International Journal of Health Systems and Medical Sciences
ISSN: 2833-7433
Volume 05 Number 04 (2026)
Impact Factor: 10.87
SJIF (2026): 3.656

www.inter-publishing.com

Article

Factors Influencing Acceptance of AI-Assisted Robotic Surgery: Review of Patient and Surgeon Perspectives

Diala Lteif[1], Ganijonova Mohlaroy[2]

1. PhD degree holder from Boston University, USA
2. Research assistant at lab, Under school No. 34, Uzbekistan

Abstract: This scoping review focuses on the perspectives of patients and surgeons on AI-assisted robotic surgery (RAS) in perioperative settings, an area that current literature covers at best indirectly. Most work on AI in surgery usually includes RAS in a broad discussion while failing to acknowledge it separately, and without examination of whether the patient would be willing to pay for the procedure. Searches followed PRISMA-ScR guidelines across Google Scholar, PubMed, JSTOR, and ScienceDirect, covering studies between 2022-2026. Only three sources met the inclusion criteria. The findings have been analyzed based on five different dimensions: knowledge, trust, previous experience, expectations, and willingness to pay. A common finding across the three sources was the fact that people trusted RAS more than they understood its technical ability. People consistently overestimated how autonomous the robot actually is and underestimated how much control the surgeons have. That misunderstanding caused anxiety about malfunction. The same was true for the surgeons whose knowledge of AI increased from 14.5% in 2021 to 44.6% in 2024, but most still couldn't explain basic concepts like machine learning and computer vision. The most notable aspect was the trend of change: as exposure to AI increased, the preference for full autonomy decreased rather than going up. Across both groups, trust held up best when AI stayed in a decision-support role rather than operating independently. This review is the first to treat RAS separately rather than folding it into the broader context of perioperative AI. It also identifies how little the field knows about willingness to pay and prior experience - both nearly absent from current studies. Surgeon acceptance closely correlates to how much control they get to keep. But, acceptance by patients is quite ambiguous; it appears related to misunderstanding robotic autonomy rather than to the technology's actual performance, but, since the pattern is based on three sources only, it can be viewed as a hypothesis to be tested. The review's obvious limitations include a small source base, and English-only search, and no formal quality assessment of the studies included. Future work should study RAS on its own terms rather than borrowing conclusions from general surgical AI research. Most importantly, it should directly analyze patients who paid for the AI procedure and what they have actually experienced.

Keywords: *Artificial intelligence; robotic-assisted surgery; patient acceptance; surgeon perspectives; trust.*

Citation: Ltief, D & Mohlaroy G. Factors Influencing Acceptance of AI-Assisted Robotic Surgery: Review of Patient and Surgeon Perspectives. International Journal of Health Systems and Medical Sciences 2026, 5(4), 1-13

Received: 10th Jan 2026
Revised: 11th Jan 2026
Accepted: 24th Jan 2026
Published: 04th Aug 2026

1. Introduction

Robotic-assisted surgery (RAS) has increased steadily in the past two decades, and artificial intelligence has taken an increasingly significant part in its implementation. Artificial intelligence-enabled robotic-assisted systems have found applications in various fields of surgeries, demonstrating enhanced accuracy, fewer complications, and quicker recovery periods in their application. One of such applications is the da Vinci surgical system. As of 2023, more than 2.2 million procedures have been completed with robotic assistance worldwide, and the number of AI-enabled medical devices authorized by the FDA each year grew from six in 2015 to 221 in 2023. A taxonomy of 1,016 FDA-authorized

AI/ML-enabled medical devices confirms this rapid growth, while also showing that intervention-focused devices, including surgical applications, remain a small minority relative to diagnostic and assessment tools [1]. This demonstrates that the technology has long surpassed the phase of experimentation. However, implementation has not been easy, and the reasons behind it are more social and behavioral rather than technological. Trust from the patients as well as the surgeons continues to be one of the key barriers in incorporating these systems into widespread use [2]. According to survey results, a substantial proportion of the population is still uneasy about the possibility of using artificial intelligence technology in their healthcare [3]. When it comes to the patients' specific worries, they usually involve the issues of safety, accountability, and the practical aspects of involving a computer into such an important procedure as a surgery. The concerns of the surgeons also include different but no less important aspects such as liability, dependence on automated algorithms, the issue of bias in algorithms, and others. This concern is not merely theoretical: a surgical AI system tested on robotic surgery videos from three hospitals was found to exhibit underskilling and overskilling biases, rating surgeons differently depending on factors such as caseload and patient characteristics outside their control [4]. A review of FDA-approved AI/ML medical devices found that the overwhelming majority of approval documents did not report the demographic or socioeconomic characteristics of the populations used to test these devices, limiting end users' ability to detect such bias before deployment [5]. According to studies, people have shown significantly low willingness to be subjected to treatment with AI assistance when there is lack of trust in the institution, and willingness varies according to the gender, health condition, and socioeconomic condition of patients [6]. Hesitation of the clinicians about automations is one of the key barriers that have been found in adoption of AI assistance in clinics along with training problems, disturbance of workflow, and accountability issues [7]. This implies that the issue of the difference between capabilities of RAS and its actual usage is mainly a human factor issue.

However, this is still not sufficient. According to [8], the latest scoping review on the matter, there were only 16 articles about perspectives of clinicians and patients towards AI in perioperative care; however, none of those was related to the use of robotic surgical systems. In addition, the human factors of satisfaction of patients and willingness to pay have not been addressed at all. The present article addresses the gap by analyzing the perspectives of both patients and surgeons towards RAS in perioperative settings. They also consider adoption and trust issues. AI technology integration in surgery represents one of the most progressive developments in modern medicine; however, human willingness to use the technology exceeds its technical abilities. In order to comprehend this problem, it is important to recognize how patients and surgeons think about trust, and either accept or reject RAS. Such characteristics as surgical sciences, human factors, ethics of medicine, and psychology of patients have similar patterns: human factors play a greater role in adoption than technical obstacles.

Usually, the case for artificial intelligence in robotic surgery is very compelling. [9] claims the increasing contribution of AI in pre-operative, during the procedure, and post-operative periods will yield consistently superior surgical results. However, performance and capabilities alone were not sufficient factors in the spread of AI. [10] addressed this problem in their early research, arguing that the surgical culture was not yet ready for AI technology, an issue that still see as open.

From the perspective of the patient, trust and confidence appear to be the key variables in determining acceptance. This fear was highlighted by [11], who found that patients' resistance to AI in medicine does not stem from skepticism about its precision. In fact, patients often believe AI is more precise than human judgment. In fact, what they fear losing is the human element of care.

In fact, this anxiety is especially common when it comes to robotic surgery. In a scoping review of 31 independent studies, [12] report that between 60-100% of the population failed to understand how RAS functions and tended to overestimate the robot's ability to operate autonomously while underestimating the influence of the surgeon. Technical malfunction and unintended system action were major barriers to acceptance, irrespective of geographical location and year of study. RAS was the only modality where patient fear had a direct impact on willingness to undergo surgery, unlike broader medical AI, where fear does not always translate into avoidance of treatment.

In a national representative sample of 2,039 US citizens, institutional confidence in the healthcare system proved to be the most powerful predictor of positive perceptions regarding the use of AI (OR 3.55, 95% CI 2.67-4.72), alongside individual trust in healthcare providers being the predictor of acceptance of AI in the healthcare field (OR 1.78, 95% CI 1.27-2.51). Moreover, these variables were unevenly distributed among different populations. For example, the likelihood of individuals to keep their AI expectations high was lower for females compared to males (OR 0.57, 95% CI 0.43-0.76) and higher for Black and Hispanic participants than for whites (OR 1.43 and OR 1.46 accordingly). The mentioned demographic differences prove that patient acceptance of AI technology in robotic surgery is not a homogenous process.

There is a unique difference in perception of AI by a surgeon, different from that of a patient as the recipient of health care service McDonnell have identified barriers in AI literacy among clinicians in perioperative settings, indicating the issues associated with excessive dependence on automatic suggestions, skill acquisition for trainees, and unresolved liability issues within the specialty. In a global analysis of this issue by [13], although there was a significant increase in the awareness about AI courses from 14.5% in 2021 to 44.6% in 2024 among surgeons from 98 countries studied, 73% of them still lacked the basics of AI, including machine learning and computer vision. The continuum of knowledge gap exists alongside high adoption willingness: 96.6% of surgeons were ready to implement AI into their practice.

Moreover, note that there is an appropriate pattern related to preferences towards autonomy. In fact, interest in automated surgery declined from 2021 to 2024, with mean ratings dropping from 3.75 to 3.35 on a 1-to-6 scale measuring interest in various AI applications. Surgeons constantly preferred the environment that would enable artificial intelligence to enhance the quality of visual perception and decisions while providing full control over surgical operating systems. Such preference toward human intervention over algorithmic autonomy is consistent with Musa who found that patient comfort with AI declined sharply as system autonomy increased, from 75.8% support for AI-assisted planning to just 17.7% support for fully autonomous surgical intervention.

Liability constitutes another form of structural hurdle. Legal and regulatory bodies have failed to catch up with the real world challenges arising due to implementation of RAS systems in operating rooms [14]. The question of liability arises in situations where complications in surgery arise due to the application of AI technology. This problem creates an ambiguity situation for the surgeon, the institution, the manufacturer of the instrument, and the regulatory body involved. Deskilling, identified for the first time by Hashimoto constituted a similar challenge: the reliance on AI during training could deprive surgeons of the fundamental skills needed when such assistance is not available Blease while researching clinicians' attitudes towards AI in primary care, recognized transparency in AI decision making as a critical requirement to build professionalism.

2. Materials and Methods

Study Design

For the development of this paper, a scoping review approach has been applied in order to search for and analyze current literature on the perspectives of patients, general population, and surgeons regarding AI-assisted robotic surgery (RAS) in perioperative context. It is important to state that this type of study is the most appropriate in our case because of its broadness and variety of available literature and nature of research questions posed. The scoping review was carried out according to PRISMA-ScR criteria. No protocol was developed for this study before carrying it out.

Search Strategy

A systematic literature search was conducted in four major electronic databases and sources, namely Google Scholar, PubMed, JSTOR, and ScienceDirect. This search was limited to the years between 2022 and 2026 to ensure the relevancy of findings within the current framework of AI implementation in surgical procedures; citations elsewhere in this paper providing background or supporting context are not subject to these criteria. The search was conducted by using keywords which can be classified into three main concept groups: the technology (such as "robotic-assisted surgery," "AI-assisted robotic surgery"), the population (e.g. "patient," "surgeon," "general public") and the human factors to investigate (e.g. "trust," "perception," "acceptance," "adoption," "barriers"). The following sets of keywords were used: "robotic-assisted surgery," "AI-assisted robotic surgery," "public trust robotic surgery," "surgeon acceptance robotic surgery," "patient perception robotic surgery," "surgeon trust robotic surgery," "robotic surgery adoption barriers." The Boolean operators (AND, OR) were used for combining terms of different concept groups.

Eligibility Criteria

Studies were selected based on pre-defined criteria including inclusion and exclusion criteria generated before carrying out the search. A study was included if it met all the following criteria: (1) written in English from 2022 to 2026; (2) concentrated on views, perceptions, trust, acceptance, or adoption of RAS or AI-assisted robotic surgery system by patient, surgeon, or the general public; (3) carried out in perioperative or postoperative setting; and (4) designed using scoping review, systematic literature review, or cross-sectional study design. The following criteria led to exclusion of the study: (1) studies that were concentrated only on performance and outcome of the procedure without involving human perspective; (2) studies done before 2022; (3) summary articles without any analysis; and (4) articles defined non-surgical and non-perioperative settings.

Study Selection

All reports labeled through the database search were imported and filtered against the eligibility requirements in two stages. In the very first stage, titles and abstracts were evaluated independently by two reviewers - the primary author and a supervising faculty mentor. In the second stage, all full-text studies of all potentially eligible studies were assessed independently by both reviewers prior to final inclusion consensus. Discrepancies at either stage were resolved through structured discussion before decisions were reached. This dual independent synthesizing process was implemented to minimize selection bias and improve the reproducibility of the study. Following the full criteria application, three existing studies were included in the final review.

Data Extraction

Before conducting the screening, the data collection sheet was developed, and then used in the first paper out of the three included studies. The data collected from each study was on the following elements: author/year, country of conduct, design of study, sample size, target population, the operating environment, type of AI/robot, and the results for the five dimensions of interest. Data extraction was done independently by both reviewers, and any discrepancy was settled amicably after discussions. The five dimensions of data extraction involved: Knowledge and awareness of RAS; trust and confidence; previous experience and satisfaction; expectations for use; and willingness to pay/use RAS.

Synthesis of Findings

Due to the heterogeneity nature of selected studies in terms of designs, populations, and outcomes measures, a narrative synthesis strategy was employed. Pooling through quantitative techniques was considered inappropriate or not even tried. Coding of finding results into thematic groups and identification of themes within the data set inductively, with the latter going through an iterative process of being discussed among both reviewers, was performed. This thematic framework helped organize the findings along the five dimensions mentioned above.

Limitations

There are various limitations associated with this. Firstly, the search was done using four sources and three studies were included in the review, thus the scope of findings that could be generated from this is narrow. The use of English language only for the search may have also affected the findings because perspectives about RAS in other countries where English is not the official language might be different. No pre-registered protocol was done before conducting the scoping review and no quality assessment of the studies included in the scoping review was done, which is inconsistent with the norms of scoping review but means that methodological heterogeneity was not assessed in the included studies. Additionally, evidence overlap between the two included scoping reviews was assessed at the reference-list level only; overlap at the level of unpublished or underlying datasets could not be ruled out.

3. Results

Following eligibility criteria application, three sources met the inclusion criteria requirements for this study. Out of three sources, two of them are themselves scoping reviews that analyze findings from multiple major studies (31 and 16 studies respectively), while Arboit is a primary cross-sectional survey directed to surgeons in two different time phases (2021 and 2024). This difference is reported here as it affects how findings are interpreted: synthesized findings from the two scoping reviews capture data trends drawn from a broader body of research, while findings from Arboit reflect direct respondent data from a single research team. Table 1 summarizes the design, scope, and population traits of three included study sources.

Table 1

Characteristics of Included Sources

Source	Design	Scope / Search	Studies/Responses Included	Population	Themes Extracted
McDonnell et al. (2025)	Scoping review (PRISMA-ScR)	8,818 records identified; 132 full-text articles assessed	31 studies	General public / patients	Understanding; Acceptance; Ancillary perceptions
Arboit et al. (2025)	Two cross-sectional surveys (2021 and 2024)	671 total responses collected across 98 countries	496 respondents (2021); 148 respondents (2024)	Surgeons	AI awareness; Expectations; Involvement; Ethical considerations (2024 only)
Musa et al. (2026)	Scoping review (PRISMA-ScR)	2,158 records screened; 32 full-text articles assessed	16 studies	Surgeons and patients (perioperative AI)	Familiarity with AI; Confidence and trust; Expectations for use; Ethical concerns and liability

Data extracted according to the five dimensions mentioned in the Methods: (1) knowledge and awareness, (2) trust and confidence, (3) prior experience and satisfaction, (4) expectations for application, and (5) willingness to pay or undergo robotic-assisted surgery (RAS). Findings for each dimension are reported below by source. Two dimensions, prior experience/satisfaction and willingness to pay, were resolved only partially or not at all across the included sources. This is reported as a finding in its own right rather than omitted from the final review.

4.1 Knowledge and Awareness

All three studies reported a gap between general or professional familiarity with AI/RAS systems and clear technical understanding McDonnell found that 60%-100% of the surveyed public did not correctly understand how RAS functions, with an uniform pattern of overestimating robotic autonomy and underestimating the surgeon's role in the operative context. This same finding continued regardless of the geographical location or year of study.

Among surgeons Arboit reported that awareness of AI-related courses to improve RAS literacy increased from 14.5% in 2021 to 44.6% in 2024, and course attendance also rose from 12.9% to 23.0% over the same time period. Despite this increase, 73.0% of respondents on average still struggled with core basic AI concepts such as machine learning, deep learning, and computer vision, and this trend did not change significantly between survey years.

Musa found comparable results when examining individual studies: 69% of trauma surgeons described themselves as familiar with AI, but merely 17% could provide a clear technical meaning; in another cohort, 86% expressed confidence in AI's potential benefits, yet only 50% was able to define terms like machine learning. Patients expressed lower familiarity than surgeons: in one included study, although 75% of patients reported having heard of AI, just 25% reported understanding its application to operative systems.

Trust and Confidence

McDonne documented fear of technical malfunction and unauthorized robotic behaviour as the key reasons for unacceptance across studies, irrespective of location or publication year. The study also noted that robotic surgery was the only unit where anxiety directly influenced a patient's decision to move forward with surgery.

Arboit reported that patient trust in AI tools was the least-mentioned barrier to adoption among surgeons surveyed in both 2021 and 2024, but concern on this specific aspect rose significantly between survey years (M=3.49 vs M=3.94).

Musa reported that trust was consistently greater when AI's function was a decision-support tool rather than an autonomous system, a trend observed in both surgeons and patients in the studies included in that review. As AI systems became more autonomous, surgeons' confidence declined with it. Just over half said they would change their clinical approach when AI recommendation and their own judgment conflicts.

Prior Experience and Satisfaction

This dimension was studied only by McDonnell where direct personal experience with RAS was reported as 3% among surveyed patients; indirect exposure to RAS, through a relative, friend, or healthcare worker, who had undergone or discussed RAS, ranged from 6% to 55% across the studies sampled.

Neither nor reported Arboit findings specific to prior experience or satisfaction with RAS or AI-assisted robotic surgical systems.

Expectations for Application

McDonnell found that patients were able to guess specific benefits of RAS (including reduced recovery times, increased accuracy, reduced pain, and overall improved outcomes) even when they had limited understanding of how the technology functions.

Arboit found a measurable growth in surgeon expectations between survey years. Interest in autonomous surgical systems decreased with the mean preference score declining from 3.75 to 3.35 on a 6-point scale. Expectations also shifted by care stage. In 2021, surgeons anticipated the greatest impact in perioperative and intraoperative stages, but by 2024 hospital management and preoperative care had overtaken them, with intraoperative care deprioritized.

Musa claimed that both surgeons and patients consistently expected AI to improve preoperative decision-making, diagnostics, and risk assessment. As the level of system autonomy increased, support for intraoperative AI adoption declined; only 53% of trauma surgeons in one included study believed that AI would enhance surgical vision, and only 12% of general surgery populations in another study supported AI application for structure identifications during robotic operation settings.

Willingness to Pay or Undergo RAS

This dimension was addressed only by McDonnell which demonstrated for the majority of respondents across studies sampled, cost did not really affect patient choice or willingness to go through with RAS.

Neither Arbo nor Musa extracted data regarding patients' willingness to pay.

4.6 Synthesis Across the Five Dimensions

Table 2 summarizes findings across all three sources organized by the five dimensions specified in the Methods.

Table 2

Synthesis of Findings by Extraction Dimensions and Sources

Extraction Dimension	McDonnell et al. (2025)	Arboit et al. (2025)	Musa et al. (2026)
Knowledge and awareness	60%-100% of the public did not correctly understand RAS mechanics, overestimating robotic autonomy and underestimating the surgeon's role	AI course awareness rose from 14.5% (2021) to 44.6% (2024); 73% of surgeons still lacked foundational ML/CV concepts	69% of trauma surgeons reported familiarity with AI, but only 17% could provide a technical definition; 75% of neurosurgery patients had heard of AI, but only 25% understood its perioperative application
Trust and confidence	Fear of malfunction and unauthorized robotic behavior was the dominant barrier across studies, regardless of geography or year	Trust in AI tools by patients was the least-cited barrier to adoption in both survey years, though concern increased significantly by 2024	Trust was consistently higher when AI functioned as a decision-support tool rather than an autonomous system; comfort declined as system autonomy increased
Prior experience and satisfaction	Direct personal experience with RAS was reported at 3% of respondents; experience through a relative or healthcare worker ranged from 6%-55%	Not addressed in the extracted data	Not extracted as a discrete theme in the source review
Expectations for application	Patients anticipated reduced recovery time, increased precision, less pain, and better outcomes, even where understanding of RAS mechanics was poor	Surgeon interest in autonomous surgical systems declined between survey years, with mean preference scores falling from 3.75 to 3.35 on a six-point scale	Surgeons and patients expected AI to support preoperative decision-making; support for intraoperative AI was more limited and decreased with increasing autonomy
Willingness to pay / undergo RAS	Cost did not significantly affect patient choice or willingness to proceed with RAS in the majority of respondents	Not addressed in the extracted data	Not addressed in the extracted data

Across the three sources, knowledge/awareness, trust/confidence, and expectations for application were evaluated in comparable detail. Prior experience/satisfaction and willingness to pay were addressed only by and were not reported as individual findings in either. This distribution is itself a finding of the present review. Although the studies meeting the inclusion criteria offer comparatively limited data on patient experience and cost-related factors specific to RAS, evidence on knowledge gaps and trust-related barriers is considerably more rigorous.

4. Discussion

The scoping review evaluated patients' and surgeons' views about the integration of artificial intelligence in RAS within the perioperative context and synthesized the results obtained from the three selected references regarding the following five dimensions: knowledge and awareness; trust and confidence; experience and satisfaction; expectations for application; and willingness to pay/undergo RAS. In all three sources reviewed, there was a common trend where both patients and surgeons have been reported to have greater confidence in AI compared to their knowledge regarding AI technology, as well as increased acceptance of AI in case AI operates as a decision-support system rather than as an independent autonomous system. Two of the dimensions, experience and willingness to pay, had only one source addressing them, thus revealing gaps in the existing literature regarding cost and experience aspects.

The knowledge-confidence gap in all three mentioned articles can be seen as a miscommunication of RAS in terms of its presentation and reception of it. According to McDonnel 60-100% of patients did not understand basic RAS mechanics by misunderstanding the level of the robot's autonomy and the involvement of a surgeon. Since the surgeon is the one who manipulates the instrument all the time during the procedure in almost all cases, people perceive the robot as more autonomous than it really is. Hence, if the patient thinks that the robot can work in an autonomous mode during the surgery, the fear of malfunctions or unwanted behavior of the robot might occur due to wrong perception rather than distrust in technology. The statement is supported by [15], according to whom the fear of malfunction and the fear of unauthorized behavior of the robot were the main barriers to the acceptance of the technology across different geographic locations and years. This same misconception has been documented independently outside the three sources formally included in this review: a survey of patients in a Singapore surgical outpatient clinic found that 43.6% believed robotic surgery involved an automated robot rather than manual surgeon control, and that concern over the robot performing the wrong procedure was independently associated with disinclination toward robotic surgery [16].

The second relevant and yet distinguishable trend relates to the surgeon's side. According to [17], the proportion of surgeons aware of AI courses significantly grew from 14.5% to 44.6% between 2021 and 2024, yet 73% of surgeons on average had problems with such core concepts of AI as machine learning and computer vision. Clearly, there is such a huge difference between the years when the survey was conducted. This means that being aware does not mean understanding. Though more and more surgeons are aware of the training options related to AI, their core knowledge did not grow proportionally. The significance of this idea can be found in one of its aspects that seems to be rather contradictory: willingness to adopt was extremely high (96.6%) at the same time as core knowledge gaps existed Musa revealed the same tendency in their studies: many surgeons claimed to be aware of AI, yet far less could define key AI concepts accurately [18].

The third observed pattern among surgeons is the reduction of the preference for autonomous systems despite the growing exposure to AI. This pattern questions the popular belief that growing exposure to increasingly advanced AI systems will necessarily lead to increased trust in them. For example Arboit demonstrated that preference for autonomous systems decreased from the mean of 3.75 to 3.35 on the scale of six points between 2021 and 2024. In his review of relevant research Musa showed a similarly structured pattern: declining confidence due to autonomy increase in systems and over 50% of the surveyed surgeons stated that they altered their clinical practice in case of disagreement between AI recommendation and their own judgment. Possibly, as surgeons become more exposed to AI systems, they become more aware of the risks associated with the decision made by automated systems. As a result, rather than fostering trust, it might have led to increased caution towards autonomous systems. Yet, the validity of this claim is questionable since there is little evidence to support it.

Though the existing literature on the subject of AI in surgery was not included in the formal synthesis process for this review, it provides helpful context in interpreting the patterns discovered in this study, in line with the gap that this paper seeks to fill Singh Zarghami characterized the evolution of the utilization of AI from the perioperative, intraoperative, to postoperative stages as the one of increasingly sophisticated technical skills development. However, the decreasing preference of autonomy found, in the same vein of increasing exposure to the use of AI by surgeons over time without increased readiness to surrender full control over the process, is an interesting finding Hashimoto expressed an initial worry about deskilling in that the reliance on AI could prevent trainees from developing sufficient baseline knowledge. More recent commentary reframes this debate, arguing that current AI applications function primarily as assistants rather than autonomous agents and introducing the related but distinct concept of "never-skilling," in which trainees who rely on AI too early in their development fail to ever acquire foundational clinical reasoning and procedural competencies in the first place.

On the patient side Blease Nong and Ji showed that institutional trust in the healthcare system and not attitudes toward the technology were the greatest determinant of positive expectations towards AI. The influence of such factors also varied greatly by demographics, especially gender and race. This corresponds with the result of this review that patients' anxiety in regard to RAS is linked with misunderstanding and not with the performance of the technology. It indicates that the acceptance of AI in surgery will also be influenced not only by the performance but also by other factors such as institutional and communication ones. The public aversion to AI in the medical environment noted by Longoni Blease supports the same conclusion as well.

Such results might serve to further confirm the surgeon-acceptance hypothesis developed by Blease. Based on the notion that it is not the lack of technological capacity that poses the major hindrance to the adoption of artificial intelligence in robotic surgery but the human acceptance of it. Based on the review above, it can be hypothesized that the confidence in AI does not depend only on experience with it but on how much responsibility the surgeons have to transfer to it.

Implications from these findings exist in the area of the consent process and surgeon training. Since patient anxiety is partially due to confusion of their role regarding physical control of RAS by the surgeon, pre-operative discussion might focus on correcting this misconception rather than on AI-literate discussion. This is consistent with survey evidence, predating this review's search window but frequently cited in surgical ethics literature, showing that patients and surgeons diverge on what should be disclosed before an innovative procedure. Across three surgical techniques (open, laparoscopic, and robotic), nearly 80% of patients reported they could not decide on surgery without knowing whether it would be their surgeon's first time performing it. More than two-thirds cited this same concern for robotic procedures specifically Regarding surgical training, the difference between the knowledge obtained in the AI courses and real understanding of the concepts shown by proves that just having access to training does not solve the issue of AI literacy. In fact, it requires a curriculum instead of just random exposure to concepts. Hospitals and the manufacturers of RAS devices may see that a surgeon's reluctance to autonomy is not an unchangeable attitude but rather something related to the exposure of the system in a variety of unpredictable ways. Design of the system, facilitating surgeon's control, might be more efficient than designing highly automated systems, a position consistent with an international consensus framework calling for human factors-based evaluation of control interface usability, surgeon trust, and risk stratified by level of system autonomy before robotic systems advance to wider clinical use [19].

There are a number of limitations that apply to this analysis, including several that reflect the points mentioned in the Methods section. The search revealed only three sources meeting the inclusion criteria, two of which were scoping reviews instead of primary sources, so the review is subject to the same limitations of source selection as its base material. To assess the risk of evidence overlap between these two scoping reviews, the complete reference lists of [20] (McDonnell et al., n=49) and (Musa et al., n=48) were cross-checked for shared primary studies. No overlapping primary studies were identified between the two reviews; the single shared citation across both lists was a methodological guideline (PRISMA-ScR), not a primary data source. This supports the interpretation that the consistency observed across the three included sources in this review reflects independent replication of the knowledge-trust pattern rather than shared underlying evidence. Limiting the search to publications in English might mean that relevant views of the healthcare system in non-English speaking countries would be missed, as trust dynamics within institutions could be different for those. There was no formal quality assessment of the sources, so the heterogeneity in methodology used in studies considered in was not assessed. Two out of five extraction variables (experience and willingness to pay) were considered in only one of the selected sources each.

Further research needs to concentrate on the RAS field specifically since a vast majority of studies on robotic surgery available to date are based on assumptions, not measurements, which is the limitation of both this scoping review and the study by [21]. Further research that will include patients and surgeons can shed light on whether decreased preference for autonomy is a permanent feature or an adaptation period. Considering the practical significance of prior experience and willingness to pay in adoption decision making, the absence of these parameters in the literature is a major deficiency that should be addressed. The institutional side of this economic question is somewhat better studied than the patient side: a systematic review of 33 full economic evaluations of robotic-assisted surgery found that 24 (70%) concluded RAS was cost-effective or potentially cost-effective from societal and payer perspectives, with case volume, length of stay, and time horizon as the main determinants of value [22]. However, this institutional cost-effectiveness picture does not address patient-level willingness to pay, which remains absent from the literature reviewed here.

5. Conclusion

In line with its objective, this scoping review sought to fill a research void in that previous studies related to perioperative AI context had mainly focused on RAS as just one of many applications without making it central, whereas issues such as patient satisfaction and willingness to pay were largely ignored. Upon analyzing three scholarly articles within five dimensions identified through the systematic review process, the review found a consistent trend among surgeons and patients: trust in AI-supported robotic surgery usually exceeded understanding of its functioning mechanisms. Trust was also greatest when the AI technology operated as a supporting device rather than an autonomous one.

There is a common misconception in the general literature where resistance against surgical AI is considered an issue of awareness, the more knowledge about these technologies the more people are going to trust them. According to the findings presented above, the matter seems to be the opposite for the surgeons Arboit reported that awareness about the courses of AI has increased sharply from 2021 to 2024, while the preference towards autonomous technologies has been decreasing. In case of patients McDonnell observed that anxiety towards RAS was related to the misinterpretation of the role of surgeon who still keeps control of the operation. Hence, the problem can appear to be related to some misunderstanding about the technology itself rather than its rejection.

In terms of practice, the weight of this discovery should be carried by the communication and design aspects, rather than by development itself. If patient anxiety is significantly reduced due to overestimation of robot autonomy, the solution would be related to informed consent and preoperative counseling, rather than further validation of the system accuracy. And if surgeon hesitation is based on the level of control assigned, rather than being unfamiliar with AI itself, it might be much more effective to design the system that clearly allows surgeons to take control, rather than automate it, even if the model works perfectly.

However, this systematic review is highly constrained due to the low number of sources which met the inclusion criteria, lack of a quality assessment within the primary research papers and almost total lack of information related to previous experience and willingness to pay. The latter two aspects play an important role in the practical decision-making process and therefore should be at the forefront of future RAS-focused research instead of the more general anesthesia literature. Even taking into account all these drawbacks, the presented study brings one closer to understanding the nature of the human-factors barrier in robotic surgery implementation. The problem is not centered on outright rejection of the innovation. Instead, it lies in a persistent gap between exposure and comprehension, and in a preference for manual control that continues despite growing AI literacy.

REFERENCES

[1] R. Singh, M. Bapna, A. R. Diab, E. S. Ruiz, and W. Lotter, "How AI is used in FDA-authorized medical devices: A taxonomy across 1,016 authorizations," *npj Digit. Med.*, vol. 8, p. 388, Jul. 2025.

[2] C. Blease, T. J. Kaptchuk, M. H. Bernstein, K. D. Mandl, J. D. Halamka, and C. M. DesRoches, "Artificial intelligence and the future of primary care: Exploratory qualitative study of UK general practitioners' views," *J. Med. Internet Res.*, vol. 21, no. 3, p. e12802, Mar. 2019.

[3] H. S. J. Chew and P. Achananuparp, "Perceptions and needs of artificial intelligence in health care to increase adoption: Scoping review," *J. Med. Internet Res.*, vol. 24, no. 1, p. e32939, Jan. 2022.

[4] D. Kiyasseh et al., "Human visual explanations mitigate bias in AI-based assessment of surgeon skills," *npj Digit. Med.*, vol. 6, p. 54, Mar. 2023.

[5] V. Muralidharan et al., "A scoping review of reporting gaps in FDA-approved AI medical devices," *npj Digit. Med.*, vol. 7, p. 273, Oct. 2024.

[6] P. Nong and M. Ji, "Expectations of healthcare AI and the role of trust: Understanding patient views on how AI will impact cost, access, and patient-provider relationships," *J. Am. Med. Inform. Assoc.*, vol. 32, no. 5, pp. 795–799, Mar. 2025.

[7] C. Varghese, E. M. Harrison, G. O'Grady, and E. J. Topol, "Artificial intelligence in surgery," *Nat. Med.*, vol. 30, no. 5, pp. 1–12, May 2024.

[8] E. Musa, J. K. H. Lee, J. Tubin, A. Saal, and P. Fallavollita, "Perceptions of clinicians and patients towards artificial intelligence applications in surgery: A scoping review," *Surgery*, vol. 196, p. 110291, Apr. 2026.

[9] A. Zarghami, "Role of artificial intelligence in surgical decision-making: A comprehensive review," *Galen Med. J.*, vol. 13, p. e3332, Mar. 2024.

[10] D. A. Hashimoto, G. Rosman, D. Rus, and O. R. Meireles, "Artificial intelligence in surgery: Promises and perils," *Ann. Surg.*, vol. 268, no. 1, pp. 70–76, Jul. 2018.

[11] C. Longoni, A. Bonezzi, and C. K. Morewedge, "Resistance to medical artificial intelligence," *J. Consum. Res.*, vol. 46, no. 4, pp. 629–650, May 2019.

[12] C. McDonnell, M. Devine, and D. Kavanagh, "The general public's perception of robotic surgery — A scoping review," *Surgeon*, vol. 23, no. 2, pp. e49–e62, Apr. 2025.

[13] L. Arboit et al., "Surgeons' awareness, expectations, and involvement with artificial intelligence: A survey pre and post the GPT era," *Eur. J. Surg. Oncol.*, vol. 51, no. 12, p. 110525, Oct. 2025.

[14] S. O'Sullivan et al., "Legal, regulatory, and ethical frameworks for development of standards in artificial intelligence (AI) and autonomous robotic surgery," *Int. J. Med. Robot. Comput. Assist. Surg.*, vol. 15, no. 1, p. e1968, 2019.

[15] A. C. Tricco et al., "PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation," *Ann. Intern. Med.*, vol. 169, no. 7, pp. 467–473, Sep. 2018.

[16] K. S. Chan, J. R. Kwan, and V. G. Shelat, "Awareness, perception, knowledge, and attitude toward robotic surgery in a general surgical outpatient clinic in Singapore, Asia," *J. Clin. Transl. Res.*, vol. 8, no. 3, pp. 224–233, May 2022.

[17] F. C. Oettl et al., "From de-skilling to up-skilling: How artificial intelligence will augment the modern physician," *J. Exp. Orthop.*, vol. 13, no. 1, p. e70677, Mar. 2026.

[18] H. J. Marcus et al., "The IDEAL framework for surgical robotics: Development, comparative evaluation and long-term monitoring," *Nat. Med.*, vol. 30, no. 1, pp. 61–75, Jan. 2024.

[19] H. Sadri, M. Fung-Kee-Fung, B. Shayegan, P. Y. Garneau, and P. Pezeshki, "A systematic review of full economic evaluations of robotic-assisted surgery in thoracic and abdominopelvic procedures," *J. Robot. Surg.*, vol. 17, no. 6, pp. 2671–2685, Oct. 2023.

[20] Intuitive Surgical, Inc., "Intuitive announces preliminary fourth quarter and full year 2023 results," *GLOBE NEWSWIRE*, Jan. 9, 2024. [Online]. Available: https://isrg.intuitive.com/news-releases/news-release-details/intuitive-announces-preliminary-fourth-quarter-and-full-year-3

[21] E. Reuter and J. Y. Han, "The number of AI medical devices has spiked in the past decade," *MedTech Dive*, Oct. 9, 2024. [Online]. Available: https://www.medtechdive.com/news/fda-ai-medical-devices-growth/728975/

[22] S. J. Lee Char, N. K. Hills, B. Lo, and K. S. Kirkwood, "Informed consent for innovative surgery: A survey of patients and surgeons," *Surgery*, vol. 153, no. 4, pp. 473–480, Apr. 2013.