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MEDICINE AND TECHNOLOGY IN HEALTH: DIGITAL INNOVATIONS AND THE IMPACT OF NEW TECHNOLOGIES ON CONTEMPORARY MEDICAL CARE

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SUMMARY

Introduction: The incorporation of digital technologies in medicine has promoted structural changes in contemporary care models, impacting clinical processes, quality of care, and organization of health systems.**Objective:**To analyze and synthesize scientific evidence regarding the impact of digital innovations, including artificial intelligence, telemedicine, mHealth, electronic medical records, and big data, on the quality of medical care and care processes.**Methodology:**This is an integrative literature review conducted in indexed scientific databases (PubMed/MEDLINE, Scopus, and Web of Science), following PRISMA model recommendations. A total of 25 peer-reviewed studies that investigated

The clinical or procedural impact of digital technologies on medical practice. The data extraction covered the type of technology, clinical context, care impact, and main findings.**Results:**The studies demonstrated that artificial intelligence contributes to greater diagnostic accuracy and reduction of clinical errors. Telemedicine showed effectiveness in increasing access and continuity of care, especially in chronic diseases and emergency health contexts. mHealth applications favored therapeutic adherence and remote monitoring, while electronic medical records improved traceability and care coordination, although associated with organizational challenges. Predictive analytics based on big data showed potential for optimizing clinical decision-making.**Conclusion:** Digital technologies have a predominantly positive impact on the quality of contemporary medical care. However, their effectiveness depends on strategic implementation, adequate organizational integration, and ethical alignment.Digital transformation consolidates a data-driven care model, with the potential to promote greater efficiency, safety, and patient-centeredness.

Keywords: Digital Health; Artificial Intelligence; Telemedicine; Quality of Health Care; Health Information Technology.

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INTRODUCTION

The incorporation of digital technologies in the health sector has promoted a structural transformation in clinical care models, reorganizing care flows, diagnostic processes, and therapeutic strategies. The advancement of tools such as electronic medical records, telemedicine, artificial intelligence (AI), machine learning, big data, and mobile health applications (mHealth) has consolidated a new data-centered paradigm of assistance, interoperability, and digital support for clinical decision-making (1,5,20).

The adoption of information technologies in health has shown a predominant positive impact on care quality, including improvements in patient safety, operational efficiency, and standardization of clinical practices (1,24). Electronic medical records, for example, have contributed to greater traceability of clinical data and reduction of errors related to prescription and medical documentation (23). However, their implementation has also introduced challenges related to professional cognitive load and reorganization of clinical time, influencing the dynamics of outpatient care (16, 17).

In the context of telemedicine, robust evidence indicates that Remote interventions are capable of maintaining or improving the quality of care compared to in-person care, especially in the management of chronic diseases and in increasing access for vulnerable populations (2,6, 12, 19). During the COVID-19 pandemic, telehealth established itself as a strategic tool for continuity of care, reducing hospital exposure and optimizing clinical flows (3,9). Observational studies have also shown a reduction in the use of emergency services among elderly populations subjected to intensive telemonitoring models (11).

The application of artificial intelligence in medical practice represents one of the fastest-growing areas in contemporary digital health. Deep learning-based systems have already demonstrated diagnostic performance comparable to that of specialists in areas such as dermatology (4), in addition to significant potential in cardiovascular risk stratification and predictive analysis based on large volumes of clinical data (14,25). Recent reviews reinforce that machine learning algorithms can contribute to improving patient safety, reducing medical errors, and supporting clinical decision-making (8,20,21).

mHealth applications have also been associated with greater therapeutic adherence and better clinical control in chronic diseases, strengthening the active participation of the patient in care (7). The integration of wearable devices, electronic records, and intelligent systems expands the possibilities for continuous monitoring and personalization of assistance (5,20).

However, despite the transformative potential of these technologies, their effective implementation depends on organizational, cultural, and regulatory factors. Barriers related to interoperability, professional training and financial sustainability still limit the full consolidation of digital health as the dominant care model (15,22). Furthermore, the need to preserve the humanistic dimension of medicine in the context of increasing technological automation remains a central point of ethical and clinical debate (13).

In light of this scenario, it becomes essential to critically analyze the available evidence regarding the impact of digital innovations on the quality of contemporary medical care, considering not only direct clinical outcomes but also improvements in care processes, operational efficiency, and patient safety. Thus, this integrative review aims to synthesize the main scientific evidence on the role of digital technologies in transforming clinical processes and enhancing health care.

METHODOLOGY

This is an integrative literature review, a methodological design that allows for the synthesis and critical analysis of evidence from different types of studies, including experimental research, observational studies, systematic reviews, and conceptual analyses. This approach was adopted as it enables a comprehensive understanding of the impact of digital technologies on the quality of clinical care and contemporary care processes, integrating multiple methodological perspectives into a structured analysis.

The bibliographic search was conducted in recognized scientific databases internationally, including PubMed/MEDLINE, Scopus, and

Web of Science, in addition to direct consultation of high-impact journals in the field of health and medical technology, such as the New England Journal of Medicine, JAMA, Nature Medicine, Nature Reviews Cardiology, BMJ, Health Affairs, and the Journal of Medical Internet Research. Controlled descriptors (MeSH) and free terms related to the topic were used, combined by boolean operators, including expressions such as "Digital Health," "Artificial Intelligence," "Machine Learning," "Telemedicine," "mHealth," "Electronic Health Records," and "Health Information Technology," associated with terms like "Quality of Health Care," "Healthcare Delivery," "Clinical Practice," "Patient Care," and "Patient Safety."

Filters were applied for studies involving human beings, published in English, peer-reviewed, and with full text availability. The selection prioritized studies investigating the impact of digital technologies on the quality of care, patient safety, efficiency of clinical processes, or healthcare organization. Clinical trials, observational studies, systematic reviews, narrative reviews with explicit methodological grounding, and structured implementation analyses were included. Technological. Duplicate publications between databases were excluded, as well as studies that were exclusively technical without direct clinical application, conference abstracts, letters to the editor without robust scientific foundation, and works that did not present data related to outcomes or care processes.

The selection process for the studies followed the recommendations of the PRISMA model (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), comprising the stages of identification, screening, eligibility, and inclusion. Initially, the studies were identified through a structured search in the selected databases. Next, the titles and abstracts were read for a preliminary assessment of thematic relevance. Potentially eligible studies were subjected to full reading to verify compliance with the inclusion criteria. At the end of the process, 25 articles that fully met the criteria were selected. to requirements methodological requirements established and presented consistent data on the clinical or procedural impact of digital technologies.

The data extraction was carried out systematically, encompassing

Author, year of publication, type of design, technology evaluated, clinical context of application, impact on the quality of care or care processes, and main findings. Subsequently, The studies were grouped into thematic categories for comparative interpretive analysis., including: (1) artificial intelligence and machine learning; (2) telemedicine and telehealth; (3) mHealth and remote monitoring; (4) electronic health records and information systems; and (5) big data and predictive analytics. The synthesis of the findings was conducted in a descriptive and critical manner, seeking to identify patterns of benefit, implementation challenges, and organizational implications for contemporary medical practice.

Since this integrative review was based exclusively on secondary data available in the public domain, there was no need to submit it to a Research Ethics Committee.

RESULTS

The analysis of the 25 selected studies allowed us to identify five main thematic areas related to the impact of digital technologies on the quality of clinical care and contemporary care processes:

(1) artificial intelligence and machine learning; (2) telemedicine and telehealth; (3) mHealth and remote monitoring; (4) electronic health records and information systems; and (5) big data and predictive analytics.

1. Artificial Intelligence and Machine Learning

Studies show that the application of artificial intelligence (AI) in medical practice has significantly contributed to improving diagnostic accuracy, patient safety, and support for clinical decision-making. Deep-based models Learning systems have shown performance equivalent to that of dermatological diagnostic specialists, demonstrating potential for improving diagnostic processes (4). Recent reviews reinforce that machine learning systems can reduce medical errors and strengthen patient safety (8, 20).

Furthermore, the integration between AI and clinical practice has been identified as a transformative element in high-performance medicine, expanding the personalization of care and predictive risk analysis (5,25). However, authors highlight the need for ethical and humanistic integration in the use of these technologies, avoiding indiscriminate replacement of clinical judgment (13,21).

2. Telemedicine and Telehealth

Telemedicine has shown a consistent impact on increasing access and maintaining the quality of care. Systematic reviews indicate high levels of patient satisfaction and clinical outcomes comparable to in-person care (2, 10, 19). In chronic diseases, telemonitoring interventions demonstrated

improvement in continuity of care and reduction of clinical decompensations (6, 12).

During the COVID-19 pandemic, telehealth established itself as a strategic tool for reorganizing care, reducing hospital exposure and maintaining active care flows (3,9). Observational studies also evidenced a reduction in the use of emergency services among elderly patients subjected to intensive telemedicine models (11).

3. MHealth and Remote Monitoring

Mobile health applications (mHealth) and digital monitoring devices showed a positive impact on therapeutic adherence and self-care, especially in the management of chronic diseases (7). Reviews indicate that mobile interventions associated with professional follow-up enhance clinical control and active patient participation (7).

These technologies also favor continuous data collection and integration with clinical systems, contributing to the personalization of care and longitudinal follow-up (5,20).

4. Electronic Health Records And Information Systems

Electronic health records (EHR) have shown benefits related to traceability, standardization of practices, and improvement of care coordination (1,23). Reviews indicate a predominance of positive outcomes in care quality after the implementation of health information technologies (1,24).

However, observational studies

show that digitalization also impacts medical workflow, increasing administrative burden and influencing time dedicated to patients (16, 17, 18). These findings indicate that the quality of care depends not only on the technology itself but also on the organizational model of implementation.

5. Big Data and Predictive Analytics

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The use of large clinical databases associated with predictive algorithms has shown significant potential in risk stratification and optimization of clinical decisions, especially in cardiology and personalized medicine. (14,25). Predictive analysis based on machine learning has been pointed out as a promising tool for anticipating adverse events and better allocation of healthcare resources (20).

Table 1 – Thematic Synthesis of the Included Studies

Thematic Axis	Main Technologies	References	Identified Impact
Artificial Intelligence	Deep learning, ML, predictive algorithms	4,5,8, 13,20,21,25	Improvement of diagnostic accuracy, reduction of errors, decision support
Telemedicine	Teleconsultations, telemonitoring	2,3,6,9, 10, 11, 12, 19	Expansion Of access, continuity of care, emergency of use reduction
mHealth	Mobile applications, remote monitoring	7,5,20	Increased therapeutic adherence and patient engagement
Electronic Medical Records	EHR, information systems	1, 16, 17, 18,23,24	Improvement of coordination and traceability; impact on workflow
Big Data	Clinical predictive, mining analysis data	14,20,25	Risk stratification and optimization of clinical decisions

Integrated Synthesis

Overall, the results indicate that digital technologies have a predominantly positive impact on the quality of clinical care, especially in terms of efficiency, patient safety, diagnostic accuracy, and increased access. However, the findings also highlight

that the effectiveness of these technologies depends on organizational factors, adequate integration into clinical workflows and professional training.

DISCUSSION

The findings of this integrative review demonstrate that digital technologies have played a central role in the reconfiguration of contemporary care models, influencing both the quality of clinical care and organizational processes in health. Overall, the evidence points to a predominantly positive impact, especially regarding diagnostic accuracy, patient safety, operational efficiency, and increased access to care (1,4,8, 10).

The incorporation of artificial intelligence into medical practice stands out as one of the most transformative vectors. Experimental studies show that deep learning algorithms can achieve performance comparable to that of human specialists in specific diagnostic tasks (4), while recent reviews indicate significant potential for reducing clinical errors and strengthening patient safety (8,20). Furthermore, predictive analysis based on big data enhances the capacity for stratification of risk and support for real-time decision-making (14,25). However, the technical benefits must be balanced with ethical and humanistic considerations, since the integration of AI does not replace clinical judgment but complements it (13,21).

In the field of telemedicine, the results reinforce that remote interventions are effective in maintaining care quality, particularly in the management of chronic conditions and in addressing populations with geographic barriers (2,6, 12). The COVID-19 pandemic accelerated the consolidation of telehealth as a strategic tool for the reorganization of health systems (3,9). Observational studies show a reduction in the use of emergency services and better continuity of care in elderly populations subjected to intensive telemonitoring models (11). These findings suggest that telemedicine, when properly integrated into clinical workflows, can contribute to more effective and sustainable care models.
more effective and sustainable.

mHealth applications and remote monitoring devices have also demonstrated a significant impact on therapeutic adherence and patient engagement (7). The possibility of continuous collection of clinical data and integration with electronic systems strengthens the personalization of care and longitudinal follow-up (5,20). This change signals a transition from reactive models to more proactive and predictive approaches.

On the other hand, the digitalization of healthcare is not without challenges. The implementation of electronic health records, although associated with improved care coordination and information traceability (1,23), has shown a significant impact on medical workflow, with increased administrative burden and potential repercussions on professional well-being (16, 17, 18). These findings highlight that the quality of care

It doesn't depend exclusively on the technology itself, but on how it is integrated into the organizational context.

From a systemic point of view, the digital transformation of healthcare requires infrastructure. suitable, interoperability between systems, data governance and continuous professional training (15,22). The absence of these elements can limit the expected benefits and generate inequalities in access to technological innovations.

Thus, the results indicate that digital technologies represent instruments powerful to Improving the quality of care is possible, but its effective impact depends on strategic implementation, integration with established clinical practices, and alignment with ethical and humanistic principles.
medicine.

CONCLUSION

This integrative review highlights that digital innovations are playing a decisive role in transforming contemporary medical care, with a consistent impact on the quality of care, patient safety, and process efficiency.

Clinical technologies such as artificial intelligence, telemedicine, mobile health applications, electronic health records, and predictive analytics systems demonstrate significant potential for improving diagnostic accuracy and strengthening decision-making.

of clinical decision and to expand access to care.

The findings indicate that artificial intelligence and machine learning excel in improving diagnostic accuracy and risk stratification, while telemedicine consolidates as an effective tool for continuity of care, especially in vulnerable populations or in contexts of health crises. mHealth solutions contribute to greater patient engagement and therapeutic adherence, promoting a more participatory and patient-centered care model. At the same time, information systems and electronic medical records enhance traceability and care coordination, although they require organizational adjustments to avoid professional overload.

However, the observed benefits are directly conditioned by the quality of technological implementation. The absence of interoperability, adequate professional training, and structured data governance can limit the expected gains and compromise the sustainability of digital health systems. Furthermore, the ethical and humanistic integration of technologies remains an essential element so that innovation does not replace, but strengthens, the doctor-patient relationship.

From a practical point of view, the results of this review suggest that health institutions should invest not only in the acquisition of digital technologies but also in the restructuring of organizational processes, training of teams, and development of digital governance policies. Evidence-based implementation strategies, with continuous monitoring of quality and safety indicators, are essential to ensure that digital transformation results in a concrete improvement in care.

It is concluded that the convergence between technology and medicine represents an irreversible structural change in health care. When implemented strategically, ethically, and integratively, digital innovations constitute powerful tools for enhancing contemporary medical care, promoting more efficient, safe, and patient-centered care models.

REFERENCES

1. Buntin MB, Burke MF, Hoaglin MC, Blumenthal D. The benefits of health information technology: a review of the recent literature shows predominantly positive results. Health Aff (Millwood). 2011;30(3):464-71. doi:10. 1377/hlthaff.2011.0178
2. Kruse CS, Krowski N, Rodriguez B, Tran L, Vela J, Brooks M. Telehealth and patient satisfaction: a systematic review and narrative analysis. BMJ Open. 2017;7(8):e016242. doi:10. 1136/bmjopen-2017-016242
3. Keesara S, Jonas A, Schulman K. Covid-19 and health care's digital revolution. N Engl J Med. 2020;382(23):e82. doi:10. 1056/NEJMp2005835
4. Esteva A, Kuprel B, Novoa RA, Ko J, Swetter SM, Blau HM, et al. Dermatologist-level classification of skin cancer with deep neural networks. Nature. 2017;542(7639):115-8. doi:10. 1038/nature21056
5. Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. Nat Med. 2019;25(1):44-56. doi:10. 1038/s41591-018-0300-7
6. McLean S, Protti D, Sheikh A. Telehealthcare for long term conditions. BMJ. 2011;342:d120. doi:10. 1136/bmj.d120
7. Tucker CA, Marsiske M, Rice KG, Jones JD, Herman WH. Patient-centered mHealth applications for chronic disease management: a systematic review. J Med Internet Res. 2017;19(5):e157.doi:10.2196/ jmir.6988
8. Bates DW, Levine DM, Syrowatka A, Kuznetsova M, Craig KJT, Rui A, et al. The potential of artificial intelligence to improve patient safety: a scoping review. NPJ Digit Med. 2021;4:54. doi:10. 1038/s41746 -021-00423-6
9. Hollander JE, Carr BG. Virtually perfect? Telemedicine for Covid-19. N Engl J Med. 2020;382(18):1679-81. doi:10. 1056/NEJMp2003539
10. Dorsey ER, Topol EJ. State of telehealth. N Engl J Med. 2016;375(2):154-61. doi:10. 1056/NEJMra1601705
11. Shah MN, Wasserman EB, Gillespie SM, Wood NE, Wang H, Noyes K, et al. High-intensity telemedicine decreases emergency department use by senior living community residents. J Am Med Dir Assoc. 2015;16(12):1077-81. doi:10. 1016/j.jamda.2015.08.018
12. Bashshur RL, Shannon GW, Smith BR, Alverson DC, Antoniotti N, Barsan WG, et al. The empirical foundations of telemedicine interventions for chronic disease management. Telemed J E Health. 2014;20(9):769-800. doi:10. 1089/tmj.2014.9981
13. Verghese A, Shah NH, Harrington RA. What this computer needs is a physician: humanism and artificial intelligence. JAMA. 2018;319(1):19-20. doi:10. 1001/jama.2017.19198
14. Rumsfeld JS, Joynt KE, Maddox TM. Big data analytics to improve cardiovascular care: promise and challenges. Nat Rev Cardiol. 2016;13(6):350-9. doi:10. 1038/nrcardio.2016.42
15. Agarwal R, Gao G, DesRoches C, Jha AK. Research commentary—The digital transformation of healthcare: current status and the road ahead. Inf Syst Res. 2010;21(4):796-809. doi:10. 1287/isre.1100.0327
16. Downing NL, Bates DW, Longhurst CA. Physician burnout in the electronic health record era: are we ignoring the real cause? Ann Intern Med. 2018;169(1):50-1. doi:10.7326/M18-0139
17. Sinsky C, Colligan L, Li L, Prgomet M, Reynolds S, Goeders L, et al. Allocation of physician time in

ambulatory practice: a time and motion study in 4 specialties. Ann Intern Med. 2016;165(11):753-60. doi:10.7326/M16-0961

18. Adler-Milstein J, Huckman RS. The impact of electronic health record use on physician productivity. Am JManag Care. 2013;19(10 Spec No):SP345-52.
19. Tuckson RV, Edmunds M, Hodgkins ML. Telehealth. N Engl J Med. 2017;377(16):1585-92. doi:10. 1056/NEJMsr1503323
20. Rajkomar A, Dean J, Kohane I. Machine learning in medicine. N Engl J Med. 2019;380(14):1347-58. doi:10. 1056/NEJMra1814259
21. Maddox TM, Rumsfeld JS, Payne PRO. Questions for artificial intelligence in health care. JAMA. 2019;321(1):31-2. doi:10. 1001/jama.2018.18932
22. Gagnon MP, Duplantie J, Fortin JP, Landry R. Implementing telehealth to support medical practice in rural/remote regions: what are the conditions for success? Implement Sci. 2006;1:18. doi:10. 1186/1748-5908-1-18
23. DesRoches CM, Campbell EG, Rao SR, Donelan K, Ferris TG, Jha A, et al. Electronic health records in ambulatory care—a national sur vey of physicians. N Engl J Med. 2008;359(1):50-60. doi:10. 1056/NEJMsa0802005
24. Goldzweig CL, Towfigh A, Maglione M, Shekelle PG. Costs and benefits of health information technology: new trends from the literature. Health Aff (Millwood). 2009;28(2):w282-93. doi:10. 1377/hlthaff.28.2.w282
25. Obermeyer Z, Emanuel EJ. Predicting the future-big data, machine learning, and clinical medicine. N Engl J Med. 2016;375(13):1216-9. doi:10. 1056/NEJMp1606181