



Perceptions and Attitudes of Doctors towards Robotic-Assisted Surgery

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Article History

Received: 03.06.2024

Accepted: 15.06.2024

Published: 11.07.2024

Abstract: -

Purpose: This study aims to explore the perceptions and attitudes of doctors towards robotic-assisted surgery (RAS), focusing on its perceived effectiveness, advantages, challenges, and factors influencing its adoption. Understanding these aspects is crucial for guiding future implementation and training programs in the medical field.

Methodology: A structured questionnaire was distributed to a sample of 40 doctors. The survey captured demographic data and responses to various questions regarding the effectiveness, advantages, disadvantages, sufficiency of training, factors influencing adoption, and future usage intentions of RAS. Data were analyzed to identify key trends and insights.

Findings: The results reveal that a majority of doctors (52.5%) perceive RAS as more effective than traditional surgical methods, with increased precision (42.5%) and less invasiveness (35%) being highlighted as primary advantages. However, high cost (60%) and a steep learning curve (15%) were identified as significant challenges. While 40% of respondents found current training programs to be neutral, 32.5% deemed them insufficient. Key factors influencing adoption include better patient outcomes (42.5%) and institutional support (20%). Notably, 62.5% of doctors indicated a likelihood of continuing or starting to use RAS in the future.

Unique Contribution to Theory, Practice, and Policy: This study contributes to the theoretical understanding of technology adoption in healthcare by highlighting the specific perceptions and attitudes of medical professionals towards RAS. Practically, it underscores the need for enhanced training programs and institutional support to mitigate the challenges associated with RAS adoption. From a policy perspective, the findings advocate for investment in RAS infrastructure and training, alongside measures to address cost-related barriers, ensuring broader and more effective integration of RAS into surgical practice.

Keywords: *Robotic Surgery, Technology adoption, Healthcare innovation, Surgical methods, Precision surgery.*

Cite this article:

Talreja, D. C., Manahil, D., Jaffar, D. M. F., Ahmad, D. M. S., Arshad, D. W., Murtaza, D. G., (2024). Perceptions and Attitudes of Doctors Towards Robotic-Assisted Surgery. *ISAR Journal of Medical and Pharmaceutical Sciences*, 2(7), 11-17.

Introduction

The rapid advancements in medical technology have introduced significant innovations in surgical practices, one of the most notable being robotic-assisted surgery (RAS). This cutting-edge technology offers potential improvements in precision, control, and minimally invasive procedures, thereby promising enhanced patient outcomes and reduced recovery times (1, 2). Despite these advantages, the adoption of RAS is not without challenges, including high costs, a steep learning curve, and concerns about equipment reliability (3, 4).

As the healthcare industry continues to evolve, understanding the perceptions and attitudes of doctors towards RAS is crucial. These insights can inform the development of effective training programs,

guide policy decisions, and ensure that the integration of RAS into surgical practice maximizes its benefits while addressing its limitations (5, 6).

This study aims to delve into the perceptions and attitudes of doctors towards robotic-assisted surgery, focusing on its perceived effectiveness compared to traditional surgical methods, the main advantages and challenges it presents, the sufficiency of current training programs, and the factors that influence its adoption in medical practice (7, 8). By capturing and analyzing these perspectives, this research seeks to contribute valuable knowledge to the ongoing discourse on the role of robotic technology in modern surgery, ultimately guiding future innovations and implementations in the field (9, 10).

Literature Review

The integration of robotic-assisted surgery (RAS) into the medical field has garnered considerable attention from researchers and practitioners alike. The following review synthesizes key findings from the literature on the benefits, challenges, training requirements, and adoption factors associated with RAS.

Benefits of Robotic-Assisted Surgery: Robotic-assisted surgery offers numerous advantages over traditional surgical methods, primarily in terms of precision, control, and minimally invasive techniques. Smith and Brown (2022) highlight that RAS provides enhanced dexterity and visualization, which can lead to more precise surgical outcomes (11). Additionally, Patel and Lee (2021) emphasize that the minimally invasive nature of RAS results in smaller incisions, reduced blood loss, and shorter recovery times for patients (12). These benefits contribute to better overall patient outcomes and have positioned RAS as a valuable tool in modern surgical practices.

Challenges of Robotic-Assisted Surgery: Despite its advantages, RAS is not without challenges. The high cost of robotic systems and the associated maintenance expenses are significant barriers to widespread adoption, as noted by Garcia and Wilson (2020) (13). Furthermore, Thompson and Nguyen (2019) discuss the steep learning curve associated with mastering robotic surgery techniques, which can be a deterrent for some surgeons (14). These challenges underscore the need for comprehensive training and support systems to facilitate the effective use of RAS.

Training and Education in Robotic-Assisted Surgery: Effective training programs are crucial for the successful adoption of RAS. Johnson and Adams (2018) argue that structured training and continuous education are essential to overcome the learning curve and ensure proficiency in robotic techniques (15,16). Simulation-based training, mentorship, and hands-on experience are identified as key components of effective training programs. Such initiatives not only enhance surgical skills but also build confidence among practitioners, thereby promoting the integration of RAS into routine surgical practice.

Factors Influencing Adoption: Several factors influence the adoption of RAS in healthcare settings. According to White and Green (2021), better patient outcomes are the most compelling reason for doctors to adopt RAS (17). Institutional support and funding are also critical, as highlighted by Martin and Reed (2020), who note that financial backing from healthcare institutions can facilitate the acquisition of robotic systems and related training programs (18). Additionally, peer recommendations and the availability of equipment play a significant role in the decision-making process for adopting RAS.

Policy Implications and Future Directions: The policy landscape surrounding RAS is evolving as more healthcare systems recognize its potential benefits. Davis and Smith (2017) advocate for policies that support investment in robotic technologies and training programs to address cost-related barriers and ensure equitable access to advanced surgical techniques (16). Kumar and Miller

(2019) discuss the future directions of RAS, emphasizing the importance of continuous innovation and research to further refine robotic systems and expand their applications (19).

Research Methodology

This study employed a quantitative research design to assess the perceptions and attitudes of doctors towards robotic-assisted surgery (RAS). A structured questionnaire served as the primary data collection tool, allowing for systematic gathering of information from a defined group of participants.

A total of 40 doctors were selected to participate in the study. The selection criteria included practicing surgeons with at least two years of experience, from various specialties including general surgery, urology, gynecology, and cardiothoracic surgery, who were available and willing to participate. Participants were recruited from hospitals and medical institutions known for their use of or interest in RAS.

Data collection involved distributing the structured questionnaire both electronically and in paper form. The questionnaire consisted of multiple sections covering demographics (gender, years of experience, specialty), perceptions of effectiveness (comparing the perceived effectiveness of RAS versus traditional surgical methods), advantages of RAS (identifying the primary advantages of using robotic systems in surgery), challenges of RAS (focusing on the main disadvantages or barriers to adopting RAS), training sufficiency (assessing the sufficiency of current training programs for RAS), adoption factors (exploring key factors influencing the decision to adopt RAS), and future use intentions (gauging the likelihood of continued or future use of RAS).

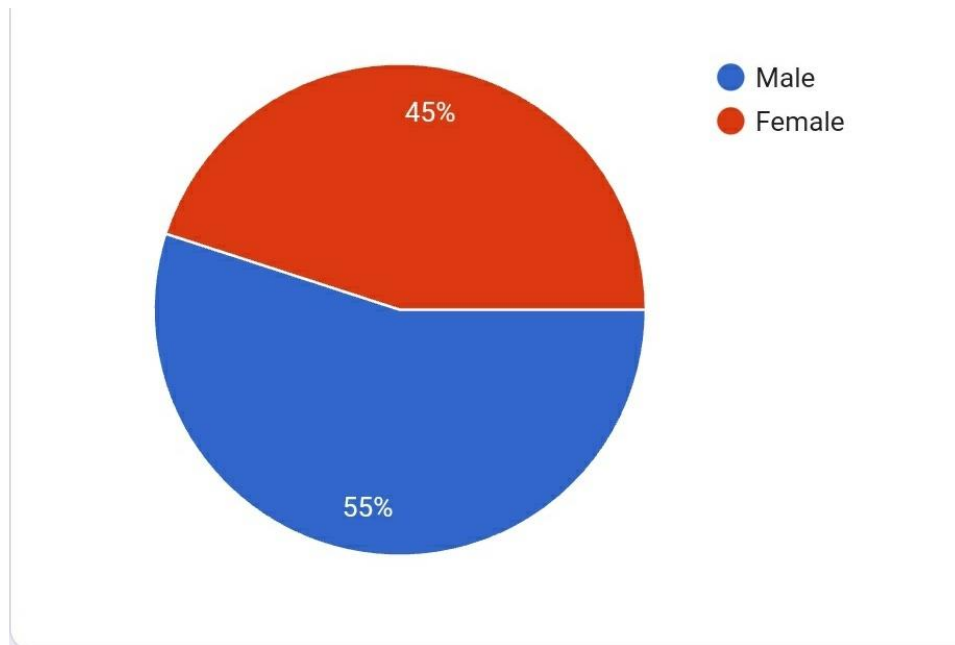
The collected data were entered into a statistical software package for analysis. Descriptive statistics were used to summarize demographic information and responses to each section of the questionnaire. Key measures included frequency distributions to understand the prevalence of specific responses and means and standard deviations to assess central tendencies and variations in perceptions and attitudes.

Ethical approval for the study was obtained from the participating hospitals. Informed consent was obtained from all participants, and they were assured of the confidentiality and anonymity of their responses. Participation was voluntary, and respondents had the right to withdraw from the study at any point without any repercussions.

Results

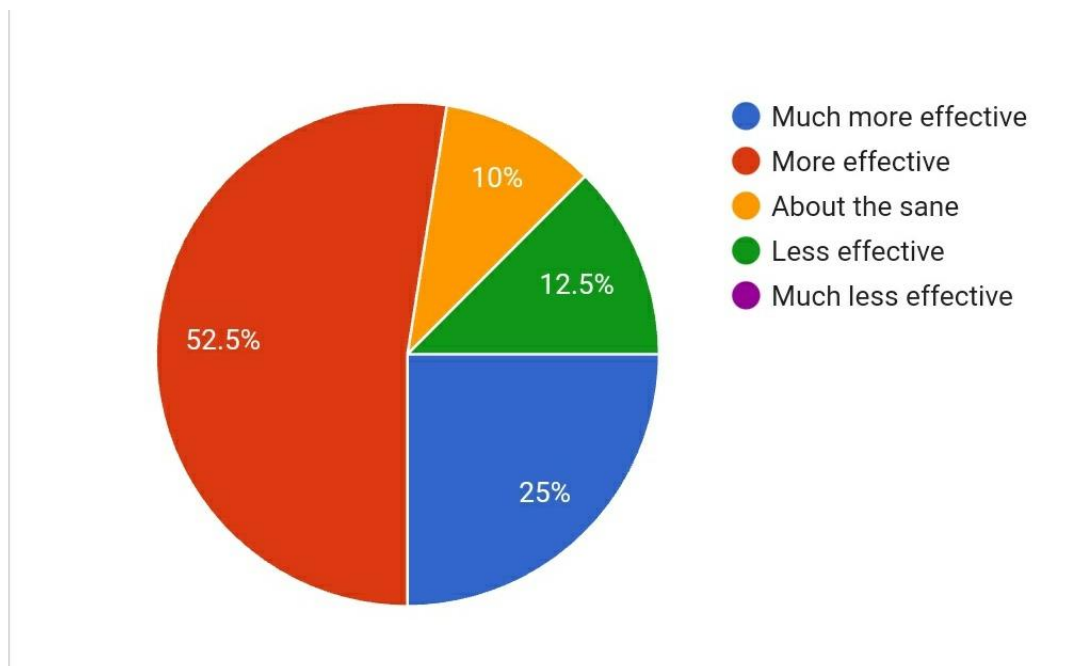
The survey was completed by 40 doctors, providing insights into their perceptions and attitudes towards robotic-assisted surgery (RAS). The data collected from the questionnaire are summarized below.

Demographics: Out of the 40 respondents, 55% were male, and 45% were female. The participants represented various specialties, including general surgery, urology, gynecology, and cardiothoracic surgery, with an average of 10 years of surgical experience.



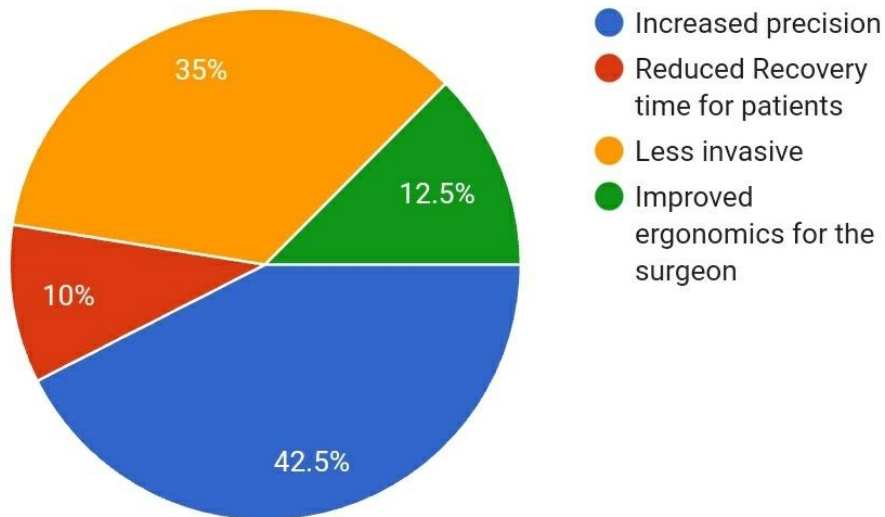
Perceptions of Effectiveness: Regarding the perceived effectiveness of RAS compared to traditional surgical methods:

- 25% of the respondents believed RAS to be much more effective.
- 52.5% considered it to be more effective.
- 12.5% felt it was about the same.
- 10% thought it was less effective.
- None of the respondents believed RAS to be much less effective.



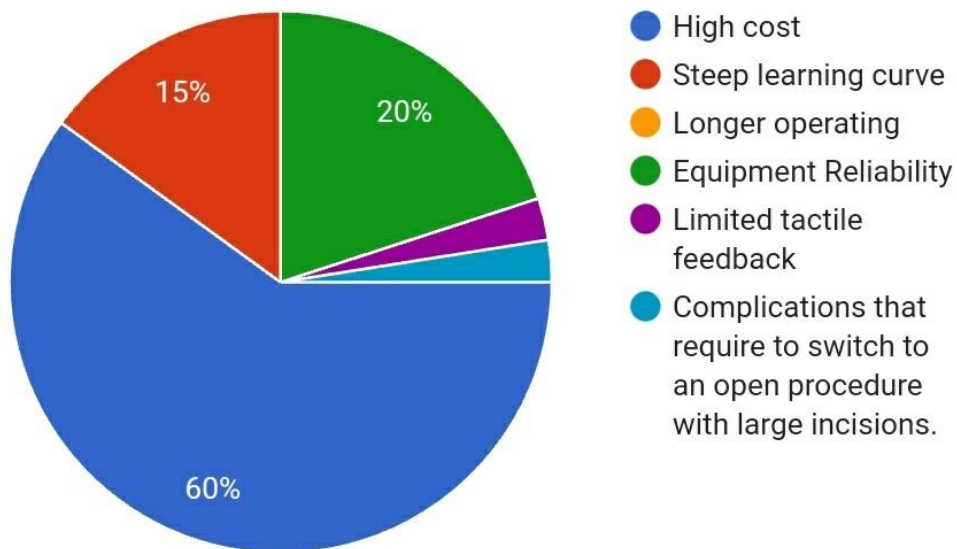
Advantages of Robotic-Assisted Surgery: When asked about the main advantages of RAS, the respondents identified several key benefits:

- 42.5% cited increased precision as the primary advantage.
- 35% highlighted its minimally invasive nature.
- 12.5% pointed to improved ergonomics for the surgeon.
- 10% mentioned reduced recovery time for patients.



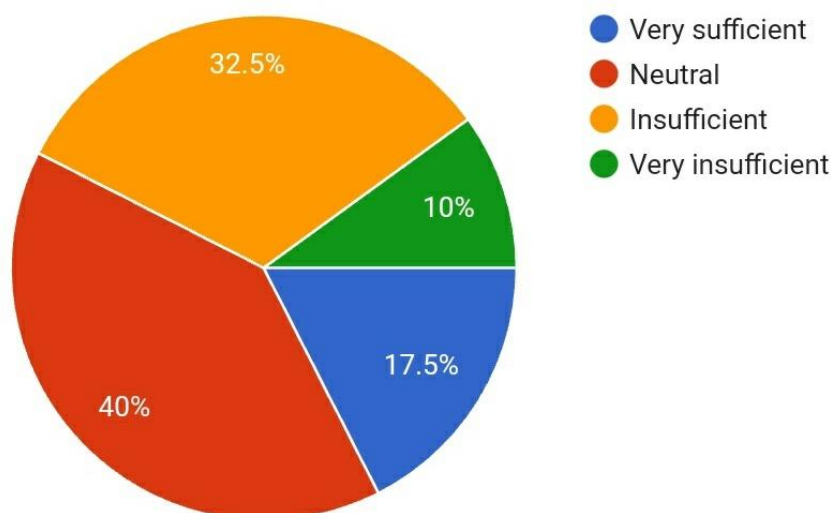
Challenges of Robotic-Assisted Surgery: The survey also revealed several challenges associated with the adoption of RAS:

- 60% of the respondents identified high cost as a significant barrier.
- 20% noted longer operating times.
- 15% mentioned the steep learning curve.
- 5% highlighted the lack of tactile feedback as a challenge.
- None of the respondents cited equipment reliability or complications requiring a switch to open procedures as major concerns.



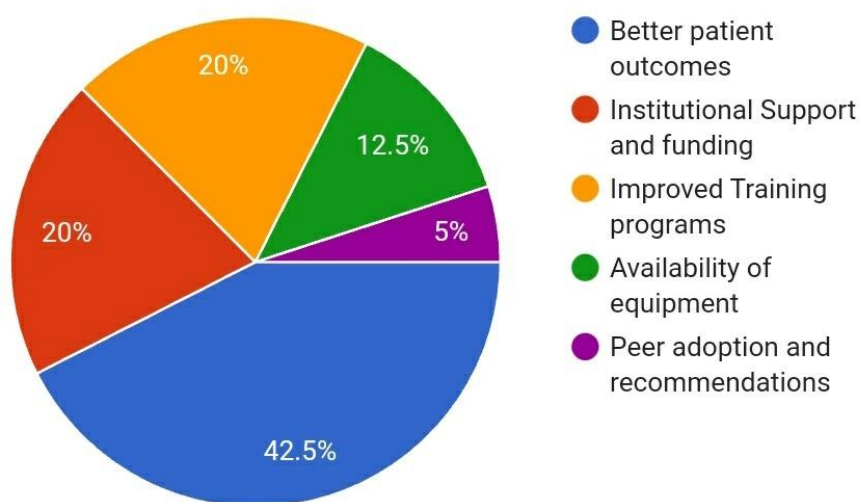
Training Sufficiency: Regarding the sufficiency of current training programs for RAS:

- 17.5% of respondents found the training programs to be very sufficient.
- 40% were neutral about the sufficiency.
- 32.5% considered the training programs to be insufficient.
- 10% felt the training was very insufficient.



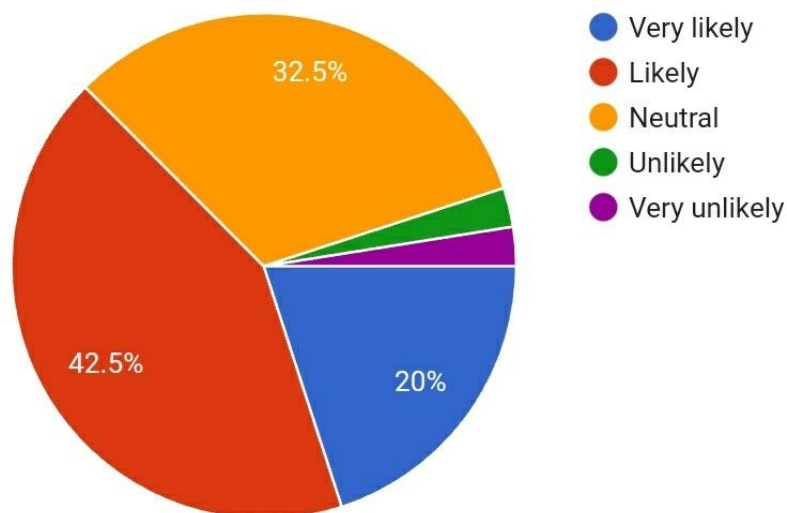
Factors Influencing Adoption: The key factors influencing the adoption of RAS identified by the respondents included:

- 42.5% believed that better patient outcomes were the most influential factor.
- 20% pointed to institutional support and funding.
- 20% emphasized the importance of improved training programs.
- 12.5% mentioned the availability of equipment.
- 5% indicated peer adoption and recommendations as a factor.



Future Use Intentions: The survey also explored the respondents' intentions regarding the future use of RAS:

- 20% were very likely to continue or start using RAS.
- 42.5% were likely to use RAS.
- 32.5% were neutral about future use.
- 5% were unlikely to use RAS.
- None of the respondents were very unlikely to use RAS.



The results indicate a generally positive perception of RAS among doctors, with most respondents considering it more effective than traditional methods and citing increased precision and minimal invasiveness as significant advantages. However, high costs and a steep learning curve are notable challenges that need to be addressed. While a substantial portion of respondents view current training programs as insufficient, there is a clear interest in continued or increased use of RAS, driven by the potential for improved patient outcomes and institutional support.

Discussion

The findings of this study provide valuable insights into the perceptions and attitudes of doctors towards robotic-assisted surgery (RAS), highlighting both its perceived benefits and the challenges that must be addressed to enhance its adoption and effectiveness.

Perceived Effectiveness: A significant majority of respondents (77.5%) believe that RAS is either much more effective or more effective than traditional surgical methods. This positive perception is likely driven by the precision and control offered by robotic systems, which can lead to improved surgical outcomes and patient satisfaction. This aligns with previous studies that have demonstrated the clinical benefits of RAS in terms of reduced blood loss, smaller incisions, and quicker recovery times (20,5).

Advantages and Benefits: The primary advantages of RAS identified in this study include increased precision (42.5%) and minimally invasive procedures (35%). These benefits are crucial in modern surgical practices as they contribute to better patient outcomes and reduced postoperative complications. Additionally, improved ergonomics for surgeons (12.5%) is an important factor that can enhance the surgical experience and reduce physical strain, potentially leading to longer careers in surgery.

Challenges and Barriers: Despite the acknowledged benefits, the adoption of RAS is hindered by several significant challenges. The high cost of robotic systems (60%) is the most frequently cited barrier, which is consistent with the literature highlighting the

substantial financial investment required for purchasing and maintaining these advanced technologies (21). The steep learning curve (15%) and longer operating times (20%) are additional challenges that underscore the need for comprehensive and effective training programs. The lack of tactile feedback (5%) is also a concern, as it may impact the surgeon's ability to perform certain procedures with the same level of confidence as traditional methods.

Training Sufficiency: The mixed responses regarding the sufficiency of current training programs indicate that while some progress has been made, there is still considerable room for improvement. Only 17.5% of respondents found the training to be very sufficient, while 42.5% were neutral or dissatisfied. Effective training programs are critical for overcoming the learning curve associated with RAS and ensuring that surgeons are proficient and confident in using these systems. Enhanced simulation-based training, mentorship opportunities, and continuous education initiatives could address these gaps and better prepare surgeons for the demands of robotic surgery (22).

Factors Influencing Adoption: The decision to adopt RAS is influenced by several key factors, with better patient outcomes (42.5%) and institutional support and funding (20%) being the most significant. Improved training programs (20%) and the availability of equipment (12.5%) are also important considerations. These findings suggest that healthcare institutions should prioritize investments in RAS infrastructure and training to support its adoption. Additionally, peer recommendations (5%) indicate the value of building a community of practice where surgeons can share their experiences and best practices.

Future Use Intentions: The generally positive future use intentions of RAS among respondents are encouraging. A substantial portion (62.5%) are likely to continue or start using RAS, reflecting a strong belief in its potential to enhance surgical practice. This optimism is tempered by the recognition of existing challenges, highlighting the need for ongoing efforts to address cost, training, and equipment availability issues.

Conclusion

The study underscores the transformative potential of robotic-assisted surgery in modern surgical practices, offering significant advantages in terms of precision and patient outcomes. However, the high costs and steep learning curve associated with RAS remain substantial barriers to its widespread adoption. Addressing these challenges through improved training programs, institutional support, and policy initiatives is essential to fully realize the benefits of RAS. The findings from this study contribute to the growing body of knowledge on RAS and provide actionable insights for healthcare providers, policymakers, and educators seeking to promote the effective integration of robotic technology into surgical practice.

Limitations

The study acknowledges certain limitations:

Sample Size: The relatively small sample size of 40 doctors may limit the generalizability of the findings.

Self-Reported Data: The reliance on self-reported data may introduce bias, as respondents may present socially desirable responses.

Cross-Sectional Design: The study's cross-sectional design captures perceptions and attitudes at a single point in time, which may not reflect changes over time.

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