addresses topics such as the use of telemedicine in the teaching of child health, as well as evaluations of pediatric cardiology, among other experiences in various specialties, evidencing the adaptability of this practice. **Discussion:** The discussion covers thematic categories, including the perception of professionals and patients about telemedicine, ethical and legal implications, and the comparison of experiences in different pediatric specialties. The acceptance of teleconsultation by health professionals is analyzed, as well as the associated ethical and legal issues, emphasizing the importance of following existing regulations. **Conclusion:** Telemedicine emerges as an important strategy in pediatric care, offering effective care, especially in contexts with limitations and other challenges. This integrative review highlights the need for clear regulations, the training of health professionals and the multidisciplinary approach as key elements for the effective and safe advancement of telemedicine in children's health, ensuring effective and bioethical care for this age group.

Keywords: Telemedicine, Child Health, Telepediatrics.

1 INTRODUCTION

Teleconsultation is defined by the World Health Organization (WHO) as a strategy practiced by health professionals, with the purpose of assisting patients through information technology, aiming to promote health, such as the prevention, diagnosis, and treatment of various health events (Nascimento *et al.*, 2023). For the purpose of promoting patient well-being, these consultations can be



conducted through secure telephony, video conferencing, and/or mobile app services (Schimitz *et al.*, 2017).

Among its sociodemographic characteristics, Brazil presents significant heterogeneities and disparities in the concentration of health professionals, as well as other essential health services (Schimitz *et al.*, 2017). This reality stems from the outdated infrastructure conditions in some regions, as well as the limitation of equipment and supplies, which negatively interferes with health care in these locations (Tagues *et al.*, 2023).

Despite these limitations, teleconsultation is considered an essential instrument to promote first contact, as well as longitudinal care, care coordination, and specialized care, i.e., care with universality, equity, and comprehensiveness, with the purpose of facilitating access to health services (Melo *et al.*, 2022). Thus, the provision of telehealth services requires specific regulations, currently developed in a multidisciplinary manner, covering speech therapy, nursing, psychology and medicine (Catapan; Calvo, 2021).

In contrast to the benefits mentioned, teleconsultation has significant limitations that deserve discussion, such as the impossibility of evaluating somatoscopy and patient-specific propaedeutics (Capelo *et al.*, 2022). In addition, confidentiality is also a questionable subject, which can compromise the professional-patient relationship, interfering with the real diagnosis and appropriate conduct of the problem in question (Capelo *et al.*, 2022).

Pediatrics, a medical specialty dedicated to the comprehensive care of children, pre-adolescents and adolescents, plays a crucial role in the healthy development of this group (Santos; Segues; Puccini, 2012). In order to ensure the well-being of future generations, the integration of advanced technologies, such as teleconsultation, is essential to ensure accessibility to care, especially in remote areas (BIRAL *et al.*, 2023).

As with face-to-face consultations, pediatric consultations can be performed remotely through various techniques, adapted to the pediatric clinical context (Macwilliam; Hennessey; Cleary, 2021). Although in some situations it is not safe to rely exclusively on remote examination, the consultation can be enriched by the use of clinical photographs shared by patients, providing benefits for both patients and parents, including reduced costs associated with transportation and less impact on work obligations (Macwilliam; Hennessey; Cleary, 2021).

Therefore, the aim of this integrative review is to conduct a critical analysis of the acceptance of telemedicine by healthcare professionals and patients, highlighting factors such as perceived value, resistance to change, and ethical and legal issues in pediatrics. In addition, we seek to investigate how the resolutions and guidelines elaborated by the Federal Council of Medicine (CFM) and the Brazilian Society of Pediatrics (SBP) can intervene in the practice of telepediatrics.



2 METHODOLOGY

The present research adopts an integrative literature review approach, a method that enables the analysis and synthesis of relevant studies, allowing comprehensive conclusions about the current state of the investigated topic (Mendes, Silveira, Galvão, 2008). The process was outlined in six distinct phases: 1) identification of the theme and selection of the guiding hypothesis or question; 2) establishment of criteria for inclusion and exclusion of studies/sampling or literature search; 3) definition of the information to be extracted from the selected studies/categorization of the studies; 4) evaluation of the studies included in the integrative review; 5) interpretation of results; 6) presentation of the review/synthesis of knowledge (Sousa, *et al.*, 2017).

The research question was formulated using the PICO strategy (population, interest/phenomenon of interest and context) (Santos, Pimenta, Nobre, 2007), considering health professionals as a population and the care of pediatric patients in teleconsultations as a phenomenon of interest. Thus, the guiding question considered the acceptance and perception of health professionals and patients in relation to telemedicine, along with the ethical and legal implications associated with the practice of telemedicine in pediatrics, which contribute to the effective advancement of telepediatrics.

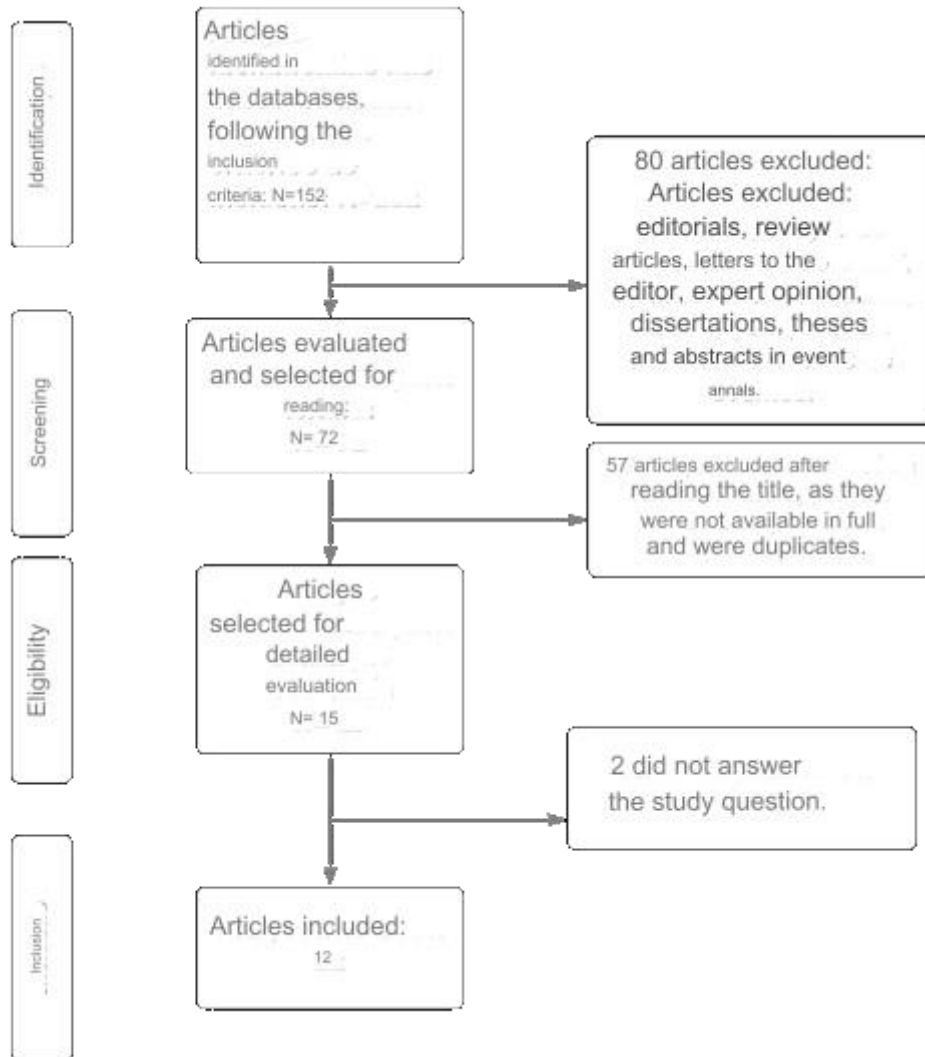
The literature search was conducted from October to November 2023, using the Scientific Electronic Library Online (SciELO), Latin American and Caribbean Health Sciences Literature (LILACS), and BDEF databases. The descriptors in Portuguese, extracted from the "Descriptors in Health Sciences" (DeCS), used for the search were: telemedicine; Child health; and telepediatrics.

Primary studies that answered the guiding question, published in any language, from 2014 to 2023, with full text available and open access, were included. Exclusion criteria included editorials, letters to the editor, dissertations, theses, and abstracts in annals of events that did not address the proposed question. Duplicate articles were treated as a single occurrence.

The data collection process followed the four phases recommended by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher *et al.*, 2009): identification, selection, eligibility, and inclusion, as shown in Figure 1.



Figure 1. Diagram of the selection of primary studies by adapting the PRISMA flowchart.



Source: Prepared by the authors, 2023.

In the end, 12 articles were meticulously chosen to participate in the review. The phases of the literature selection process were conducted by a reviewer, considering the scope of the study, the research question, and the inclusion and exclusion criteria. When uncertainties arose about eligibility, meetings were held to reach a consensus. The decision to include articles from 2014 onwards was also made by consensus.

The critical analysis and qualitative synthesis of the studies selected in this review were based on the content analysis proposed by Bardin (2016), following three stages: pre-analysis, which involved the selection and ordering of the documents to be analyzed, resulting in the formulation of hypotheses, objectives, and criteria to support the analysis; the exploration of the material, which consisted of the analysis of the documents using the chosen methodology; and the treatment of results, inference and interpretation, a stage dedicated to the interpretation and exploration of content through thematic categories.



In order to categorize the studies and establish the level of evidence of the articles, the proposed classification was adopted: level I - meta-analyses and randomized controlled studies; level II - experimental studies; level III - quasi-experimental studies; level IV - descriptive, non-experimental or qualitative studies; level V - experience reports; and level VI - consensus and expert opinions (Melnyk, Fineout-Overholt, 2015).

As an integrative review, this study was not submitted to the research ethics committee. However, national and international ethical principles were respected, preserving the ideas of the authors of the publications used in the conception of this work.

3 RESULTS

In the analysis of the scientific articles, as shown in Chart 01, the results of this research stand out. All articles were published in health journals, and the languages used were predominantly Portuguese, English and Spanish.

Table 1: Summary of the articles included in the final sample of the review.

Articles	References	Methods	Objectives	Results
01	ALMINO, <i>et al.</i> , 2014.	Experience report	To describe the experience of using telemedicine in the teaching-learning process in Pediatrics.	Teleconferencing is evidenced as a resource for the consolidation of active methodologies of the teaching-service process, with students playing a leading role in their academic training, and as an innovative technology for the pedagogical problematization of clinical practices.
02	CARDOSO, <i>et al.</i> , 2014.	Experience report	To report the experience and quality of daily contacts between a pediatric cardiology center and 14 health centers in Paraíba.	Technical difficulties occurred, with the difficulty of responding to the call being the most responsible (57.7%), followed by problems with the internet connection (11.8%).
03	STRICKLER, <i>et al.</i> , 2018.	Experience report	Report 10 years of mixed care experience (face-to-face and remote), the institutional impact, the advantages, as well as the informed acceptance by parents and patients.	It was concluded that 70% of the parents and patients accepted the care model. The annual number of transferees decreased from 10 to 1. The advantages perceived by parents and patients were overcome.
04	KRYNSKIA, <i>et al.</i> , 2018.	Literature review	Analyze the channels available for communication with patients, mediated by information and communication technologies.	It was observed that patients tripled their visits when they had electronic means during the first 5 years, which allowed physicians to alternate face-to-face practice with online consultations.
05	GÓMES, <i>et al.</i> , 2020.	Literature review	To present the potential of telemedicine as an alternative to conventional face-to-face consultations in patients with epilepsy.	Applied telemedicine services have proven to be very useful, allowing them to continue to provide remote healthcare services to people with epilepsy. Telemedicine has been shown to



				be non-inferior to face-to-face consultations, in addition to reducing expenses and time spent on transportation to the hospital.
06	JALDÍN <i>et al.</i> , 2020.	Literature review	Address telemedicine, as a fundamental care service, in the COVID-19 era.	Telemedicine in this new era of pandemic has become very important, due to the digital connection between the doctor and the patient, providing the opportunity for the early diagnosis of pathologies, as well as treatment and clinical follow-up.
07	PELLEGRINI, <i>et al.</i> , 2021.	Experience report	Describe the current regulatory and ethical framework for telemedicine in Argentina.	Telemedicine represents an alternative for communicating with patients, but it requires specific legislation. The experience of the Teleconsultation project of the British Hospital of Buenos Aires demonstrates acceptance by doctors and patients.
08	COSTA, <i>et al.</i> , 2021	Quantitative cross-sectional study	OBJECTIVE: To analyze the profile of dental teleconsultation in the area of Pediatric Dentistry of the Telehealth Program Redes Brasil, in centers of Minas Gerais, Brazil.	Most of the questions in pediatric dentistry were related to clinical management (81.4%), and 16.6% were related to prevention. Continuing education programs for professionals working in primary health care are crucial for the comprehensive care of pediatric patients.
09	PALOMBO, <i>et al.</i> , 2022	Scope Review	Map mobile health interventions to improve health outcomes in childhood.	The importance of telehealth is recognized, corroborating current evidence on the development and implementation of virtual tools, which are implemented to promote children's health.
10	PAIVA, <i>et al.</i> , 2023	Scope Review	To identify the evidence on internet-based technologies and their applicability in outpatient and home care in pediatric urology.	Technological evidence and its respective applications in outpatient and home care enable the care and monitoring of urological symptoms in children.
11	TAKAO, <i>et al.</i> , 2023	Descriptive study	Describe the development of a website and the creation of a paediatric allergy/immunology social media account with reliable information, to promote education and to have a doctor-patient contact channel.	Patients and caregivers of the Pediatric Allergy and Immunology service considered the digital information shared by the teaching and research institution to be timely and relevant. These interviewees acknowledged that the site has presented adequate performance and feedback regarding accesses.
12	MALDONADO, <i>et al.</i> , 2016	Exploratory work	Provide an overview of telemedicine as an important tool to address the challenges of universal health systems.	Telemedicine is a strategic area that has the potential to collectivize access to health services, integrating remote regions with health services located in hospitals and referral centers in terms of prevention,



				diagnosis and treatment, as well as clinical follow-up.
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Source: prepared by the authors, 2023.

When analyzing the table, it is noted that the most predominant type of study is qualitative research, covering approximately 55% of the studies (Almino *et al.*, 2014; Cardoso *et al.*, 2014; Krynski *et al.*, 2018; Gómes *et al.*, 2020; Costa *et al.*, 2021). This predominance suggests an exploratory and descriptive orientation in research, aiming to understand experiences, perceptions and impacts of telemedicine in pediatrics. At the same time, experience reports are also relevant, highlighting the importance of sharing practices and learnings in the field of technology-mediated pediatric health.

Regarding the objectives, there is a convergence in the search to understand the efficacy and acceptance of telemedicine in pediatric contexts. With regard to the main results, studies indicate that telemedicine in pediatrics has the potential to consolidate active teaching methodologies (Almino *et al.*, 2014), facilitate clinical management at a distance (Strickler *et al.*, 2018), *expand access and communication between professionals and patients* (Cardoso *et al.*, 2014; Krynski *et al.*, 2018; Costa *et al.*, 2021), and *address specific challenges, as in the case of paediatric epilepsy during the pandemic* (Gómes *et al.*, 2020).

4 DISCUSSION

After reading and analyzing the articles, the following thematic categories were established: Perception of health professionals and patients in relation to telemedicine; Ethical and legal implications associated with the practice of telemedicine in pediatrics; Comparison of Experiences in Different Paediatric Specialties:

4.1 PERCEPTION OF HEALTH PROFESSIONALS AND PATIENTS IN RELATION TO TELEMEDICINE

The acceptance of telemedicine by health professionals is a relevant topic that is still little explored. The study by Castro *et al.* (2020) investigated the acceptance of telemedicine, specifically teleconsultation, by Brazilian physicians. The results indicate that factors related to value perception, resistance to change and regulation are crucial for the acceptance of teleconsultations.

In addition, the study identified factors not previously addressed in the literature, such as the previous doctor-patient relationship, the importance of face-to-face physical examination, possibilities in medical specialties, and corporatism. These results may be useful for the implementation and dissemination of telemedicine in Brazil, taking into account the perspectives and concerns of health professionals in relation to this type of care (Carneiro; Santin, 2023; Castro *et al.*, 2020). Telemedicine



services should be incorporated into healthcare providers' privacy and security policies, procedures, and workflows. Patients should only enter their personal information on secure websites, keeping their devices protected with up-to-date antivirus software, and securing their wireless connection with a password. It is also advisable to avoid using public Wi-Fi to access telemedicine services (Castro *et al.*, 2020).

4.2 ETHICAL AND LEGAL IMPLICATIONS ASSOCIATED WITH THE PRACTICE OF TELEMEDICINE IN PEDIATRICS

The article "Telepediatrics: norms, legislation and ethics" discusses the ethical and legal implications associated with the practice of telemedicine in pediatrics. The text highlights that the Federal Constitution of Brazil and the civil penal code bring important elements for the reflection of safe, ethical and normative practices.

In addition, the Federal Council of Medicine and the Brazilian Society of Pediatrics have developed resolutions and guidelines to guide professionals and parents/guardians of patients to use the available tools legally and responsibly. The legislation that ensures the confidentiality, secrecy and security of data has been increasingly improved.

The text emphasizes the importance of following existing rules and regulations to ensure the safety and quality of care (Azevedo, 2019). The practice of telemedicine in pediatrics has ethical and legal implications to consider. On the one hand, the Code of Medical Ethics states that the doctor should not prescribe treatments or perform procedures without directly examining the patient, unless it is an urgent or emergency situation and there is a proven impossibility to perform the examination.

In addition, Resolution 1974/2011 of the Federal Council of Medicine prohibits consultation, diagnosis or prescription by any means of distance communication. However, there are exceptions to this prohibition. The doctor can guide patients he already knows, to whom he has already provided face-to-face care, by phone, to clarify doubts about prescribed medications, for example. Therefore, telemedicine can be used as a complementary means of communication, as long as the physician has already had previous face-to-face contact with the patient (Melo *et al.*, 2022; Santos *et al.*, 2014).

4.3 COMPARISON OF EXPERIENCES IN DIFFERENT PAEDIATRIC SPECIALTIES:

A study by Gómes *et al.* (2020) highlights telemedicine as an effective alternative in pediatric epilepsy, providing remote services through various communication channels. In addition, specific considerations about seizure control, medication adjustment, and psychological support reinforce the adaptability of telemedicine in specific pediatric clinical settings.

No study by Paiva *et al.* (2023) on pediatric urology, a variety of technologies, such as telehealth and telemedicine, highlight the diversity of approaches available for outpatient and home



care. This scoping survey not only provides a broad overview of the available evidence, but also highlights the importance of internet-based technologies, mobile apps, and other resources in the delivery of specialized care.

Another relevant study is that of Jaldín *et al.* (2020), which presents a remote care guide for pediatric COVID-19 patients. The research highlights the great importance of telemedicine, recommended by the World Health Organization, for the follow-up of patients with respiratory symptoms, underlining the flexibility of this modality in treating various pediatric pathologies, including in emergencies.

In summary, telemedicine in pediatrics presents a range of experiences and outcomes. The accessibility and perception of healthcare professionals, ethical and legal considerations, and variations between specialties highlight the complexity of this evolving field. The continuous search for solutions that maximize benefits and minimize challenges is crucial for the effective advancement of teleconsultation in child health. Understanding these experiences contributes to a more complete picture of the benefits and challenges of telemedicine in pediatrics.

5 CONCLUSION

Telemedicine has been recognized as an effective strategy in primary health care, contemplating its respective essential attributes, mainly as a possibility of access to health services. The advancement of this practice in medical specialties and other professions corroborates health promotion, including the planning of prevention activities, early diagnosis and effective treatment, enabling patient follow-up in hard-to-reach places.

In view of the critical analysis of the selected studies, it is evident that telemedicine plays a significant role in pediatric health care, offering a viable and effective alternative, especially in challenging contexts such as remote regions.

The integrative review allowed a comprehensive understanding of the ethical, legal, and practical implications associated with teleconsultation in pediatrics, highlighting the acceptance of health professionals, the relevance of face-to-face physical examination, and the need for clear regulations. In addition, it is crucial to consider the limitations, such as the impossibility of the remote physical examination and the concerns about data privacy and security. The diversity of experiences in different pediatric specialties, such as cardiology, juvenile idiopathic arthritis, critical care, and urology, highlights the adaptability of telemedicine to diverse clinical conditions. Understanding these experiences is key to optimizing the benefits of teleconsultation in child health and overcoming challenges specific to each area.

In view of this scenario, the acceptance of telemedicine by health professionals, combined with the development of clear ethical and legal norms, emerges as determining factors for the effective



advancement of teleconsultation in pediatrics. The continuous search for solutions that maximize benefits and minimize challenges is imperative to ensure effective, accessible, and ethical healthcare delivery for future generations.

With this study, scientific information on the development and challenges of telemedicine in the context of child health is expanded, recognizing the scarcity of bibliographic references, which corroborate the discussion of a topic that is currently on the rise. Such knowledge should influence the training of health professionals involved in telepediatrics, with the objective of providing remote care as a problem-solving capacity and safety.



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