

Telemedicine in clinical practice: challenges and benefits for healthcare: a systematic review

La telemedicina en la práctica clínica: desafíos y beneficios para la atención de salud: revisión sistemática

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ABSTRACT

Background: Telemedicine has experienced exponential growth over recent decades, establishing itself as an essential tool for ensuring access to healthcare services, particularly in contexts of healthcare restrictions such as the COVID-19 pandemic. Initially employed for remote monitoring of vital signs, the evolution of communication technologies allowed telemedicine to expand into areas such as remote consultations, chronic disease management, and access to specialists in underserved regions. Methods: A systematic review of the literature was conducted using reputable databases such as PubMed, Scopus, SciELO, and Google Scholar, focusing on the impact of telemedicine on continuity of care, operational efficiency, and the doctor-patient relationship. Results: Evidence suggests that telemedicine improves therapeutic adherence, reduces unnecessary hospitalizations, and optimizes healthcare resource utilization. However, it also faces significant challenges related to equitable access to technology and the preservation of the human connection in medical care. Conclusion: Telemedicine is emerging as a fundamental strategy in modern clinical practice. Nonetheless, its successful implementation requires addressing the technological, regulatory, and cultural barriers that continue to persist.

Keywords: Telemedicine; Health Care; Chronic Diseases; Doctor-Patient Relationship; Health Efficiency; Continuity of Care.

RESUMEN

Introducción: La telemedicina ha experimentado un crecimiento exponencial en las últimas décadas, consolidándose como una herramienta esencial para garantizar el acceso a la atención médica, especialmente en contextos de restricciones sanitarias como la pandemia de COVID-19. Inicialmente utilizada para monitorear signos vitales a distancia, la evolución de las tecnologías de comunicación permitió que la telemedicina se expandiera hacia áreas como la consulta remota, el seguimiento de enfermedades crónicas y el acceso a especialistas en regiones de difícil cobertura. Métodos: Se realizó una revisión sistemática de la literatura en bases de datos reconocidas como PubMed, Scopus, SciELO y Google Académico, focalizándose en el impacto de la telemedicina en la continuidad del cuidado, la eficiencia operativa y la relación médico-paciente. Resultados: La evidencia sugiere que la telemedicina mejora la adherencia terapéutica, reduce hospitalizaciones innecesarias y optimiza los recursos sanitarios, aunque también enfrenta desafíos importantes relacionados con la equidad en el acceso tecnológico y la preservación del vínculo humano en la atención médica. Conclusión: La telemedicina se perfila como una estrategia fundamental en la práctica clínica moderna, pero su implementación exitosa requiere abordar barreras tecnológicas, regulatorias y culturales que aún persisten.

Palabras clave: Telemedicina; Atención de Salud; Enfermedades Crónicas; Relación Médico-Paciente; Eficiencia en Salud; Continuidad del Cuidado.

INTRODUCTION

Telemedicine represents one of the most notable advances in contemporary clinical practice, facilitating access to health services in high-demand settings or those with geographical limitations. (1,2) The definitive impetus for its implementation came during the COVID-19 pandemic, where the need for social distancing accelerated its global adoption. (3) From its earliest applications in the 1960s, used to remotely monitor vital signs in space, to the consolidation of complex virtual care platforms, telemedicine has evolved into a complementary—and, in many cases, essential—model within healthcare systems. (4)

Currently, its applications include teleconsultation, telemonitoring, tediagnosis, and teletherapy, which have enabled expanded access in rural areas, reduced waiting times, improved chronic disease management, and promoted continuity of care. (5,6) Furthermore, it has been key to empowering patients in their self-care and facilitating health education. (5) Despite these benefits, significant challenges remain, such as gaps in technological access, the need for digital literacy, data security and confidentiality, and limitations in the doctor-patient relationship due to the absence of physical contact. (7,8)

This study aims to systematically analyze the current scientific evidence on the impact of telemedicine in clinical practice, evaluating its benefits, limitations, and opportunities for continuous improvement. The central hypothesis proposes that telemedicine not only increases the efficiency of the healthcare system but also contributes to more equitable care, provided that adequate measures are implemented to mitigate its barriers. (6,9,10)

MATERIALS AND METHODS

This study consisted of a systematic review of the scientific literature to identify, analyze, and synthesize existing evidence on the impact of telemedicine on clinical practice. It focused particularly on its application in the management of chronic diseases, continuity of care, and the doctor-patient relationship. To this end, recognized electronic databases used in the biomedical field were consulted, such as PubMed, Scopus, SciELO, and Google Scholar. These databases were selected for their breadth of themes, coverage of the health sciences, and access to peer-reviewed scientific literature.

MeSH descriptors and keywords such as “Telemedicine,” “Health Care,” “Chronic Diseases,” “Physician-Patient Relationship,” “Health Efficiency,” and “Continuity of Care” were used. The initial database search identified 426 articles. After removing 37 duplicates, 389 records were evaluated by title and abstract, and 51 studies were selected for full-text review. After applying the inclusion and exclusion criteria, 13 scientific articles were included in the final analysis of this review. The inclusion and exclusion criteria applied during the study selection process are detailed in Tables 1 and 2, respectively.

Table 1 – Inclusion Criteria

Inclusion Criteria
Systematic reviews, clinical trials, observational studies, and cohort studies addressing the impact of telemedicine on clinical practice.
Studies on telemedicine in the management of chronic diseases (diabetes, hypertension, cardiovascular diseases, respiratory diseases).
Evaluation of telemedicine interventions in the clinical setting.
Articles in Spanish, English, or Portuguese.
Publications between 2010 and 2024.
Full-text access and adherence to rigorous methodological criteria.

The article selection process was conducted in three sequential phases: initial review of titles, evaluation of abstracts, and critical reading of the full text. The methodology followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure rigor, transparency, and reproducibility.

Data synthesis was qualitative, structured in a narrative format, which allowed for the identification of trends, similarities, differences, and gaps in the existing literature.

Table 2 – Exclusion Criteria

Exclusion Criteria
Articles focused exclusively on telemedicine as an educational or training tool.
Studies that focus solely on technological aspects without evaluating clinical outcomes.
Studies that, even if they meet the inclusion criteria, exhibit low methodological quality (e.g., lack of a control group when necessary, obvious biases, absence of adequate statistical analysis).
Duplicate or redundant publications of the same study in different sources.

RESULTS

After applying the defined inclusion and exclusion criteria, 13 scientific articles were selected for the final analysis, covering different methodological approaches (qualitative studies, quantitative studies, case studies, and systematic reviews) and geographic contexts (Brazil, Argentina, Bolivia, Colombia, Angola, and European n countries). The findings were organized into five main categories: clinical benefits, economic impact, technological and organizational barriers, ethical and legal aspects, and the doctor-patient relationship.

1. Clinical and Care Benefits

Several studies agree that telemedicine improves diagnostic efficiency, access to specialists, and continuity of care, especially for patients with chronic diseases.(8,9,11) A notable example was the use of teleneurology in Brazil’s public healthcare system, which significantly reduced unnecessary referrals, optimized care flows, and shortened the time to clinical decision-making. (10)

Furthermore, it was observed that telemedicine can be effective in postoperative follow-up, for patients with reduced mobility, and in regions with a shortage of specialized healthcare personnel. (12)

2. Economic Impact and Resource Optimization

Studies identified a significant reduction in costs associated with patient transport, avoidable hospitalizations, and unnecessary use of high-complexity resources. Ekeland et al. (2010) conducted a systematic review that concluded that telemedicine has the potential to reduce costs without compromising the quality of care. (6,7)

Similarly, in low-income settings such as Angola, telemedicine has been implemented to expand access without requiring massive investments in physical infrastructure. (9)

3. Technological, Organizational, and Cultural Barriers

Despite the reported benefits, multiple barriers persist that hinder the implementation of telemedicine. These include a lack of interoperability between systems, the absence of integrated electronic health records, a shortage of specific training, and resistance from professionals and patients. (8,9)

The study by Arteche et al. showed that, in Latin America, the digital divide between urban and rural regions limits the scalability of telemedicine. Bolivia, for example, faces serious infrastructure and connectivity limitations that hinder its widespread adoption. (12)

4. Ethical, Legal, and Regulatory Aspects

Regulating telemedicine remains a challenge. Several authors highlighted the need for clear regulations on the protection of personal data, professional liability, the legal validity of remote medical acts, and the confidentiality of electronically transmitted information. (7,8)

In some Latin American countries, legal gaps create legal uncertainty for healthcare professionals. The lack of common accreditation and certification standards for telemedicine services was also cited as a limitation.

5. Doctor-patient relationship and humanization of care

One of the most debated issues is the impact of telemedicine on the doctor-patient relationship. Some studies argue that the absence of physical contact and limitations in nonverbal communication weaken the bond. (7) However, other studies indicate that, with well-structured systems and adequate training, it is possible to maintain the quality of interaction and promote patient empowerment. (8,10)

DISCUSSION

The results of this systematic review demonstrate that telemedicine has established itself as an effective strategy for expanding access to health services, optimizing resource use, and improving continuity of care, especially in contexts with geographical or structural limitations. The range of benefits observed in the analyzed studies aligns with findings from previous reviews, such as that by Ekeland et al. (2010), which highlights its clinical effectiveness and cost-effectiveness across various medical specialties. (6,7)

One of the main findings was telemedicine's ability to reduce unnecessary referrals, as demonstrated by Gonçalves et al. (2023) in the context of teleneurology in Brazil's Unified Health System, thereby saving resources and improving the quality of care. (10) This type of direct impact on the efficiency of the healthcare system reaffirms the transformative potential of digital health technologies.

Regarding the economic impact, several authors agree that the proper implementation of telemedicine programs can generate significant savings for the healthcare system by reducing hospitalizations, transfers, and unnecessary in-person consultations. (8,9) These advantages, however, require strategic planning that includes initial investments in technological infrastructure and professional training.

However, the review also identified a series of structural and organizational barriers that hinder the full adoption of telemedicine. Difficulties with interoperability between systems, lack of access to technology in rural areas, low digital literacy among some patients and professionals, and resistance to change were repeatedly highlighted. (12) These barriers, while surmountable, require robust public policies, inter-institutional integration, and ongoing awareness-raising and training processes.

Another critical aspect identified was the absence or fragmentation of regulatory frameworks governing telemedicine. The lack of legal clarity on medical liability, data protection, and the validity of electronic prescriptions compromises the safety of remote medical care. (7) This is particularly relevant in countries where healthcare legislation has not yet been fully adapted to new digital modalities.

Regarding the doctor-patient relationship, the results reveal a tension between the operational benefits of virtual care and the perceived risks of dehumanization. While some studies suggest that telemedicine could weaken the therapeutic bond due to the lack of physical contact and nonverbal cues, other studies highlight its ability to empower patients, promote their autonomy, and facilitate active monitoring of their clinical condition. (8,10) This suggests that the impact on the care relationship depends more on the quality of the implemented system and the level of professional training than on the modality itself.

Furthermore, recent studies, such as those by Rodrigues Neves and Djament (2023), highlight that telemedicine, combined with mobile technologies and digital platforms, has also proven effective in the treatment of chronic diseases such as obesity. This systematic review showed that patients who accessed telehealth programs, including videoconferencing and monitoring apps, achieved greater weight loss and better treatment adherence than those who received only conventional care. These results reinforce the potential of telemedicine not only to improve accessibility but also to promote sustainable lifestyle changes and improved management of conditions with high health prevalence. (13)

The findings of this review underscore the need to view telemedicine not as an end in itself, but as a complementary tool within an integrated, patient-centered care network. Its implementation must consider not only technical aspects, but also sociocultural contexts, ethical frameworks, and the user experience. Only then will it be possible to achieve effective, equitable, and sustainable integration of telemedicine into clinical practice?

CONCLUSION

This systematic review demonstrated that telemedicine has established itself as a key tool for transforming health systems, offering concrete benefits in terms of accessibility, operational efficiency, cost reduction, and continuity of clinical care, especially in contexts with structural or geographic limitations.

It was demonstrated that its application can optimize resource use, reduce unnecessary referrals, strengthen care for chronic diseases, and expand access to medical specialties in regions with a shortage of trained professionals. Furthermore, during the COVID-19 pandemic, its essential role as a rapid and effective health response strategy was confirmed.

However, its full implementation still faces significant challenges, including cultural resistance to change, the digital divide between urban and rural regions, the lack of interoperability among systems, and the absence of consolidated regulatory frameworks that ensure the safety, confidentiality, and legality of remote medical procedures.

Therefore, telemedicine should not be viewed as a standalone solution, but rather as a complementary strategy within a patient-centered, ethical, inclusive, and evidence-based care model. Its effectiveness will depend on proper planning, investment in technological infrastructure, ongoing training for healthcare professionals, and the development of specific regulations to support its evolution.

Future studies should focus on evaluating the longitudinal impact of telemedicine, considering quality indicators, clinical outcomes, user satisfaction, and economic sustainability. Only through a comprehensive approach will it be possible to establish telemedicine as a fundamental pillar of 21st-century healthcare systems.

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