Artificial Intelligence Applied to the Safety of Perioperative Nursing Care: Integrative Review

Inteligência Artificial Aplicada à Segurança da Assistência de Enfermagem Perioperatória: Revisão Integrativa

Inteligencia Artificial Aplicada a la Seguridad de la Asistencia de Enfermería Perioperatoria: Revisión Integrativa

RESUMO

Objetivo: Identificar as contribuições da inteligência artificial para a segurança da assistência de enfermagem perioperatória. **Método:** Revisão integrativa da literatura, com coleta de dados realizada entre agosto e setembro de 2025. A busca e seleção dos artigos primários, publicados em português ou inglês entre 2015 e 2025, ocorreram nas bases de dados: Literatura Latino-Americana e do Caribe em Ciências da Saúde, Base de dados em Enfermagem e Medical Literature Analysis and Retrieval System Online. **Resultados:** Na busca primária foram encontrados 36 artigos, dos quais 10 foram incluídos. A inteligência artificial apresentou potencial para contribuir com a tomada de decisão clínica ou gerencial, melhorar a precisão e a acurácia na interpretação de exames de imagem, prevenir complicações e eventos adversos, promover qualidade de vida e satisfação do paciente, identificar riscos e detectar alterações clínicas, otimizar o processo de trabalho e fluxo cirúrgico, favorecer a recuperação acelerada no pós-operatório (fast-track), melhorar a comunicação e a colaboração interprofissional e colaborar com a vigilância no período pós-alta hospitalar. **Considerações finais:** A inteligência artificial fortalece a segurança e a qualidade da enfermagem perioperatória ao apoiar decisões, prevenir complicações e otimizar processos. Aliada a protocolos bem estruturados, promove cuidado eficiente, individualizado e seguro, sem substituir o pensamento crítico e o raciocínio e julgamento clínico da equipe de enfermagem.

DESCRITORES: Inteligência Artificial. Sistemas Inteligentes. Enfermagem Perioperatória. Segurança do Paciente.

ABSTRACT

Objective: To identify the contributions of artificial intelligence to the safety of perioperative nursing care. **Method:** Integrative literature review, with data collection carried out between August and September 2025. The search and selection of primary articles, published in Portuguese or English between 2015 and 2025, took place in the following databases: Latin American and Caribbean Health Sciences Literature, Nursing Database, and Medical Literature Analysis and Retrieval System Online. **Results:** In the primary search, 36 articles were found, of which 10 were included. Artificial intelligence showed potential to contribute to clinical or managerial decision-making, improve precision and accuracy in the interpretation of imaging exams, prevent complications and adverse events, promote quality of life and patient satisfaction, identify risks and detect clinical changes, optimize the work process and surgical flow, favor accelerated postoperative recovery (fast-track), improve communication and interprofessional collaboration, and assist with surveillance in the post-discharge period. **Final considerations:** Artificial intelligence strengthens the safety and quality of perioperative nursing by supporting decisions, preventing complications, and optimizing processes. Combined with well-structured protocols, it promotes efficient, individualized, and safe care without replacing the critical thinking, reasoning, and clinical judgment of the nursing team.

DESCRIPTORS: Artificial Intelligence. Intelligent Systems. Perioperative Nursing. Patient Safety.

RESUMEN

Objetivo: Identificar las contribuciones de la inteligencia artificial a la seguridad de la asistencia de enfermería perioperatoria. **Método:** Revisión integrativa de la literatura, con recopilación de datos realizada entre agosto y septiembre de 2025. La búsqueda y selección de los artículos primarios, publicados en portugués o inglés entre 2015 y 2025, se realizó en las bases de datos: Literatura Latinoamericana y del Caribe en Ciencias de la Salud, Base de datos en Enfermería y Medical Literature Analysis and Retrieval System Online. **Resultados:** En la búsqueda primaria se encontraron 36 artículos, de los cuales se incluyeron 10. La inteligencia artificial mostró potencial para contribuir a la toma de decisiones clínicas o administrativas, mejorar la precisión y la exactitud en la interpretación de exámenes de imagen, prevenir complicaciones y eventos adversos, promover la calidad de vida y la satisfacción del paciente, identificar riesgos y detectar alteraciones clínicas, optimizar el proceso de trabajo y el flujo quirúrgico, favorecer la recuperación acelerada en el posoperatorio (fast-track), mejorar la comunicación y la colaboración interprofesional y colaborar con la vigilancia en el período poshospitalario. **Consideraciones finales:** La inteligencia artificial refuerza la seguridad y la calidad de la enfermería perioperatoria al apoyar las decisiones, prevenir complicaciones y optimizar los procesos. Junto con protocolos bien estructurados, promueve una atención eficiente, individualizada y segura, sin sustituir el pensamiento crítico y el razonamiento y juicio clínico del equipo de enfermería.

DESCRIPTORES: Inteligencia artificial. Sistemas inteligentes. Enfermería perioperatoria. Seguridad del paciente.

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Anny Larissa de Castro
Undergraduate Nursing Student at Centro Universitário UniDomBosco.
ORCID: https://orcid.org/0009-0006-5264-4512

Joyce Meldola Soares
Undergraduate Nursing Student at Centro Universitário UniDomBosco.
ORCID: https://orcid.org/0009-0003-3047-8558

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Marina Berneck Renner
Undergraduate Nursing Student at Centro Universitário UniDomBosco.
ORCID: https://orcid.org/0009-0007-7981-3475

Maria Luiza de Medeiros Amaro
Master's Degree in Nursing. Faculty member at Faculdade Evangélica Mackenzie do Paraná.
ORCID: https://orcid.org/0000-0001-7880-3258

Fernanda Broering Gomes Torres
PhD in Health Technology. Faculty member of the Nursing Program at Centro Universitário UniDomBosco.
ORCID: https://orcid.org/0000-0002-1163-3781

Josemar Batista
PhD in Nursing. Faculty member of the Nursing Program at Centro Universitário UniDomBosco.
ORCID: https://orcid.org/0000-0001-9838-1232

INTRODUCTION

Surgical units are complex, high-risk areas with a high occurrence of errors and adverse events, as the provision of safe practices depends on the integration of different health professionals, the adequate availability of physical and material resources, and the constant training of surgical, anesthesiology, and nursing teams[1].

From an organizational point of view, surgical patient safety is not limited to the individual care provided by professionals, but requires a systemic approach, in which the entire care network is organized to prevent harm and promote more reliable and sustainable care practices aimed at achieving universal health coverage[2]. Among the actions undertaken to protect patients in health services, discussions regarding the use of Artificial Intelligence (AI) as a tool to reduce healthcare risks stand out[3].

AI can be defined as a machine-based system that can, for a set of objectives defined by humans, make predictions, recommendations, or decisions that influence real or virtual environments. It is a set of techniques designed to emulate some aspects of the cognition of living beings through machines, with varying levels of autonomy[4]. Subareas of AI include Natural Language Processing (NLP) and Artificial Neural Networks, used in the field of Machine Learning and Deep Learning[5-6].

The incorporation of digital technologies, such as electronic medical records, traceability systems, real-time monitoring, and the use of AI in image-guided surgeries (laparoscopic and robotic), has shown promise in improving surgical patient care and the quality of care[7-10].

In this sense, synthesizing the main contributions of the different types of AI available for use in the perioperative context and applicable to the promotion of safe and quality care by the nursing team favors interdisciplinary discussions and the implementation of policies that enhance the operationalization of these systems in health services with different levels of financing for health actions and different technological densities, whose purpose is to optimize processes and reduce care errors, improve managers' decision-making, and, consequently, strengthen the culture of organizational safety.

Thus, the objective of this research was to identify the contributions of artificial intelligence to the safety of perioperative nursing care.

METHODOLOGY

This is an integrative literature review conducted in six stages: (1) choice of research topic and formulation of the guiding question; (2) search and establishment of inclusion and exclusion criteria for publications; (3) extraction of data from primary studies; (4) critical evaluation of the included studies; (5) synthesis and interpretation of results; and (6) presentation of the review[11]. Stage 1 consisted of formulating the guiding question: what are the contributions of artificial intelligence to the safety of nursing care in the perioperative period?

In Stage 2, articles were searched for and selected between August and September 2025, through the Virtual Health Library (VHL) portal, in the following databases: Latin American and Caribbean Health Sciences Literature (LILACS), Nursing Database (BDENF), and Medical Literature Analysis and Retrieval System Online (MEDLINE). (MEDLINE). The descriptors were selected from the Health Sciences Descriptors (DeCS) and *Medical Subject Headings* (MeSH), combined with the Boolean operator *AND,* resulting in the following search strategy: Artificial Intelligence *AND* Perioperative Nursing and Intelligent Systems (*Intelligent Systems*) *AND* Perioperative Nursing (*Perioperative Nursing*).

The following inclusion criteria were adopted: original articles, published online and in full, between 2015 and 2025, in Portuguese or English. Literature reviews, theoretical studies, case reports and experience reports, duplicate productions, and those that did not answer the guiding question were excluded. The selection of studies was performed through an initial reading of the titles and abstracts by three independent reviewers. Subsequently, the texts were read

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in full, on a recurring basis, to define the articles to be included in the research. In case of disagreement, a fourth reviewer was consulted to assist in the decision to include or exclude studies.

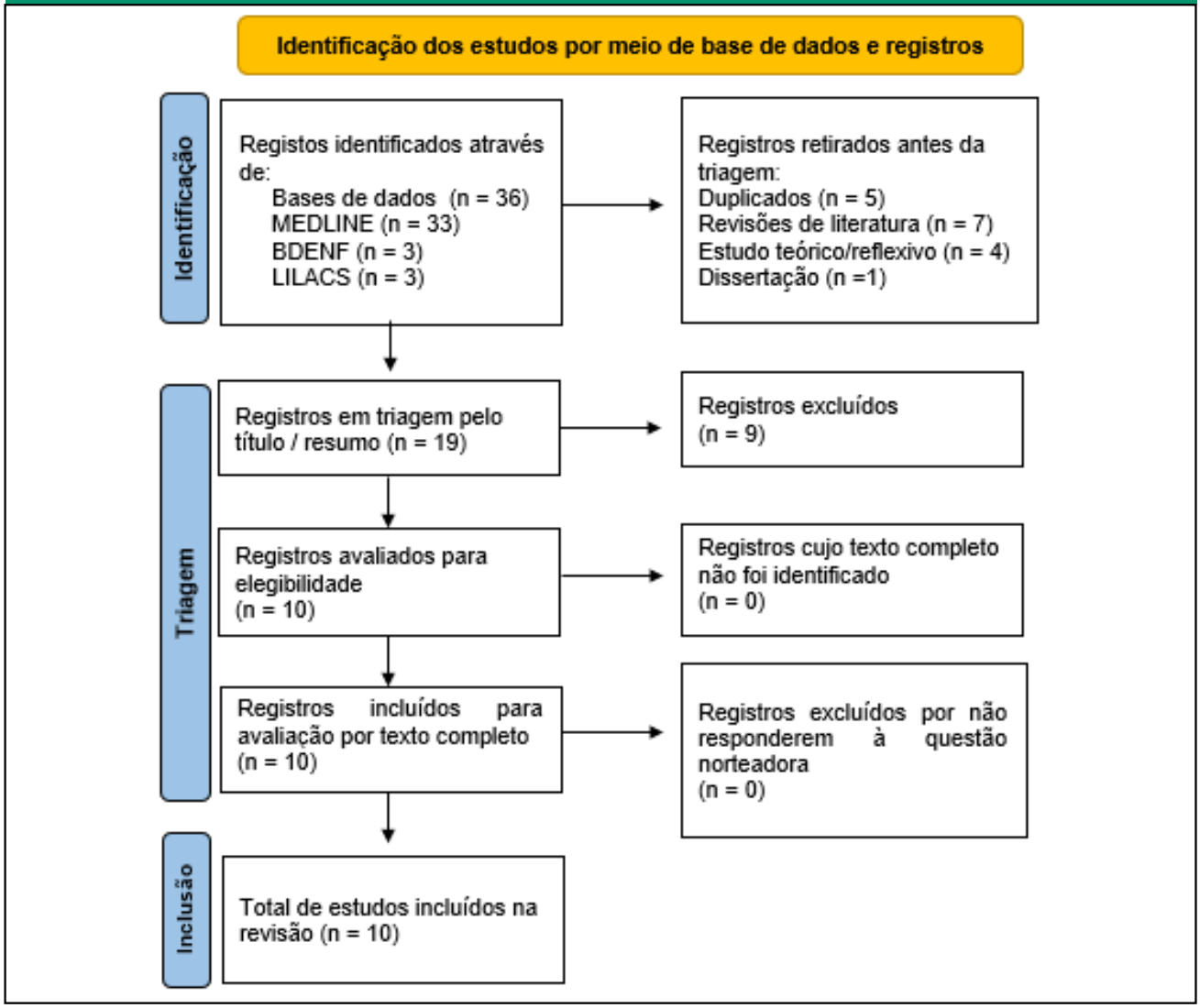
In Stage 3, the included studies were organized in a Microsoft Office Excel® spreadsheet, version 2016, and the following information was extracted: authors, year of publication, country, title, objective, method, and main findings. In Step 4, a critical analysis of the results was performed. The level of evidence adopted was classified as follows: (I) systematic reviews or meta-analyses of randomized clinical trials; (II) evidence derived from well-designed randomized clinical trials; (III) non-randomized clinical trials; (IV) cohort and case-control studies; (V) systematic reviews of descriptive or qualitative studies; (VI) descriptive or qualitative studies; and (VII) expert opinions and/or committee reports[12].

The information was presented descriptively in a summary table, and the results were interpreted based on the study categories, with the aim of presenting and summarizing the knowledge produced in the health and nursing sciences (Steps 5 and 6).

RESULTS

In the primary search, 36 articles were identified, of which 10 were included in the review. The process of searching, selecting, and including the publications is shown in Figure 1.

FIGURE 1 - Flowchart of identification, selection, and inclusion of studies.



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There was a predominance of publications from the Asian continent (n=7; 70%), conducted mainly by researchers from China (n=6; 60%). The most prevalent year of publication was 2022 (n=4; 40%), and the predominant level of evidence was VI (n=4; 40%), as shown in Table 1.

TABLE 1 – Characterization of the studies included in the integrative review.

Authors, country, and year of publication	Title	Objective	Method	Main Findings
Zhao; Li; Zhang[13] China, 2025	Postoperative self-care ability of continuous nursing based on artificial intelligence for stroke patients with neurological injury	To analyze the effects of an AI-supported continuous nursing care model on self-care capacity, psychological status, treatment adherence, and clinical indicators of patients in the post-stroke period.	A non-randomized clinical trial conducted with 106 patients with stroke, divided into two groups of 53 participants. The Control Group received conventional nursing care, including hygiene, diet, rehabilitation exercises, medication administration care, and general guidance. The Intervention Group received conventional care associated with the use of artificial intelligence through the WeChat platform, regular follow-up, and home care for three months after hospital discharge. Data collection included laboratory indicators, a form to assess adherence to health and treatment guidelines, the Barthel Index (BI), and the Self-Rating Depression Scale (SDS).	Compared with conventional care, the Intervention Group showed a mean increase of 23.87 points in the Barthel Index (BI) and a reduction of 9.12 points in the Self-Rating Depression Scale (SDS). Patients' self-care capacity, depressive status, adherence to health guidelines, and laboratory indicators were significantly better in the Intervention Group than in the Control Group ($p < 0.05$).
Moura; Rinaldi; Sousa[14] Brasil, 2025	Digital transformation with the Hoobox OR© system: Optimising efficiency in the surgical theatre of a Brazilian hospital	To evaluate the level of process automation achieved with the implementation of the Hoobox OR© system.	A descriptive study conducted in a large private hospital. The Hoobox OR© platform was used, operating under a cloud-based software model, interconnecting operating rooms and different specialties, such as nursing, pharmacy, central supply, blood bank, radiology, clinical engineering, and hospitality services. The system enables digital requests, activity tracking, chat-based interventions, and real-time monitoring of patients in the surgical environment. The platform has three interfaces: (1) an interface intended for nursing professionals, used on a tablet near circulation areas; (2) an interface for support teams, responsible for responding to requests; and (3) an interface intended for the nurse working inside the operating room, allowing monitoring and visualization of requests in real time.	The implementation of the Hoobox OR© system promoted significant improvements in communication among teams, reducing the number of telephone calls and the time required to request and receive materials across all sectors. Automated task coordination contributed to improved operating room turnover, reducing delays and rework, as well as enhancing overall operational efficiency.
Reeve et al.[15] Suíça, 2025	Prospective external validation of the automated PIPRA multivariable prediction model for postoperative delirium on real-world data from a consecutive cohort of non-cardiac surgery inpatients	To externally validate the Pre-Interventional Preventive Risk Assessment (PIPRA) algorithm.	A prospective validation study conducted with 866 hospitalized patients aged ≥60 years who underwent non-cardiac and non-intracranial surgeries. The PIPRA algorithm includes the following variables: age, body mass index, American Society of Anesthesiologists Physical Status Classification score, number of prescribed medications, cognitive impairment, prior history of delirium, surgical risk, performance of laparotomy or thoracotomy, and an optional preoperative C-reactive protein (CRP) value. Algorithm development data were obtained from an international meta-analysis, while validation data were derived from a continuous improvement project conducted in a Swiss hospital. Delirium diagnosis was defined by a score ≥3 on the Delirium Observation Screening Scale (DOSS) or by the recording of the corresponding ICD-10 code during hospitalization.	The algorithm demonstrated good performance and high clinical applicability, being able to adequately stratify the risk of postoperative delirium in elderly patients.

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Wang et al.[16] China, 2024	3D printing and intelligent technology increase convenience, reliability, and patient acceptance of ostomy nursing: a randomized controlled trial	To examine the effect of a 3D-printed ostomy pouch equipped with sensors and stimulators, used by nursing professionals in patients undergoing surgery for colorectal cancer or intestinal obstruction.	A randomized clinical trial conducted with 113 patients, divided into two groups: (1) Intervention Group – intelligent 3D-printed ostomy pouch (n=57); and (2) Control Group – conventional Coloplast® pouch (n=56). In the Intervention Group, the shape of the stoma and peristomal skin was scanned using a portable 3D scanner, followed by personalized pouch printing and adaptation of an intelligent device containing sensors. Duration of use, leakage rate, Discoloration, Erosion, and Tissue Overgrowth (DET) score, and the Acceptance of Illness Scale (AIS) were used for data collection.	Significant differences were observed in pouch usage time in the Intervention Group (0.7 ± 0.4 months) and in leakage rate (1.75%) compared with the Control Group (9.1 ± 3.5 months and 16.1%, respectively). The DET score was lower in the 3D-printed pouch group, while the AIS score was higher than that of the Control Group.
Hoshijima et al.[17] Japão, 2024	Machine learning-based identification of the risk factors for postoperative nausea and vomiting in adults	To identify risk factors for postoperative nausea and vomiting in adults using machine learning–based artificial intelligence.	A retrospective study that applied a machine learning algorithm to analyze data from 37,548 adult patients (≥20 years) who underwent surgery under general anesthesia. The model used the Gradient Boosting Decision Tree (GBDT) algorithm, implemented with the LightGBM framework. Data sources included electronic medical records, anesthetic records, and nursing records.	The identified risk factors were female sex, age between 20 and 50 years, surgical duration between 60 and 400 minutes, total intraoperative fluid infusion volume under 1,000 mL, total blood loss during surgery between 1 and 2,500 mL, and absence of blood transfusion. Other associated factors included the use of desflurane for anesthetic maintenance, dopamine administration, non-use of atropine or phenylephrine, absence of lumbar epidural anesthesia, performance of laparoscopic surgery, and lateral patient positioning during the surgical procedure.
Xu et al.[18] China, 2022	Cerebral Angiography under Artificial Intelligence Algorithm in the Design of Nursing Cooperation Plan for Intracranial Aneurysm Patients in Craniotomy Clipping	To assess the value of indocyanine green cerebral angiography (ICGA), based on the Otsu artificial intelligence algorithm, in planning perioperative nursing care for patients undergoing intracranial aneurysm clipping (ICAC).	A randomized clinical trial conducted with 86 patients diagnosed with intracranial aneurysm, randomly allocated into two groups (n=43): Experimental Group (using ICGA + clipping + systematized perioperative nursing care) and Control Group (clipping + conventional nursing care). In the Experimental Group, after aneurysm exposure, ICG contrast (0.5 mg/kg) was injected, and the microscope was set to infrared imaging mode. The Otsu method was used to process images, improving visualization of the aneurysm, the main vessel, and surrounding vessels, allowing more precise clip positioning. After 15 minutes, a new angiography was performed. In the Control Group, routine nursing interventions, health education, and standard perioperative clinical monitoring were performed. In the Experimental Group, systematized nursing care was implemented from the preoperative stage. Surgery time, blood loss, length of hospital stay, and patient satisfaction with nursing care were evaluated in both groups. After six months, patient recovery was analyzed using the Glasgow Scale. The World Health Organization Quality of Life (WHOQOL-BREF) was adopted to assess quality of life before and after the nursing intervention.	Length of hospital stay in the Experimental Group (19.9 ± 3.5 days) was significantly shorter ($p < 0.05$) than in the Control Group (23.2 ± 3.0 days). The operation time in the Experimental and Control Groups was 180.3 ± 29.2 minutes and 173.9 ± 30.3 minutes, respectively. Intraoperative blood loss was 234.4 ± 86.4 mL and 256.4 ± 64.7 mL, respectively. The overall incidence of complications was significantly lower in the Experimental Group ($p < 0.05$). WHOQOL-BREF scores improved in both groups after the nursing intervention; however, they were significantly higher in the Experimental Group. In addition, patient satisfaction with nursing care was significantly greater in the Experimental Group.

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Zhang; Wang[19] China, 2022	Evaluation of Nursing Effects of Pelvic Floor Muscle Rehabilitation Exercise on Gastrointestinal Tract Rectal Cancer Patients Receiving Anus-preserving Operation by Intelligent Algorithm-based Magnetic Resonance Imaging	To investigate the effects of pelvic floor muscle rehabilitation associated with the use of magnetic resonance imaging processed by a deep learning algorithm (CNN) on functional recovery and quality of life in patients with rectal cancer undergoing anus-preserving surgery.	A randomized clinical trial conducted with 88 patients, randomly divided into experimental and control groups (44 in each group). Patients in both groups received medication, diet, perianal skin care, stoma anastomosis dilation, regular evacuation training, and other conventional nursing measures. One week after the first postoperative evacuation, the pelvic floor muscle rehabilitation program was initiated. In the Control Group, patients performed simple Kegel exercises, with pelvic muscle contraction for 5 seconds followed by relaxation for 10 seconds, for three minutes, with 10 repetitions per session, three times daily. In the Experimental Group, exercises were enhanced and integrated, including breathing and abdominal massage, in addition to Kegel movements and other anal lifting exercises, lasting 8 to 10 minutes per session, three times daily, associated with guidance and specialist follow-up. Data collection included an anorectal function rating scale and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire in Colorectal Cancer (EORTC QLQ-CR29).	The use of the algorithm allowed improvement in magnetic resonance image quality. After the intervention, comparison of anorectal function between the groups showed statistical significance ($p > 0.05$). In the Experimental Group, a significant improvement in quality of life was observed after the intervention.
Yu et al.[20] China, 2022	Ultrasound Image under Artificial Intelligence Algorithm to Evaluate the Intervention Effect of Accelerated Rehabilitation Surgery Nursing on Laparoscopic Hysterectomy	To evaluate the effects of a nursing intervention based on the Enhanced Recovery After Surgery (ERAS) protocol in patients undergoing total laparoscopic hysterectomy, using ultrasound processed by the Capon beamforming algorithm (ISCB).	A non-randomized clinical trial conducted with 120 patients, equally divided into two groups: Control – traditional perioperative nursing care; Experimental – nursing care based on the Enhanced Recovery After Surgery (ERAS) protocol, composed of different interventions directed at the preoperative, intraoperative, and postoperative phases, aiming to accelerate functional recovery, reduce complications, and decrease hospital length of stay. All participants underwent ultrasound examination with images enhanced by the ISCB algorithm. Analyzed variables included operation time, length of hospital stay, time to first postoperative gas passage, intraoperative blood loss volume, postoperative analgesic effect assessed by the numerical pain scale, postoperative complications, and costs. The Newcastle Satisfaction with Nursing Scales (NSNS) was applied to assess patient satisfaction with nursing care.	The use of the ISCB algorithm improved ultrasound image quality. A significant reduction in pain, length of hospital stay, and hospitalization costs was observed in the Experimental Group ($p < 0.05$). The proportion of patients satisfied with nursing care was significantly higher in the Experimental Group ($p < 0.05$).
Duan et al.[21] China, 2022	Adoption of Artificial Intelligence (AI)-Based Computerized Tomography (CT) Evaluation of Comprehensive Nursing in the Operation Room in Laparoscopy--Guided Radical Surgery of Colon Cancer	To discuss the application of computed tomography (CT) images based on the traditional Non-Local Means (NLM) algorithm in the evaluation of nursing interventions in patients undergoing radical laparoscopic surgery for colon cancer.	A non-randomized clinical trial conducted with 100 patients diagnosed with colon cancer who underwent radical laparoscopic surgery, divided into two groups: (1) Intervention Group – received comprehensive nursing care in the operating room (clinical assessment, complementary exams, surgical planning, proper positioning, teamwork, and postoperative visit); and (2) Control Group – received routine nursing care (fasting, routine exams, and vital sign monitoring). All patients underwent computed tomography using the improved NLM algorithm (INLM). Surgery time, blood loss, recovery time, and postoperative complications were analyzed.	The INLM algorithm showed better image quality and shorter processing time compared with traditional algorithms. Operative time and intraoperative blood loss in patients in the Intervention Group were significantly lower than in those in the Control Group ($p < 0.05$). Patients in the Intervention Group experienced faster recovery (early ambulation, feeding, and ventilation), and postoperative complications were significantly fewer ($p < 0.05$).

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Kulkarni; Thangam; Amin[22] Estados Unidos da América, 2021	Artificial neural network-based prediction of prolonged length of stay and need for post-acute care in acute coronary syndrome patients undergoing percutaneous coronary intervention	To develop and validate Artificial Neural Network (ANN)–based models to predict prolonged hospital length of stay (>7 days) and the need for post-acute care after percutaneous coronary intervention (PCI).	A retrospective and quantitative study analyzing data from 22,591 procedures performed in 21,874 patients. A feed-forward neural network structure designed with a Multilayer Perceptron (MLP) was used.	The MLP-based model achieved accuracies of 90.87% and 88.36% for the training (derivation) and test (validation) datasets, respectively, in predicting prolonged length of stay. Accuracy was 90.22% and 86.31%, respectively, for predicting the need for acute care/treatment in patients undergoing PCI.

Based on the findings, nine contributions of AI applicable to patient safety and quality of care in the perioperative context were categorized, with emphasis on those that assist the nursing team, especially nurses, in clinical and managerial decision-making (Table 2).

TABLE 2 – Summary of the contributions of artificial intelligence to the promotion of safe and quality care.

Potential contributions of AI to the safety of perioperative nursing care	Autores/ Ano de publicação									
	Zhao; Li; Zhang, 2025[13]	Moura; Rinaldi; Sousa, 2025[14]	Reeve et al., 2025[15]	Wang et al., 2024[16]	Hoshijima et al., 2024[17]	Xu et al., 2022[18]	Zhang; Wang, 2022[19]	Yu et al., 2022[20]	Duan et al., 2022[21]	Kulkarni; Thangam; Amin, 2021[22]
Tomada de decisão clínica ou gerencial	X	X	X	X	X	X	X	X	X	X
Precisão/Acurácia na interpretação de exames de imagem						X	X	X	X	
Prevenção de complicações e eventos adversos				X		X		X	X	
Qualidade de vida/ Satisfação do paciente				X		X	X	X		
Identificação de riscos e detecção de alterações clínicas			X		X					
Otimização dos processos de trabalho e fluxo cirúrgico		X	X							
Recuperação acelerada pós-operatória (fast-track)								X	X	
Melhora da comunicação e da colaboração interprofissional		X								
Vigilância pós-alta hospitalar	X									

DISCUSSION

The results of this integrative review made it possible to identify several types of AI applied to the clinical and managerial context of surgical units, with significant contributions to the healthcare and nursing team. It was observed that, in most of the studies analyzed, AI supports decision-making, a central aspect for the optimization of surgical processes and for the protection of patients against the risks and harms associated with perioperative care. It is recognized that AI has been reshaping healthcare practices by automating tasks, optimizing workflows, and improving clinical judgment, enabling faster, evidence-based, patient-centered decisions[6,23].

It should be emphasized, however, that technology does not replace critical thinking, clinical reasoning, and the professional judgment of nurses, and human action is indispensable for the ethical and responsible interpretation of data generated by intelligent systems. In this sense, AI should be seen as an ally, capable of enhancing the nursing process through the analysis of large volumes of information. Its effectiveness, however, depends on the technical and scientific competence of the healthcare professional, who must integrate the best evidence into the practice of care[24].

In this regard, the use of AI algorithms[18,20-21], especially deep learn-

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ing algorithms[19], helps healthcare professionals analyze high-resolution imaging exams, contributing to greater diagnostic accuracy and surgical planning. In addition, machine learning algorithms analyze information and data from imaging exams contained in the patient's electronic medical record, making it possible to alert the healthcare team to the need for immediate interventions[25].

It appears that these factors become important contributions to the construction of the nursing process, especially for the stages of diagnosis, planning, and nursing interventions[26]. This potentially favors nurses in clinical assessment and systematic care planning, whose purpose is to minimize complications, accelerate surgical recovery[25], and promote satisfaction with the care provided and the patient's quality of life[16,18-20].

The integration of AI into the nursing process transforms automated information into targeted interventions, promoting personalized, effective, and safe care. However, its incorporation into evidence-based clinical practice must occur in a critical, ethical, and regulated manner, ensuring that its use complements the nurse's clinical reasoning and actually promotes safety, satisfaction, and value-based practices for patients in the perioperative context[27-28].

Recent evidence shows that the application of AI has contributed to clinical risk management[15,17], which, in turn, acts as a protective factor against complications and adverse events related to perioperative practice, as it allows for predictive analysis of clinical data, continuous monitoring, and decision support, strengthening patient safety and, consequently, hospital indicators.

The studies included in this integrative review found that the application of algorithms and intelligent systems in different surgical contexts, such as colon surgery, hysterectomies, and cerebral aneurysms, contributed to the reduction of infections, pain, intraoperative bleeding, and postoperative complications, with significant effects on surgical time, length of hospital stay, and hospital costs[16,18,20-21].

The promotion of surgical safety and quality of care is not exclusively the result of automation or the use of AI, but rather the synergy between technology and the nursing professional's know-how and expertise, enabling the incorporation of risk assessment and intelligent patient monitoring to reduce care errors and implement early, personalized, and safe clinical interventions[9,29], including monitoring and follow-up of patients at home after hospital discharge[13]. In this context, AI in nursing represents an important advance for continuity of care by promoting greater efficiency, diagnostic accuracy, and personalized therapeutic planning. It acts as a support to nurses in monitoring patients and analyzing clinical data, enabling more integrated and preventive care.

The limitations of this research include the methodological heterogeneity of the included studies and the different programs and methodologies that encompass a wide range of nursing interventions incorporated into the different types of AI investigated. The absence of standardized protocols for data collection, subjectivity in the interpretation of findings, the limited number of databases consulted, and the languages of the primary publications limit the scope of the search and the representativeness of the sample, making it difficult to compare results and preventing the generalization of evidence on the use of AI in perioperative nursing practice.

FINAL CONSIDERATIONS

The evidence showed that AI contributes to clinical and managerial decision-making, increases the accuracy of nursing diagnoses, helps prevent complications and adverse events, and promotes quality of life and patient satisfaction. There are also potential benefits related to optimizing the work process in the operating room, identifying risks and clinical changes, and faster recovery in the postoperative period, in addition to promoting effective communication between healthcare professionals and contributing to patient monitoring after hospital discharge.

It should be noted that, although AI enhances the promotion of nursing care safety in the perioperative period and strengthens the culture of organizational safety, it is not intended to replace the clinical judgment of nurses and should be understood as a tool to support clinical and managerial decisions. Notwithstanding ethical and regulatory issues, which vary between countries regarding the application of AI in health and nursing services, this research highlights its role in the process of caring for patients in the perioperative context.

Thus, the results of this research indicate the need to address this topic in the generalist training of health professionals, with an emphasis on the nursing team, as a contribution to the translation of knowledge into perioperative practice. Furthermore, the incorporation of technology into daily care reinforces the need for continuous training of nursing workers and for research that explores the topic from different epistemological perspectives, with the aim of adding the responsible use of AI to human knowledge, thereby increasing safety and quality of care.

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