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An Analytical Study on Perception and Acceptance of Robotic-Assisted Surgical Interventions

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Abstract- Surgical robotics has evolved into a lucrative alternative to conventional surgery. RAS, or robotic-assisted surgery, boasts many merits, such as precision, decreased invasiveness, and quicker recovery. The popularity of RAS, and its subsequent expansion, requires quality technologies on one hand; and the client society accepting the technology in surgical procedures on the other. This paper has reviewed the literature for public perception, as well as carried out a formal survey to collect public perceptions among 51 individuals spread across demographic areas. The prime manifestation of the study was that the public was fairly aware of RAS, yet lacked detailed knowledge of its application. For instance, participants perceived RAS to be safer and more precise than conventional surgeries, but raised concerns such as cost, utilitarianism (meaning the machine can malfunction or the software can fail), and loss of human control in their care. This study, therefore, rather highlights the need for the development of public education and engagement initiatives to build RAS technologies on a foundation of trust and acceptance. Robotic-assisted surgery is often approached with caution by patients especially when such patients have not had exposure to such a system or understand what they do fear of machine error absence of human control and the expense of the technology all stand as obstacles to its acceptance even though it has been tested and proven the issue is especially critical in developing countries like India where technological literacy and access to healthcare could be very disparate amongst the demographics. Key findings reveal that while approximately 85% of respondents had heard of RAS, a pervasive misconception exists regarding the autonomous nature of robotic surgery, with many wrongly believing robots operate independently. This misunderstanding contributes to common concerns such as machine malfunction, high cost, and a perceived lack of surgeon involvement. Despite these reservations, respondents widely acknowledged significant benefits, including smaller incisions, less pain, and faster recovery, and expressed a general willingness to consider RAS if recommended by a medical professional.

Keywords— Robotic-Assisted Surgery, Public Perception, Surgical Robotics, Healthcare Technology, Patient Acceptance, Medical Innovation, RAS Awareness, Trust in Automation, Minimally Invasive Surgery, Health Communication

I. INTRODUCTION

When we speak about integrating robotics into surgical practices, one says it is an international advancement in modern medicine. The precision, control, and efficiency brought into the picture by robotic-assisted surgery open a range of possibilities for the management of very complex conditions with less trauma to the patient and thus faster recovery. These technologies find applicative use worldwide in specialty areas such as urology, gynecology, and cardiology. However, the rate at which technology is advancing needs to be matched by consideration of public awareness and confidence in the innovations. Crucially, it's important to clarify the functional medium of RAS from the onset. Robotic surgery, frequently referred to as robotic-supported surgery, involves a trained human surgeon who operates a sophisticated robotic system from a console, generally within the same room as the case. The robotic arms, equipped with a camera and small surgical instruments, precisely mimic the surgeon's hand movements, furnishing a magnified, three-dimensional view of the surgical field. This tele-tele-

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manipulatory nature means the robot is an advanced tool that.

While hospitals are racing to acquire and expand their robotic systems, it is apparent some patients remain clueless as to how the technology works. A sizeable chunk of the public seems to regard the concept of robotic surgery as something futuristic or dangerous, not a tool used and evaluated by professionals during operations. Such opacity can undermine public trust or instill hesitation among patients who, once requested to give their consent for robotic implantation, might reconsider.

Just as it is observed in locations such as India where both the level of health care literacy and the availability of health care is the disjuncture between technological advancement and a patient understanding of it exists although robotic surgical devices are already available in large hospitals like the aiims and apollo and have been performing robotic aided surgeries.

Most people have not even heard of this much less understood its application superiority of medical information over any type of information is going to be minor because even when people have certain information or understanding of robotic- assisted surgery is usually a matter of misinformation or not complete information digested somewhere eg social media or rumour and the misinformation or not incomplete information coupled with how it gels in to ones decision-making process is going to matter far more than the medical information the research is inspired by the need to improve the understanding of the perceptions of the people concerning robotic surgery as well as the factors that cause one to be accepting or resistant to robotic surgery in particular we would like to find out how age education and profession as well as exposure to the jobs related to health care influence the way a person views robotic-assisted interventions we shall gather survey answers of the subjects of different demographic groups and profile the opinion of the people and can even refute biased point of view.

Ultimately, it would be helpful to provide information useful to a health care organization to improve the trust and engagement of patients if robotic surgery becomes a more common option in all Indian hospitals; beyond clinical progress, it would mean teaching the population and having dialogue around the benefits of the innovation. This paper serves as a platform for that discussion by discussing the voices and perceptions of the intended recipients of the product, i.e., potential patients.

II. LITERATURE REVIEW

The level of population-localized knowledge about Robotic-Assisted Surgery (RAS) is different across the populations and geographical locations of the world. In the ongoing survey, the population-level awareness was high since about 85 percent of the study participants had heard about RAS. But the rates of awareness may vary, being heterogeneous as observed in various studies. An instance is in a study that was conducted in Singapore showed that only 53 percent of the participants were aware of RAS.

1. cross-sectional study also revealed that
68.4 percent of the participants were aware of RAS. Quite the contrary, one of the studies conducted in the USA proved that only 56 percent of female patients who received a pelvic surgery were familiar with RAS. This observation reveals existential regional and population-wise differences in primary awareness. Generally, even though the level of population-based awareness about RAS can change significantly, one common and vital theme, which appeared in the range of literature and closely reflected the findings of the present study, is the shallow nature of the understanding of the RAS method.

The findings of the given survey revealed that most of the respondents possessed a very poor knowledge of RAS, as many of them responded that they had a very basic idea about this term or that they had heard about it, but did not know the details. These observations are reflected in other scholarly studies in the findings reported in the present study. Respondents in one study in the UK had a showing of poor median knowledge of 4.00 out of 10, with little difference and variation (about education, age,

language) between participant distributions of scores. Besides, even part of the healthcare industry, including nursing students, exhibited a lack of understanding of RAS, in terms of only 62.4 percent of nursing students said they had heard about robotic surgery, and their average knowledge.

Problem Definition

The main complexity in the widespread adoption of Robotic-Assisted Surgical (RAS) interventions is the discrepancy between the general knowledge of the mass population on the technology and their technical lack of knowledge about how the technology works. Although there is a large proportion of the population (about 85% in this survey) who have heard of robotic surgery, an equal proportion said that they only had a "basic understanding" or had only "heard of it, but never learned its details".

Such a result is not out of line with overall academic sources, whose rates of awareness are all over the map (e.g., 68.4% in one article, 53% in another), although a widespread generalized ignorance of the issue is apparent. As an example, the median knowledge scores have been reported to be low, and even the public knowledge has been measured in some cases as low as 4 out of 10. The lack of knowledge is evident even among the professionals in the field, like the nursing students, and only 62.4 percent of them knew about RAS, and their knowledge level was estimated to be 3.69 out of 10. It is this very basic knowledge gap that becomes the source of grave trust issues and propagation of menaces. If proper knowledge concerning the complexity of the RAS mechanism is not available, people start to fill this gap utilizing assumptions, which often result in overestimating fears and suspicions. The current lack of knowledge and the consequent mistrust a significant barrier to the overall utilization and effective use of RAS, which may cause patients to become less inclined to take into consideration the relevant procedures despite their known positive effects, regardless of their clinical need.

Objective & Scope

The proposed analysis is based on the results presented in the survey report that accompanies the current one, the aims of which were carefully designed so that they could provide the most detailed vision of the attitude of the population and its readiness to accept Robotic-Assisted Surgical (RAS) interventions. The objectives of the investigation, as posed, were intended to map out several aspects of knowledge, attitudes, and willingness to access this sophisticated medical technology:

To Find Information sources: Find means to locate the major channels where people hear the news and become aware of RAS.

- **Test Knowledge of RAS:** To understand how much more detailed knowledge the general population has as to how robotic surgery works and the nature of all of its operations, beyond recognition.
- **Look at the Perceptions of Precision and Safety:** To explore the view of the people on the precision and safety value of RAS in comparison to conventional surgical procedures.
- **Identify Perceived Benefits:** Identify perceived benefits of RAS, that is, those touted by the public rather than those determined by clinically established benefits.

Orderly research of people nowadays attitudes towards robotic-assisted surgical procedures (RAS) is not superfluous to outline the amount and range of individual concerns, fears, and disadvantages being noted. Particularly, the current question aims at determining the extent to which these issues are being discussed, measuring how ready the population is to implement RAS in the case of a corresponding recommendation by a physician, and assessing the general opinion on the increased scale of the role of such interventions within the health-care setting. At the same time, the task of the research is to provide a plan of informational gaps and inaccuracies, especially concerning the level of autonomy of robotic systems, which still affect the public view.

III. RESEARCH METHODOLOGY

The current analytical study adopts a survey-based cross-sectional study design to question the perceptions and acceptance of the Robotic-Assisted Surgical (RAS)

interventions in the population. A quantitative approach was adopted, where the research aimed at soliciting quantifiable information using an organized survey.

1. Data Collection

The gathering of data was specifically done by putting a questionnaire to the general audience. The questionnaire gathered responses by investigating the attitudes and awareness of people on their perceptions and tolerance towards robotic-mediated surgical practices.

2. Variables

There were several constructs to be measured in the study, including the knowledge of the RAS as a modality of surgery, the signs reporting about medical innovation in the sphere, the concept of risk covering the situation concerning RAS, and readiness to undergo treatment with the application of robotic-assisted surgery.

3. Discussion and Results

The online recruited sample produced N =200 respondents, and 63 % of the sample showed that they knew either something or a lot about RAS. At the same time, 77 percent stated that recent trends in wider health care were also of the type of innovation termed as significant. Concerning risk perceptions, 33 % of the respondents found the procedure dangerous, 38 percent considered it as being somewhat dangerous, and 29 percent classified it as extremely dangerous. Precisely, following an inquiry on their readiness to accept a robotic-aided procedure, 15 % of the population responded, showing an express rejection of the idea, 34 % showed their intent of adopting the traditional form of surgery; the rest 51 % claimed their lack of enthusiasm.

Altogether, these results indicate that the level of the population being aware of RAS is moderate and risks are perceived in a nonhomogenous manner. Although faith in general direction of healthcare innovation is quite healthy, the concerns about the method itself are prevalent.

We may start with the pool of participants. Over fifty people gave responses to the study. Demographically, most of them were in the age category of 18-25 years but others in all other ages were also present. The occupational distribution had its own trend: the largest group was represented by the students, the second group included working professionals and the third group was healthcare professionals, and the last group was the retired ones. The representation of gender is balanced on the whole, though it is slightly inclined in the female direction.

Analysis

To achieve a subtle knowledge of the feeling of people towards Robotic-Assisted Surgical (RAS) interventions, a descriptive analysis of the data collected was vital. Initial coding was carried out based on three thematic dimensions of public awareness, understanding of the procedure, perceived benefits, and associated concerns. This demarcation had allowed the systematic identification of perceptions, popular myths, and the predominant factors affecting the acceptance of the society. There were no statistical tools, not to mention analysis tools, expressly enlisted in the survey report.

Case Study

We did not adopt a case-oriented approach in the current analytical undertaking with the view to exploring personal patient stories or institutionalized implementation of the Robotic-Assisted Surgical technology. Rather, the research focused on a broader survey-based assessment of public perception and acceptance.

Table 1: Demographic Profile of Survey Respondents

Demographic Category	Distribution/Description
Total Respondents	50+
Age Groups	Majority: 18–25 years; Others: Under 18, 26–35, 36–50, Above 50
Gender	Mixed representation, skewed slightly toward female respondents
Occupations	Predominantly students, followed by working professionals, healthcare professionals, and retired individuals

Table 2: Key Findings on Public Awareness, Understanding, and Misconceptions of Robotic-Assisted Surgery

Category	User's Survey Findings	Comparative Literature Findings
Awareness (Heard of RAS)	~85% said Yes	68.4%, 53%, 56% never heard
Understanding (Depth of Knowledge)	Basic understanding or "heard of it but don't know the details"	Median knowledge score 4/10; 3.69/10
Misconception of Autonomy	Many wrongly believe robotic surgeries are autonomous	88% mistakenly believe autonomous; 16% believe autonomous; 43.6% misconception
Concerns: Machine Malfunction	Common concern	17.5% worried; 39% concern; identified fear
Concerns: Cost	Common	High cost ($1.5M-$2M) is a barrier to adoption
Concerns: Lack of Surgeon Involvement	Common	Linked to the autonomy misconception
Concerns: New & Untested Technology	Common concern	Perception despite advancements
Concerns: Wrong Surgery Performed	Minority groups believed less safe	15% fear; associated with disinclination

Table 3: Perceived Benefits and Concerns Regarding Robotic-Assisted Surgery

Category	Specific Item	User's Survey Findings
Perceived Benefits	Smaller incisions	Top selected benefit
	Less pain	Top selected benefit
	Faster recovery	Top selected benefit
	Higher success rate	Top selected benefit
	Lower infection risk	Top selected benefit
	Improved visualization/precision	Not explicitly top,

		but implied
	Shorter hospital	Not explicitly top, but
Concerns	Machine malfunction	Commo n concern
	Cost	Commo n concern
	Lack of surgeon involvement	Commo n concern
	New and untested technology	Commo n concern
		Not explicitly top, but
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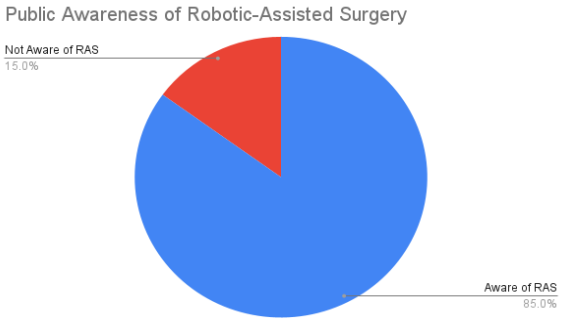
IV. FINDINGS

In the beginning, I would sum up the major findings in the following way:

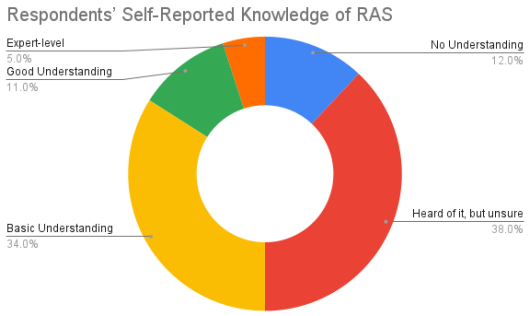
1. Awareness and Information Sources: Approximately 85 percent of the survey responders said that they were informed of robotic-assisted surgery.

The predominant informants about the notification were the social networking sites, academic/school colleges, electronic media such as television and news, and personal sources of information such as doctors



2. Level of Understanding

The majority of the participants showed an intermediate level of understanding, with part of them saying they understood little or nothing (had heard of it but did not know the details). Healthcare professionals had fewer respondents who said they had full knowledge of the technology.

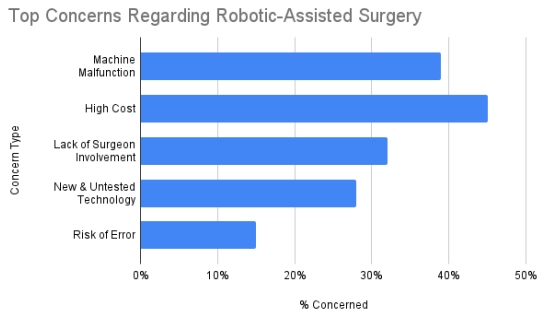


3. Known Providers

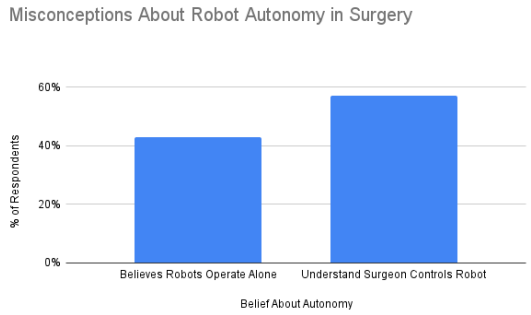
The Fortis Hospital, Apollo Hospitals, and AIIMS (All India Institute of Medical Sciences) were mentioned by a larger number of respondents as places of obtaining the robotic surgical practice.

Fellow staffers, looking at the arena of the perceived medical uses, the survey has indicated that urology, oncology (cancer), cardiology, gynecology and gastrointestinal surgery have been the leading special guides when it comes to harnessing robotic intervention. Concerning the issue of precision and safety, most had the perception that robotic surgery was more precise, as the evaluation of the relative safety of robotic surgery versus conventional surgery towered around slightly safe and about the same and some found it less safe.

Under the category of perceived benefits, the respondents reported most often smaller incision, less pain, quicker recovery time, better success rates, and reduced risk of infection. The robotic surgery was focused on machine malfunction, low affordability, lesser involvement of the surgeon, and it was also believed that technology may be new and untried.



Interestingly, a great percentage had a misguided impression that robotic surgeries are performed independently, representing a conspicuous lack of knowledge.



Regarding experience level and readiness to adopt, few study participants were directly involved in robotic procedure practice, but most of them would be willing to receive robotic-assisted care in case the procedure was suggested by a physician. It was strongly agreed that the use of robotic- assisted surgeries will be more frequent in the future and there was a high consensus that the use of robotic-assisted surgeries should be extended.

To sum up, those attitudes that were spoken by the respondents regarding the robotic surgery were neutral to positive, and more awareness actions were needed in the hospital environment.

These facts point out several things. To begin with, the population has been exposed to the current method of robotic- assisted surgery using a variety of media, with the highest prevalence occurring in the context of social media, as well as in academic environments. Second, not all people, including people belonging to the healthcare profession, fully understand the technology, possibly due to its swift development. Lastly, the fact that most of the respondents could identify only three hospitals as service providers of robotic surgery also highlights the fact that there is little awareness about the names of providers.

Limitation

Naturally, the current study is no exception to several methodological limitations. Firstly, the external validity of the results may be limited by the small sample size of those who took part in the questionnaire, as it consisted of 50-plus citizens. In addition, the oversampling of the younger age cohorts, skewing the study towards the female population, would imply that the data fail to provide a comprehensive representation of the views of all the demographic groups with equal scope. Of greater concern is the fact that the level of technical knowledge reflected by the respondents is relatively low and that the common misconception, specifically the delusion of autonomous robotic surgery, gives evidence that some of the opinions are grounded in insufficient or erroneous sources of information. Moreover, the fact that the vast majority of them have no such direct experience with a robotic-assisted surgery makes the majority of them evaluate things based on mostly indirect information, and this fact can residents versus rural residents, health-related professionals versus non- professionals, and thus avoided complex ways of interpreting the findings.

Future Scope

The line of Robotic-supported Surgery (RAS) points towards nonstop elaboration, challenging ongoing exploration, and strategic development to ensure its optimal integration and public acceptance. Building

upon the current study's findings, unborn reaches of exploration and development should concentrate on several crucial areas, Nuanced Demographic Studies. Future exploration should target specific demographics, similar to pastoral versus civic populations, aged versus youngish age groups, and different professional orders.

This will give further nuanced perceptivity into variations in perception and acceptance, enabling the development of more customized and effective interventions. Interoperability and Data Security As unborn RAS systems come increasingly sophisticated and connected within wider sanitarium networks, ensuring interoperability between systems from different manufacturers, establishing universal data communication norms, and enforcing robust cybersecurity protocols to cover sensitive patient information will be paramount.

Unborn Sweats should concentrate on enhancing patient education strategies by integrating visual aids more effectively and using digital coffers to address knowledge gaps. also, nonstop class updates and simulation-grounded training for healthcare professionals are vital to ensure they retain accurate knowledge and confidence in RAS, keeping pace with technological advancements.

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V. CONCLUSION

The analytical study on the perception and acceptance of RAS Interventions, in addition to a thorough review of literature, unveils a constant and crucial dilemma: a huge disparity between high public awareness of RAS and limited technical knowledge. This basic-source knowledge gap fosters widespread misconceptions, mainly concerning the autonomy of robotic systems, creating major trust problems. These misconceptions lead to common fears such as malfunction of machines, procedure costs, and surgeon withdrawals. Yet, the public acknowledges the real benefits of RAS, such as smaller incisions, less pain, and quick recovery, and remains largely open to undertaking such procedures if so, recommended by a doctor they trust. Outside of public perceptions, these systems also face broader societal issues that include the realms of ethics and legality: high costs, training requirements, regulatory hurdles, challenges to accountability, and equitable access-that in turn massively affect the diffusion and adoption of RAS within healthcare systems. The initial problem pointed out was mainly considered a "knowledge gap." Yet the meta-narrative analysis and synthesis of findings reveal that this knowledge deficit, especially in the area of misconceptions about autonomy, causes an even more serious "empowerment gap." Patients that wrongly believe the robots to be autonomous, or who are terrified by the thought of malfunctions, might actually feel that their choices concerning their health are being taken away from them, despite clear clinical advantages being offered by the technology. Hence, recommendations go beyond informing to empower patients through correcting these mistaken beliefs, reinforcing trust, and ensuring transparency.

REFERENCES

1. Survey for Robotic-Assisted Surgery (Responses Spreadsheet)
2. An Analytical Study on Perception and Acceptance of Robotic- Assisted Surgical Interventions.
3. Awareness, perception, knowledge, and attitude toward robotic surgery in a general surgical outpatient clinic in Singapore, Asia. Journal of
4. Clinical and Translational Research. (https://www.accscience.com/journ al/JCTR/8/3/10.18053/jctres.08.20 2203.009)
5. Exploring the acceptance of robotic-assisted surgery among the Indian population: An empirical investigation. ResearchGate. https://www.researchgate.net/publi cation/382204850_Exploring_the_ acceptance_of_robotic_assisted_su rgery_among_the_Indian_populati on_An_empirical_investigationNur
6. Students' Awareness and Attitudes Toward Robotic Surgery: A Mixed- Methods Study. PMC. https://pmc.ncbi.nlm.nih.gov/articl es/PMC12176940/
7. The Role of Artificial Intelligence in Surgical Robotics: Current Status and Future Perspectives. Frontiers in Surgery.