

## The Contribution of Artificial Intelligence to the Operational Performance of Quality System: A Systematic Review in the Healthcare Sector

Ouafa BARAKAT<sup>a1</sup>, Imane BOUHSAIN<sup>b</sup>

<sup>a</sup> ENCG- Agadir, Université Ibn Zohr, Morocco

<sup>b</sup> ENCG- Agadir, Université Ibn Zohr, Morocco

| Article Info   | Abstract   |
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| <p><b>Keywords:</b><br/>Artificial Intelligence, Operational Performance, Quality System, Healthcare, Systematic Review</p> <p><b>JEL :</b><br/>L86, L25, I14, L15.</p> <p>Received 6 December 2025<br/>Accepted 25 February 2026<br/>Published 12 February 2026</p> | <p>This paper presents a systematic review of the contribution of Artificial Intelligence (AI) to the operational performance of quality system in the healthcare sector. Over the past decade, AI has emerged as a transformative technology in healthcare, offering opportunities to enhance diagnostic accuracy, patient monitoring, treatment personalization, and the operational performance of hospital quality system. Beyond clinical applications, AI supports quality management by reducing medical errors, promoting continuous improvement, facilitating accreditation processes, and strengthening overall quality assurance practices. Despite these potential benefits, the adoption of AI in healthcare quality system remains limited and faces several challenges, including high implementation costs, lack of specialized skills, and ethical and legal concerns related to accountability and transparency. These challenges are compounded by disparities in digital infrastructure and the uneven dissemination of technological innovations across healthcare institutions. Based on the synthesis of the reviewed studies, it is clear that addressing these challenges through clear regulatory frameworks, investment in infrastructure, and professional capacity-building could enable AI to play a transformative role in enhancing operational performance and overall healthcare quality in hospitals.</p> |

<sup>1</sup> Corresponding author. E-mail address : [imane.bouhsain@edu.uiz.ac.ma](mailto:imane.bouhsain@edu.uiz.ac.ma)

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## 1. Introduction

Artificial intelligence (AI) first surfaced a few decades ago as one of the most bothersome and transformative agents in contemporary history. AI is changing our lives, businesses, and interactions with the environment, from virtual assistants responding to human voices to algorithms perfectly diagnosed with diseases (Olorunlana, 2025). Concurrent advances in information technology infrastructure and mobile computing power in many low and middle-income countries (LMICs) have raised hopes that AI might help to address challenges unique to the field of global health and accelerate achievement of the health-related sustainable development goals (Schwalbe, 2020). AI holds the potential to revolutionise healthcare by improving diagnostics, helping develop new treatments, supporting providers and extending healthcare beyond the health facility and to more people (Frederik Federspiel et al., n.d.). The increasing availability of healthcare data and rapid development of big data analytic methods has made possible the recent successful applications of AI in healthcare. Guided by relevant clinical questions, powerful AI techniques can unlock clinically relevant information hidden in the massive amount of data, which in turn can assist clinical decision making (Jiang et al., 2025).

AI significantly contributes to strengthening the operational performance of healthcare quality system. By optimizing resource allocation, improving planning processes, streamlining patient flow, and reducing diagnostic errors through advanced analytics, AI supports more reliable and efficient decision-making (Saqib Jalil et al., 2025). Moreover, the automation of administrative tasks reduces inefficiencies by over 30%, while predictive models achieve up to 95% accuracy, ultimately enhancing the effectiveness, consistency, and reliability of quality management practices within healthcare organizations (Guo et al., 2024). AI-based operational management systems enhance staff efficiency and satisfaction, notably by reducing administrative workload and facilitating team engagement (Xie et al., 2025). AI contributes to the improvement of quality indicators (accuracy, speed, personalization of care) and to the proactive management of risks (A. Alowais et al., 2023).

Recent scientific literature shows that, although AI is widely studied in the healthcare sector, there is limited research specifically targeting its contribution to the operational performance of quality system (I. Hazarika, 2020). Most studies focus on the overall improvement of care quality, the efficiency of clinical processes, data management, and task automation, but rarely on the direct impact of AI on the operational performance of quality systems as such (Secinaro et al., 2021). Recent systematic reviews and studies highlight the lack of comprehensive syntheses on the application of AI specifically for improving quality system in healthcare, with most research focusing on care quality or overall operational management (Aminizadeh et al., 2024). Several articles call for future research to address this gap, particularly by developing frameworks to assess the impact of AI on the performance of quality systems (J. Kelly et al., 2019).

Based on our systematic review, we found that while only a few studies have addressed the contribution of AI to the operational performance of quality system in the healthcare sector at the international level, no such research has been conducted. This study seeks to fill this gap by examining how AI can enhance the efficiency, accuracy, and reliability of quality processes. Accordingly, it raises the following research question: How does AI contribute to the operational performance of the quality system in the healthcare sector?

The study is guided by the following research questions:

1. How does Artificial Intelligence contribute to the efficiency, accuracy, and reliability of processes in healthcare quality systems?
2. Which organizational, technological, and human factors shape AI's contribution to the operational performance of quality systems in healthcare establishments ?

The article is structured as follows: the Methods section details the systematic literature review process, including search strategy, eligibility criteria, study selection, quality assessment, and data synthesis following PRISMA guidelines. The Findings section presents descriptive analyses, document distributions, the PRISMA flow diagram, quality assessment results, and identified themes regarding AI's contribution to healthcare quality system. Finally, the Conclusion summarizes the main insights, discusses managerial implications, and highlights limitations and directions for future research.

## 2. Methods

This systematic literature review approach analyzes the contribution of AI in the operational performance of quality system in the healthcare sector. The review followed PRISMA guidelines to ensure a transparent and rigorous process. The study process included: literature search strategy, eligibility criteria, selection process, quality assessment, data synthesis, and Prisma flow diagram. All steps were conducted independently by the authors.

### 2.1. Literature search strategy

A systematic literature search was conducted in the following databases: Scopus and Web of Science. The search covered the period from January 2019 to May 2025, focusing on studies addressing AI applications in healthcare quality system and operational performance.

Table 1 lists the keywords and their synonyms used to search the databases. These terms allowed a comprehensive identification of studies on the contribution of Artificial Intelligence to the operational performance of quality system in the healthcare sector.

Table 1. Keywords and synonyms.

| Keywords                | Synonyms   |
|-------------------------|--|
| Artificial Intelligence | “Artificial Intelligence” OR “AI” OR “Machine Learning” OR “ML” OR “Deep Learning” OR “Artificial Neural Networks” OR “Computer Vision”        |
| Quality System          | “Quality system” OR “Quality management” OR “Quality assurance” OR “Quality improvement” OR “Process optimization” OR “Operational efficiency” |
| Operational Performance | “Operational performance” OR “Performance” OR “Efficiency” OR “Productivity” OR “Process performance”  |
| Healthcare              | “Healthcare” OR “Hospitals” OR “Health sector” OR “Medical care” OR “Patient care” OR “Clinical services”                                      |
| Contribution            | “Contribution” OR “Role”   |

## 2.2. Eligibility criteria

The eligibility criteria are specified as inclusion and exclusion criteria in Table 2. We stipulated that the selected documents had to be aligned with the inclusion and exclusion criteria to fit the scope of our research.

Table 2. Inclusion and exclusion criteria

| No | Inclusion   | No | Exclusion  |
|----|---|----|--|
| 1  | Published between January 2019 and May 2025.            | 1  | Published outside the 2019–2025 period   |
| 2  | Written in English or French.                           | 2  | Written in other languages   |
| 3  | Focus on AI applications in healthcare quality systems. | 3  | Focus only on clinical outcomes without quality or operational aspects           |
| 4  | Address operational performance or efficiency.          | 4  | Do not mention quality systems or operational performance                        |
| 5  | Research articles, review articles, conference papers.  | 5  | Opinion papers, editorials, or documents with insufficient methodological detail |

## 2.3. Selection process

The selection of studies followed a structured, stepwise process:

1. Preliminary collection of studies: All articles retrieved from the databases (Scopus, Web of Science) were compiled, and duplicates were removed.
2. Screening of titles and abstracts: The titles and abstracts of the remaining articles were reviewed according to the inclusion and exclusion criteria presented in Table 2. Studies that did not meet the criteria were excluded.
3. Full-text review: The full texts of the selected studies were carefully examined to ensure they addressed the contribution of AI to the operational performance of quality systems in the healthcare sector. Only studies meeting all inclusion criteria were retained for the systematic review.

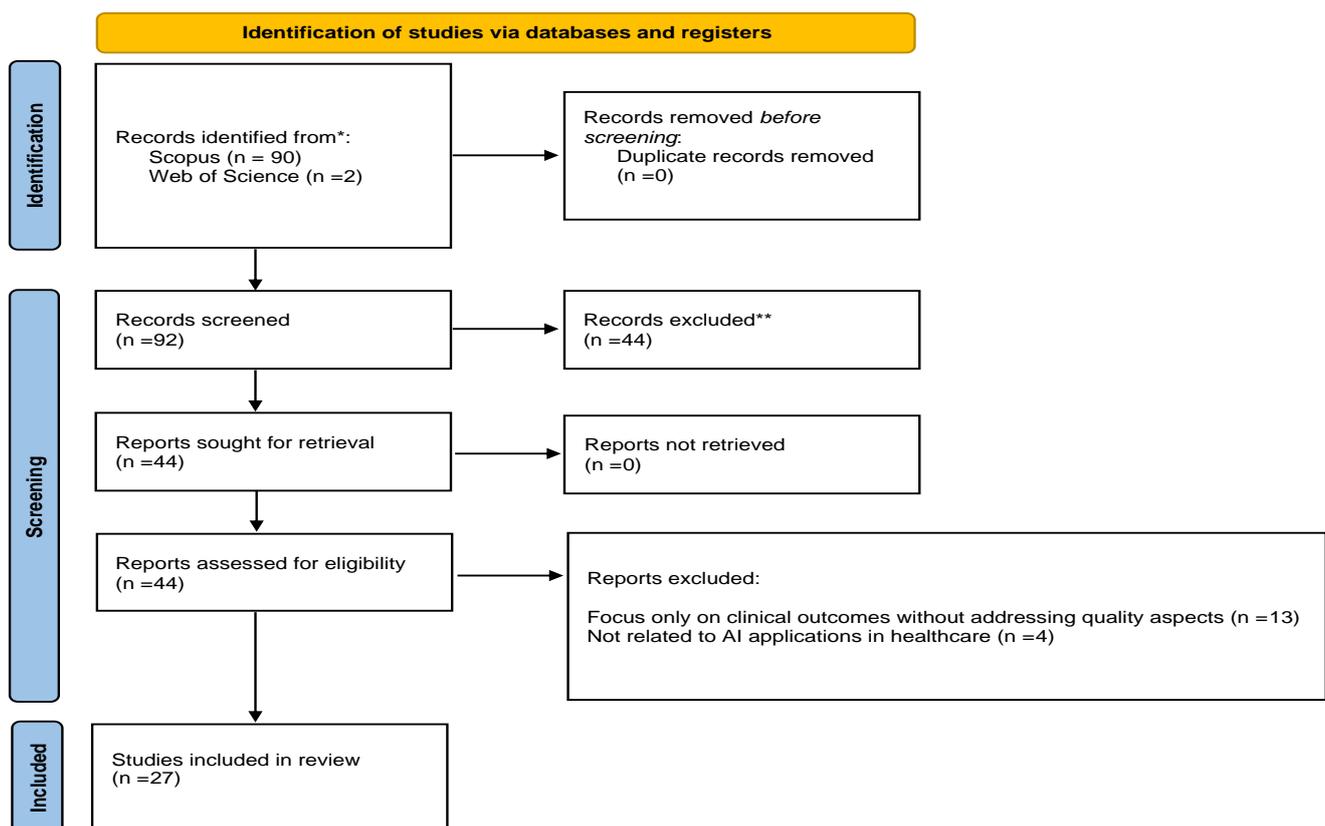
## 2.4. Data synthesis

The synthesis of the selected studies was conducted with the aim of identifying and categorizing the main contributions of AI to the operational performance of healthcare quality system. An inductive approach was adopted, as the analysis is grounded in empirical data and seeks to build theoretical insights from recurring patterns rather than testing predefined hypotheses (Liu, 2017).

## 2.5. Prisma flow diagram

The results of this systematic literature review are presented in several stages. First, the study selection process was documented using the PRISMA 2020 flow diagram to ensure rigor and transparency (J. McKenzie et al., 2020). The database search initially identified 92 records (Scopus = 90, Web of Science = 2). No duplicates or records removed by automation tools were found, so all 92 records were screened based on titles and abstracts, leading to the exclusion of 48 records that did not meet the inclusion criteria. A total of 44 full-text articles were then assessed for eligibility, of which 17 were excluded for reasons such as focusing only on clinical outcomes without addressing quality aspects ( $n = 13$ ) or being unrelated to AI applications in healthcare ( $n = 4$ ). Finally, 27 studies fulfilled all criteria and were included in the synthesis. The complete selection process is illustrated in the PRISMA flow diagram (Figure 1).

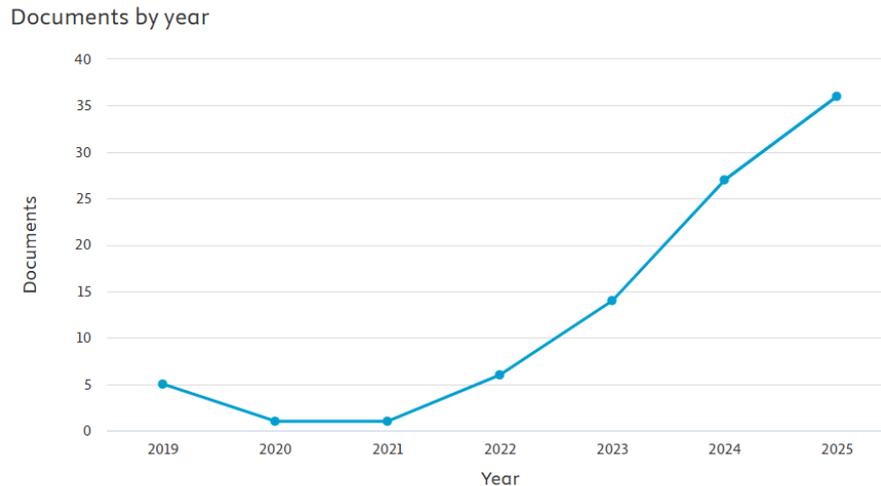
Figure 1: PRISMA Flow



## 3. Findings

Based on the PRISMA procedure, a total of 27 studies were considered to provide adequate discussion regarding the contribution of AI in the operational performance of healthcare quality system. A descriptive analysis was then conducted on these included studies. The distribution of papers by year of publication provides an overview of research trends in this area, highlighting periods of increased scholarly activity as well as gaps where fewer studies have been carried out.

Figure 2: The distribution of papers by year of publication.

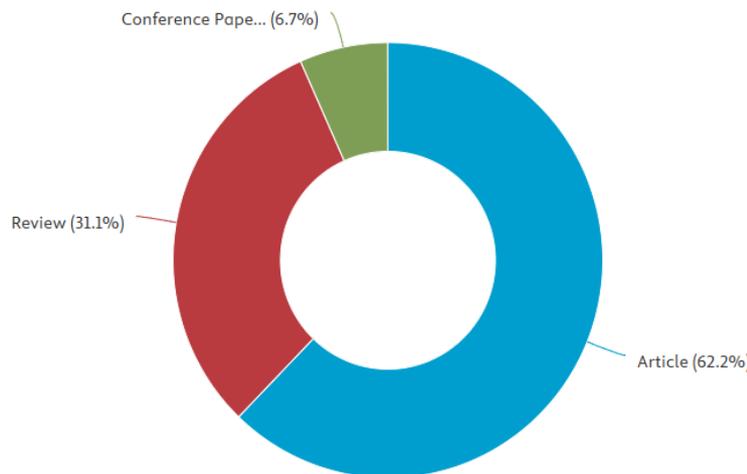


source: generated from Scopus

Figure X illustrates the distribution of the included documents by type. The majority of studies are original research articles (62.2%), followed by review articles (31.1%), while conference papers represent a smaller proportion (6.7%). This distribution indicates that most of the evidence on AI’s contribution to healthcare quality systems comes from empirical studies, providing concrete data and practical insights, whereas review articles offer synthesized perspectives and conceptual discussions. The limited number of conference papers suggests that preliminary findings are less represented in this field.

Figure 3: Number of published papers by document type

Documents by type



source: generated from Scopus

### 3.1. Quality assessment

The quality assessment in this study (Table 3) followed a scoring approach commonly used in systematic reviews, where predefined criteria are rated (yes = 1, partial = 0.5, no = 0) (Tran et al., 2021). This method, widely applied in the literature, was adapted to the specific objectives of our review to ensure consistency and minimize bias.

Table 3. Quality assessment questions.

| No | Quality questions  | Score   |
|----|--|---------|
| 1  | Does the research method clearly address the study objectives and research questions?  | 1/0.5/0 |
| 2  | Does the study have a clear description of AI applications in healthcare quality systems?  | 1/0.5/0 |
| 3  | Does the study specifically address operational performance outcomes   | 1/0.5/0 |
| 4  | Are the methods and results clearly described and replicable?  | 1/0.5/0 |
| 5  | Does the study contribute meaningful insights to understanding the role of AI in operational performance of healthcare quality system? | 1/0.5/0 |

### 3.2. Thematic Analysis and Construction of Categories

The thematic coding process was conducted through an iterative and structured approach. Initial codes were independently generated by the authors based on recurring patterns identified across the selected studies. These codes were then compared, refined, and consolidated through analytical discussion to ensure consistency and reduce subjectivity. Any discrepancies in coding were resolved through consensus, thereby enhancing the reliability and robustness of the thematic synthesis. To address the contribution of AI beyond descriptive reporting, the selected studies were analyzed using an inductive thematic synthesis approach. Following full-text review, recurrent patterns related to AI-driven operational performance were initially identified through open coding. These codes were subsequently grouped through axial coding to form coherent analytical sub-themes. Finally, selective coding enabled the consolidation of broader themes that explain the mechanisms through which AI contributes to healthcare quality system performance.

This process resulted in four main analytical themes, each composed of distinct yet interrelated sub-themes. Rather than representing isolated categories, these themes reflect complementary mechanisms and contextual conditions shaping AI's operational impact.

### 3.3. Identified themes

This approach allowed for the systematic grouping of findings into themes that emerged across the literature and empirical observations. These themes include optimization of resources and planning (Snigdha et al, 2025), patient flow and care process management (Riyaz Rashid Pathan et al., 2025), reduction of errors and improvement of accuracy (Bhimavarapu, 2025), organizational, technological, and human factors influencing AI's contribution to quality system operational performance (Khalifa et a., 2024) . Such thematic categorization provides a structured framework

for analyzing how AI supports (Saqib Jalil et al., 2025), reliability (A. Alowais et al., 2023), and overall operational performance in healthcare quality (Kumar et al., 2025).

Building on these identified themes, Table 4 presents the quality assessment scores of the 27 studies included in the review. This highlights the methodological robustness and relevance of each study in exploring how AI contributes to the efficiency, accuracy, and reliability of processes in healthcare quality systems. The table shows that studies addressing resource optimization and error reduction are the most numerous and methodologically strong, while themes related to organizational, human, and technological factors have slightly lower scores, reflecting fewer studies or some methodological limitations. Overall, the table provides a clear overview of where research is concentrated and where further detailed investigation may be needed.

Table 4. Studies' quality assessment scores in decreasing order.

| No | Document   | Citation                                   | Score |
|----|--|--|-------|
| 1  | AI-Powered Transformation of Healthcare: Enhancing Patient Safety Through AI Interventions with the Mediating Role of Operational Efficiency and Moderating Role of Digital Competence—Insights from the Gulf Cooperation Council Region | (AlDhaen, 2025)                            | 5     |
| 2  | Impact of AI and big data analytics on healthcare outcomes: An empirical study in Jordanian healthcare institutions  | (Aldmour et al., 2025)                     | 5     |
| 3  | Machine Learning in Optimising Nursing Care Delivery Models: An Empirical Analysis of Hospital Ward  | (Aslan & Toros, 2025)                      | 4.8   |
| 4  | Technologies and decision-support tools for health systems management: a scoping review of features and use cases  | (Bellei et al., 2025)                      | 4.8   |
| 5  | Design and implementation of an automatic nursing assessment system based on CDSS technology   | (Dai et al., 2024)                         | 4.5   |
| 6  | A hospital wide predictive model for unplanned readmission using hierarchical ICD data   | (Deschepper et al., 2019)                  | 4.5   |
| 7  | Charting the future of patient care: A strategic leadership guide to harnessing the potential of artificial intelligence   | (Ennis-O'Connor & O'Connor, 2024)          | 4.5   |
| 8  | Challenges and strategies for wide-scale artificial intelligence (AI) deployment in healthcare practices: A perspective for healthcare organizations   | (Esmacilzadeh, 2024)                       | 4.5   |
| 9  | Role of Artificial Intelligence in TeleStroke: An Overview   | (Ali et al., 2020)                         | 4.2   |
| 10 | The Role of Large Language Models in Transforming Emergency Medicine: Scoping Review   | (Preiksaitis et al., 2024)                 | 4.2   |
| 11 | Real-time health monitoring by examining the role of next-generation elements in a medical app   | (Jayaprakash & Keerthana, 2025)            | 4     |
| 12 | From errors to excellence: The pre-analytical journey to improved quality in diagnostics. A scoping review   | (John et al., 2025)                        | 4     |
| 13 | Forecasting the future of smart hospitals: findings from a real-time delphi study  | (Jovy-Klein et al., 2024)                  | 4     |
| 14 | Impact of an artificial intelligence-driven operational management system on operational efficiency in health care organization in Saudi Arabia: a mediating role of staff attitude  | (Kumar, Singh, Ahmed Kassar, et al., 2025) | 4     |
| 15 | Leveraging machine learning to enhance appointment adherence at a novel post-discharge care transition clinic  | (Lee et al., 2024)                         | 4     |

|    |   |                            |     |
|----|---|----------------------------|-----|
| 16 | AI in diagnostic imaging: Revolutionising accuracy and efficiency   | (Khalifa & Albadawy, 2024) | 4   |
| 17 | Enhancing Environmental Sustainability in Diagnostic Radiology: Focus on CT, MRI, and Nuclear Medicine  | (Leswick et al., 2025)     | 3.8 |
| 18 | Cloud Horizons: Strengthening Rural Healthcare Through Telemedicine's Digital Canopy  | (Kitole & Shukla, 2024)    | 3.8 |
| 19 | AI Powered Medical Waste Management with IoT  | (Karmakar et al., 2024)    | 3.8 |
| 20 | Clinician interaction with artificial intelligence systems: a narrative review  | (Esmaeilzadeh, 2024)       | 3.8 |
| 21 | AI2-SXI algorithm enables predicting and reducing the risk of less than 30 days patient readmissions with 99% accuracy and precision  | (Mahto et al., 2025)       | 3.8 |
| 22 | The intersection of quality improvement, artificial intelligence and patient safety in healthcare—current applications, challenges and risks, and future directions: a scoping review | (Nawawi et al., 2025)      | 3.5 |
| 23 | Evaluating AI adoption in healthcare: Insights from the information governance professionals in the United Kingdom  | (Olawade et al., 2025)     | 3.5 |
| 24 | Leveraging Large Language Models for Smart Pharmacy Systems: Enhancing Drug Safety and Operational Efficiency   | (Osheba et al., 2025)      | 3.5 |
| 25 | Individual dynamic capabilities and artificial intelligence in health operations: Exploration of innovation diffusion   | (Pesqueira et al., 2025)   | 3.5 |
| 26 | Applications of Artificial Intelligence in the Radiology Roundtrip: Process Streamlining, Workflow Optimization, and Beyond   | (Pierre et al., 2023)      | 3.5 |
| 27 | Quality management and certified medical physicist's role in radiology for radiation dose optimisation: a literature review until 2024  | (Sekkat et al., 2025)      | 3.5 |

#### 4. Conclusion

This systematic review examined the contribution of AI to the operational performance of healthcare quality system. Following the PRISMA 2020 methodology, 92 records were initially retrieved, and after rigorous screening and eligibility checks, 27 studies were included for synthesis and quality assessment. These studies were systematically analyzed to identify recurring themes and assess the methodological robustness of the evidence base.

The findings reveal four major themes: optimization of resources and planning, patient flow and care process management, reduction of errors and improvement of accuracy, and organizational, technological, and human factors influencing AI adoption. Descriptive analyses showed that most contributions come from original research articles (62.2%), followed by reviews (31.1%), with relatively few conference papers (6.7%). Quality scoring highlighted that studies addressing resource optimization and error reduction are methodologically stronger, while organizational and human factors remain underexplored, despite their importance for AI adoption.

The review highlights that AI contributes to operational performance in multiple ways: optimizing resource allocation, reducing clinical and administrative errors, streamlining workflows, and automating repetitive tasks. However, technological advances alone are insufficient. Successful AI adoption depends on organizational readiness, staff engagement, governance mechanisms, and alignment with institutional objectives. For managers and policymakers, this implies that financial and technological investments must be complemented by strategies to build human capacity, foster continuous learning, and manage change effectively.

The review is limited to studies published in English and French between 2019 and 2025, which may have excluded relevant works in other languages or outside this timeframe. The heterogeneity of methodologies also restricts direct comparability across studies. Therefore, some insights were drawn from comparable contexts in other developing countries.

Future studies should deepen the analysis of human, organizational, and governance dimensions of AI adoption in healthcare quality system. Qualitative research on professionals' experiences and institutional practices would help uncover barriers and enablers in real-world contexts. Moreover, investigating ethical, cultural, and regulatory considerations will provide a more comprehensive understanding of sustainable AI integration.

In conclusion, AI represents a transformative opportunity to enhance the operational performance of healthcare quality systems. While the strongest evidence currently relates to efficiency gains and error reduction, broader challenges concerning human and organizational factors remain insufficiently addressed. Achieving the full potential of AI requires a balanced approach that integrates technological innovation with organizational preparedness and active stakeholder engagement. This review provides a foundation for both future academic research and practical strategies, underscoring that technology alone is not enough sustainable success depends on aligning human, organizational, and technological elements in a coherent and context-sensitive manner.

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