

HEALTHCARE AUDIT PRACTICES BASED ON DATA FROM TECHNOLOGICAL SYSTEMS: A LITERATURE REVIEW

PRÁTICAS DE AUDITORIA EM SAÚDE BASEADAS EM DADOS DE SISTEMAS TECNOLÓGICOS: UMA REVISÃO DE LITERATURA

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Abstract: Introduction: Quality in healthcare is defined as the ability to provide the greatest benefit to the patient with the lowest possible cost and risk. In order to provide care safely and effectively, specific tools are used to ensure that healthcare services meet quality and reliability metrics, which contributes to service improvement. In this sense, healthcare auditing works to prevent and identify failures, improve the quality of information, and contribute to cost reduction and new opportunities, which simultaneously reduces the occurrence of future errors. **Objective:** To investigate the primary health audit practices that use data from information and communication 235

technology systems. **Methods:** This is a literature review, with a descriptive approach, in the MEDLINE and Pubmed databases using the keywords "(AUDIT) AND (DATA) AND (QUALITY) AND (TECHNOLOGY)" by year, from 2019 to 2024. The inclusion criteria were free full-text articles that addressed the topic, resulting in a final sample of 22 articles. **Results:** Nine (nine) articles were included for data tabulation after the selection process. **Discussion:** The research demonstrates the importance of effective strategies to ensure the quality of care and minimize risks to patients. **Conclusion:** Health auditing based on data and technological systems proves to be a strategy to resize and redirect corrections and improvements in each of the care procedures, aiming at the quality, safety and humanization of care.

Keywords: clinical audit; health care; health technology.

INTRODUCTION

The history of quality In health is marked by a constant commitment to improving patient care, aiming at safety, effectiveness and efficiency. This evolutionary process Began in 1924 with the Hospital Standardization Program, initiated by the American College of Surgeons, which established standards to improve the quality of the Hospital care. In 1977, INAMPS (National Institute of Social Security Medical Assistance) was created as a milestone in public health Brazilian, which culminated in the implementation of the Unified Health System (SUS) in 1988, promoting a more accessible and universal health model for all Citizens.¹

Quality in health is defined as the ability to provide the greatest benefit to the patient with the Lowest possible cost and risk, aligning with the advances in current scientific knowledge. To ensure that care is provided in a way Effective and safe, several tools are used, such as: ISO (International Organization for Standardization); hospital accreditation and Audits. These practices are essential to ensure that health services meet the necessary quality and safety standards, contributing For the excellence of service.¹

Within this context, health auditing plays an essential role in promoting the quality of care, Acting as a strategic tool to identify failures, ensure compliance with regulatory standards and drive continuous improvement Of the processes.¹ Over the years, its approach has evolved to include preventive, operational and analytical audits, allowing the Health institutions use concrete data to monitor performance indicators, anticipate risks and implement corrections before problems arise Become critical.⁵ In this way, the audit not only ensures the efficiency and safety of the services provided, but also contributes to a Evidence-based management, strengthening decision-making and improving the patient's experience.⁴ Nursing Also played an important role in this process, with Florence Nightingale being a pioneer in promoting the quality of health care. The

Systematization of Nursing Care (SAE) is a Clear example of how nursing practice was organized and structured to ensure effective and high-quality care for patients, meeting the Your needs in a planned and methodical way

Therefore, the objective of this study was to investigate the primary audit practices in Health, which use data from information and communication technology systems. In addition, it seeks to evaluate how the data generated and analyzed by these systems Can be used to ensure that health practices meet the required quality standards, contributing to the continuous improvement of services. O Study also aims to identify the benefits and challenges related to the implementation of data-based audit, highlighting improvements in the Efficiency, error reduction, greater compliance with security protocols and the ability to implement corrective actions in a more agile way¹. Finally, the research intends to analyze the contribution of data technologies to transparency and responsibility in health audit practices, Showing how these technologies impact the confidence of patients, health professionals and the quality of care.

METHODS

The research was conducted in the Pubmed and Medline database in November 2024. The keyword "AUDIT AND DATA AND QUALITY AND TECHNOLOGY" was used, without language restrictions. The following filters were applied: Free Full Text, Clinical Trial, Meta-Analysis and Randomized Controlled Study, in order to ensure the inclusion of studies with free full access and high methodological quality, such as clinical trials, meta-analyses and randomized controlled studies. The selection of articles followed criteria of relevance and timeliness, to reach a comprehensive set of articles related to these themes, the selection of the "Title/Summary" field ensures that the most relevant articles are retrieved from various areas, including health, information technology systems (IT) and organizational audits.

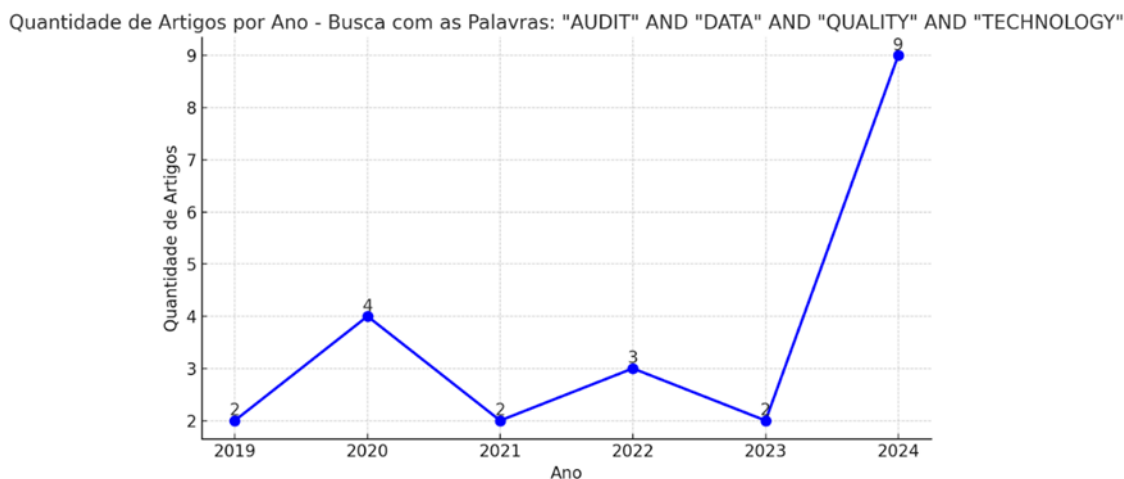
Specifically, the search aims to identify research that discusses how data is used in audit practices within technological systems to ensure quality standards. The keywords chosen cover the main concepts:

1. DATA: Refers to the collection, analysis and application of data in various areas, particularly in audits and quality evaluations.
2. TECHNOLOGY: It encompasses the tools, systems and innovations used in auditing and quality control, such as software, automation and technological frameworks
3. AUDIT: It relates to the systematic evaluation or examination of processes, systems or data, often with the aim of ensuring compliance, accuracy and efficiency.

4. **QUALITY:** Focuses on the standards of excellence in processes, products or services, particularly in relation to data integrity, technological systems and audit procedures.

Studies that did not directly approach the technology as a resource for collecting, processing or storing data for decision-making through the improvement of health audit processes, did not meet the study designs included in the filter, as well as opinion articles, narrative reviews, literature reviews or case studies without control, were described as criteria for the exclusion of the research. Duplicate studies or those whose results were not available in free full text were also excluded. The second stage of the process consisted of reading in pairs the abstracts of the selected articles. Two independent reviewers analyzed the abstracts to determine the inclusion or not of the studies, based on the previously established inclusion and exclusion criteria. In cases of disagreement, a third reviewer was consulted to reach consensus.

Figure 1- Search for Articles by year. Salvador, BA, Brazil, 2024.



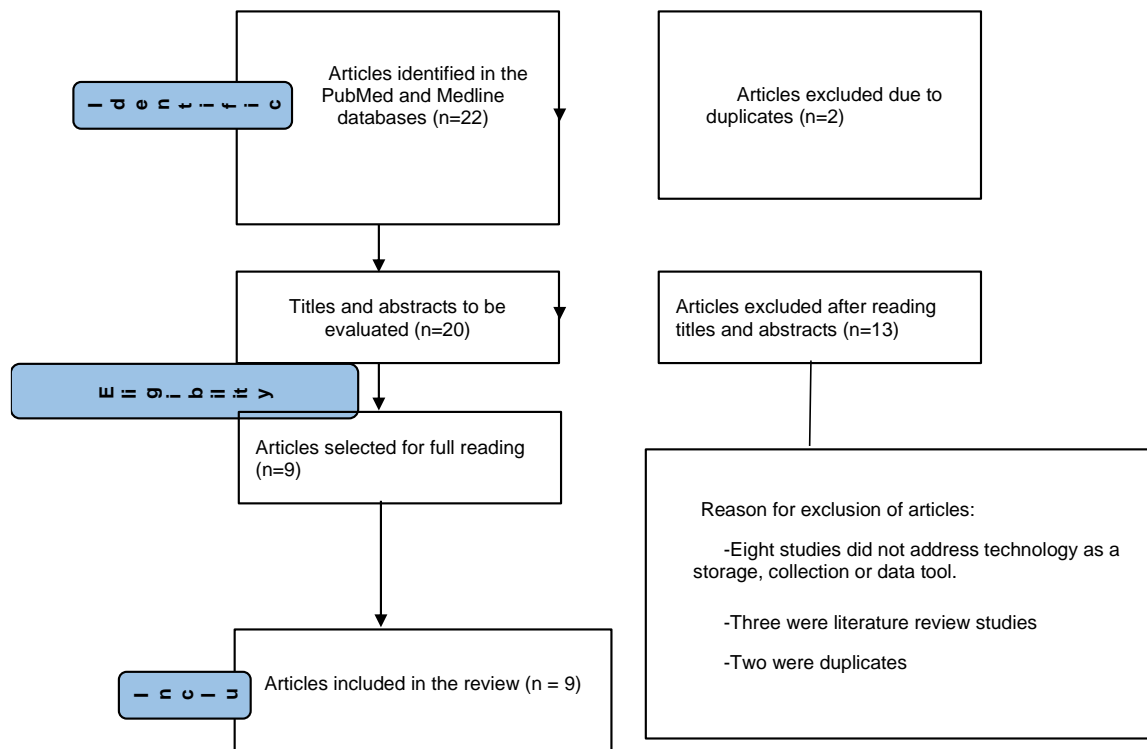
Source: Authors' own authorship, 2025

The line chart shows the amount of articles found in the Medline and Pubmed database using the Keywords "(AUDIT) AND (DATA)AND (QUALITY) AND (TECHNOLOGY)" per year, from 2019 to 2024. The number of Articles presented varies from 2 (two) to 9 (nine) over the years, with a significant increase in 2024, with 9 articles found. In 2020, the amount Of articles was the largest before 2024, with 4 articles. It portrays 22 articles in total. In the other years, the number of articles was lower, oscillating between 2 (two) And 3 (three), with a slight decrease in 2023, where only 2 (two) articles were found. This may indicate a growing increase in interest and publications Related to audit, data, quality and technology in recent years, particularly in 2024, possibly due to the development and implementation of new Technologies and practices in the context of audit and data quality.

Initially, 22 (twenty-two) articles were read, in total. In the reading phase of the abstracts 13 (thirteen) articles were excluded, because eight of these did not address technology as a

storage, collection or data tool, Three articles in the search were literature review, and two were duplications. After eliminating the duplicates, Incomplete, and literature reviews, the total number of articles reduced to 9 (nine). Therefore, a total of 9 were analyzed and included in this review (Nine) articles.

Figure 2- Explanatory flowchart on the article selection process. Salvador, BAHIA, BRAZIL, 2024.



Fonte: Autoria própria dos autores, 2024.

RESULTS

9 (nine) articles were included for data tabulation, after the selection process. The results of the studies Are described in **Table 1**.

Table 1 - Selected studies for tabulation of data.

Author/Year	Title	Objective	Design	Description	Keywords
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Aili K. Maki, et al. 2023. ¹	Audit of data from examination image headers collected for quality assurance in the ECOG-ACRIN EA1151 tomosynthesis mammographic imaging screening trial (TMIST)	To analyze data extracted from de-identified DICOM image headers in the TMIST study to assess their usefulness in quality assurance in mammographic images.	Retrospective Observational Study.	The TMIST study compared breast tomosynthesis (BT) and digital mammography (DM) for cancer screening using a centralized quality control program. Parameters such as radiation dose, compression force, and acquisition settings were extracted from image headers. Dose variability was observed, with BT being more consistent than DM. Header data have been shown to be useful for automated quality control and to ensure data accuracy in clinical studies.	Digital Mammography, Mean Glandular Dose, Quality Control, Tomosynthesis.
Robert Pickard, et al. 2020. ²	Open urethroplasty versus endoscopic urethrotomy for recurrent urethral stricture in men: the OPEN RCT	To evaluate the benefits, harms and cost-effectiveness of open urethroplasty compared with endoscopic urethrotomy in the treatment of recurrent bulbar urethral stricture in men.	Randomized Clinical Trial.	Participants were randomly allocated to two groups: one receiving open urethroplasty (experimental group) and one receiving endoscopic urethrotomy (control group). The mean difference in urinary symptom score between 0 (no symptoms) and 24 (severe symptoms) was -0.36, which was not statistically significant ($p = 0.6$). Both groups showed improvement in symptoms over 24 months, but the need for further intervention was lower in the urethroplasty group, with a lower recurrence rate (hazard ratio 0.52; $p = 0.02$). The cost of urethroplasty was higher than urethrotomy (difference £2148), with similar quality-	Bulbar Urethral Stricture; Cost-Effectiveness Analysis; Health Status; Lower Urinary Tract Symptoms; Male; Outcome Assessment; Qualitative Process Assessment; Randomized Clinical Trial; Recurrence; Urethroplasty; Urethrotomy.

				adjusted life years (QALYs) gained between the groups.	
Duarte-Díaz et al., 2022. ³	Factors associated with patient empowerment in Spanish adults with type 2 diabetes: A cross-sectional analysis	To identify factors associated with patient empowerment in individuals with type 2 diabetes mellitus (T2DM) in the Canary Islands (Spain).	Secondary Cross-Sectional Analysis with data obtained from the INDICA study, a 24-month Cluster Randomized Clinical Trial.	The effectiveness of educational interventions supported by technological decision-making tools for patients with T2DM was evaluated. The analysis included baseline data from 2334 patients. The results showed that age ($B = -0.14$; $p < 0.001$), diabetes knowledge ($B = 0.61$; $p < 0.001$) and state anxiety ($B = -0.09$; $p < 0.001$) are significantly associated with patient empowerment.	Spain; Related; Patient Empowerment; Type 2 Diabetes Mellitus.
Zia Sadique et al., 2024. ⁴	Cost-effectiveness of high flow nasal cannula therapy versus continuous positive airway pressure for non-invasive respiratory support in paediatric critical care	To evaluate the cost-effectiveness of high-flow nasal cannula (HFNC) therapy compared with continuous positive airway pressure (CPAP) for noninvasive respiratory support in pediatric critical care units.	Study Based on Economic Analysis Derived from Data from Two Randomized Controlled Clinical Trials (FIRST-ABC RCTs).	To evaluate the cost-effectiveness of high-flow nasal cannula (HFNC) therapy compared with continuous positive airway pressure (CPAP) as noninvasive respiratory support in critically ill children.	High Flow Nasal Cannula Therapy, CPAP, Noninvasive Respiratory Support, Pediatrics, Cost-effectiveness, Critical Care.
K. Curtis et al., 2024. ⁵	Successful and sustained implementation of a behavior-change informed strategy for emergency nurses: a multicenter implementation evaluation	Evaluate the HIRAID® behavior change-informed implementation strategy regarding reach, effectiveness, adoption, quality (dose, fidelity), and maintenance	Randomized Controlled Trial.	The research focused on implementing the evidence-based emergency nursing framework HIRAID® (History, including risk of infection, warning signs, Assessment, Interventions, Diagnostics, Communication, and Reassessment) to reduce clinical variation and increase	Behavior Change, Clinical Deterioration, Education, Emergency Department, Emergency Nursing, Implementation, Patient Assessment, Patient Safety, Randomized Controlled Trial.

		(sustainability).		the safety and quality of emergency nursing care.	
Ianthe Boden et al. 2020. ⁶	Preoperative physiotherapy is cost-effective for preventing pulmonary complications after major abdominal surgery: a health economic analysis of a multicentre randomised trial	To assess whether preoperative physiotherapy is cost-effective in reducing postoperative pulmonary complications (PPC) and improving quality-adjusted life years (QALYs) after major abdominal surgery.	Multicenter Randomized Clinical Trial.	The study involved 441 adults awaiting elective upper abdominal surgery at three public hospitals in Australia and New Zealand. The experimental group received an information booklet and a 30-minute session with a physiotherapist focused on respiratory education and breathing exercise training. The control group received the information booklet only.	Breathing Exercises, Cost-Effectiveness Analysis, Elective Surgical Procedures, Hospital Costs, Physiotherapists, Quality-Adjusted Life Years.
Jan Jansen et al., 2024. ⁷	The UK resuscitative endovascular balloon occlusion of the aorta in trauma patients with life-threatening torso haemorrhage: the (UK-REBOA) multicentre RCT	To compare standard treatment associated with resuscitative endovascular balloon occlusion of the aorta versus standard treatment in patients with exsanguinating hemorrhage in the emergency department.	Pragmatic, Multicenter, Randomized Controlled Clinical Trial.	Ninety-day mortality was higher in the standard care plus resuscitative endovascular balloon occlusion of the aorta group (54%) compared with the standard care group (42%). The odds ratio was 1.58 (95% credibility interval 0.72 to 3.52).	Aortic Balloon Occlusion; Bayesian Analysis; Hemorrhage; Human; Randomized Clinical Trial; Reboa; Resuscitation; Trauma.
Paul R Mouncey et al., 2021. ⁸	Reduced exposure to vasopressors through permissive hypotension to reduce mortality in critically ill people aged 65 and over: the 65 RCT	To estimate the clinical effectiveness and cost-effectiveness of reducing vasopressor exposure through permissive hypotension (target mean arterial pressure	Pragmatic, Randomized Clinical Trial with integrated economic evaluation.	The main clinical outcome was all-cause mortality at 90 days. The economic analysis measured the incremental net monetary benefit after 90 days.	Blood Pressure, Clinical Trial, Critical Care, Intensive Care, Mean Arterial Pressure, Vasopressors.

		(MAP) of 60-65 mmHg) in critically ill elderly patients.			
Tim Luckett et al., 2024. ⁹	Factors influencing fidelity to guideline implementation strategies for improving pain care at cancer center's: a qualitative sub-study of the Stop Cancer PAIN Trial	To identify factors that hinder or facilitate fidelity in implementing guidelines for pain management in adults with cancer, with the aim of informing future guideline implementation initiatives.	Randomized Controlled Clinical Trial.	The trial compared the effectiveness of screening strategies and guidelines with or without implementation strategies for improving pain management. Implementation strategies included auditing adherence to guideline recommendations, professional education through 'spaced learning' modules, and patient education resources.	Pain Management, Guideline Implementation, Cancer, Fidelity, Implementation Strategies, Quality of Life, Capacity, Opportunity, Motivation, COM-B Model.

Source: Authors' own work, 2025.

DISCUSSION

The study conducted audited the data of the headers of Examination images in the context of the mammographic screening protocol with tomosynthesis (TMIST). In this protocol, patient images and data are De-identified for use in future studies, with the transfer of images by a secure platform and verification of metadata to ensure quality Of the images.¹ The focus of quality control has expanded from traditional ammography, previously focused on the maintenance of films and systems, to Digital systems, where the monitoring of metadata and technical parameters, such as kV, mAs and compression thickness, have become fundamental. This guarantees That the technique used is adequate and that possible failures in the system, such as equipment calibration, are identified and corrected. The study Verified the consistency of the data, including the radiation dose, and pointed out failures in the examinations performed on non-accredited or controlled equipment of poor quality. Critical data monitoring is essential to ensure patient safety and image quality, being essential for effective tracking protocols.

Similarly, a study compared open urethroplasty and endoscopic urethrotomy in the treatment of urethral stenosis Recurrent, also highlighted the importance of choosing techniques that maximize patient safety and treatment efficiency. Both procedures Showed efficacy in the control of urinary symptoms, but urethroplasty showed less need for new interventions, although with

a cost Significantly higher.⁶ In this case, urethrotomy was considered more cost-effective, an important factor in the allocation of resources In health systems. This analysis is an example of how clinical quality and patient safety should be balanced with economic efficiency⁶

Still in the context of patient safety, a study on the empowerment of Patients with type 2 diabetes highlights the importance of factors such as knowledge about the disease and anxiety management. The empowerment of the Patient, especially in chronic diseases such as diabetes, can lead to better clinical results and adherence to treatment. This reinforces the Need for interventions that consider the emotional and educational aspects of patients, increasing the quality of care.⁴

Patient safety was also in focus, Where a study compared therapy with High Flow Nasal Cannula (HFNC) and Continuous Positive Airway Pressure (CPAP) in Pediatric Intensive Care Units. Although both therapies have shown similar clinical efficacy, HFNC was more cost-effective, which can be relevant in resource management contexts.² However, implementation of adequate protocols and training of the medical staff is Essential to ensure that any technology adopted is used safely and effectively.

Research shows the importance of strategies Effective to ensure the quality of care and minimize risks to patients. Whether through the implementation of secure technologies, control Rigor of procedures or consideration of costs in the choice of treatments, patient safety, quality of care and efficiency Economic should be taken into account in an integrated way, always with the aim of improving health outcomes and the patient's experience.

These studies can be highlighted in the context of Audit, quality, patient safety, health indicators and technology, as they address several aspects that are fundamental for the improvement of health care, both at the clinical and operational level.

First, the audit is a key element in quality assurance, such as the study that conducted an audit of the Mammography test data to ensure that the images are within the quality and safety standards. This audit process allows the Identification of technical or operational failures, which is essential to prevent medical errors and improve patient outcomes.¹

The studies also show the importance of quality control, such as the analysis of images and the technical parameters of mammographic examinations. In addition, the use of strategies to reduce human errors and improve diagnostic accuracy was demonstrated in a research, which used a framework to improve behavior of nurses in emergency environments³, is a clear example of how the improvement of patient quality and safety can be achieved by through informational technologies and adequate training.

Health indicators play a fundamental role in the evaluation and monitoring of the effectiveness of interventions. In the case of studies On the treatment of diabetes and urethral stenosis, indicators such as patient empowerment and the need for new intervention are fundamental To measure

the effectiveness of treatments and patient satisfaction. In addition, in study2 the Comparison of costs and results between HFNC and CPAP is also an example of how economic indicators can be used to evaluate the Cost-effectiveness of different interventions, in order to optimize the use of resources in the health system.

Technology at the service of health is a fundamental aspect In all these studies. The use of digital platforms, monitoring software and advanced imaging technologies, such as mammographic tomosynthesis, are examples of how technological innovations are Applied to improve the accuracy of diagnosis, treatment monitoring and patient safety. In addition, the implementation of systems For auditing and automated data collection, such as those described in the studies, enables the integration of essential information more efficiently, the That contributes to the continuous improvement in health management.

These examples demonstrate how the health audit, combined with the quality of care, patient safety, To health indicators and technology, act in an integrated way to improve processes and ensure safer, more efficient and Effective. The audit, by using data and indicators, enables the identification of failures, the standardization of practices and the implementation of Continuous improvements, strengthening patient safety. In this context, technology plays an essential role, facilitating the collection and analysis of Real-time information, which allows more strategic and evidence-based management. As a result, this interaction not only raises the quality of Services provided, but also contributes to the sustainability of health systems, promoting more responsible and efficient care.

CONCLUSION

Audit studies in data-based health and technological systems to ensure quality standards prove to be a strategy to resize and redirect Corrections and improvements, in each of the care procedures, aiming at the quality, safety and humanization of assistance. However, methodological limitations, as a method of rapid monitoring, statistical uncertainties and shortage of studies based on the Brazilian health system, indicate the need for more studies to consolidate the scientific evidence and consequently, being able to standardize systems, ensuring the quality of service provision, information and the reduction of Costs.

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