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Perception on Robotic Surgery

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Abstract

Introduction: Since the rise of robotic surgery (RS) in the NHS from 2001, its adoption has spanned various specialties. Despite the prevalence of robotic surgery, studies indicate a significant knowledge gap. Our study investigates awareness, perception, and attitudes toward RS among attendees and staff at University Hospitals Coventry and Warwickshire.

Method: Conducted in July 2024, this descriptive cross-sectional study involved 206 participants, excluding certain groups. A 9-question self-reported survey was distributed in English. Data were analyzed using Microsoft Excel and SPSS.

Results: Of 212 surveys, 206 were analyzed. 68.4% had heard of RS, with 46.1% correctly identifying surgeon control. Education level significantly correlated with understanding; 57.3% had no concerns.

Conclusion: Despite strong baseline awareness and preference for direct/video-based education about RS, significant gaps and misconceptions persist. Targeted strategies are essential to improve public understanding and acceptance.

Keywords: Robotic Surgery; Perception; Public awareness

Introduction

With technological advancements in healthcare, there has been a notable shift from open approaches to minimally invasive techniques, and a notable increase in robotic surgery (RS). Since the introduction of surgical robot systems to the National Health Service (NHS) in 2001, RS has been adopted in general surgery, colorectal surgery, urology, gynecology, thoracic surgery, and neurosurgery [1]. As healthcare shifts to a more patient-centric approach, understanding public opinion and awareness of RS arere crucial. Existing studies indicate a significant knowledge gap, which can lead to unmet expectations, patient dissatisfaction, and potential medicolegal issues [3]. Despite the increasing prevalence of RS, studies conducted in the UK [1] and Saudi Arabia [2] indicate that many patients may not be fully aware of these advancements. Our study aims to investigate the awareness, perception, knowledge, and attitudes towards RS among attendees and staff at University Hospitals Coventry and Warwickshire (UHCW). This research seeks to inform future educational initiatives and policy decisions.

Method

UHCW is a tertiary teaching hospital with 1,250 beds, in which approximately 4,000 robotic surgeries have been performed over the past

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decade across various departments, including Urology, General Surgery, Gynecology, Thoracic, and Head & Neck.

This descriptive cross-sectional study was conducted during the month of July 2024. The study excluded surgeons, operating theater staff, individuals under 18, incomplete surveys, and individuals who were not literate in English. Participation was voluntary with no follow-up for those who declined.

The 9-question survey was distributed in printed form, available only in English. The printed questionnaire was self-reported without investigator influence. Data from 206 participants was analyzed using Microsoft Excel and SPSS software.

The survey covered the following questions:

Q1. Who are you?

(A) Patient

(B) Public (Patient's relative/friend/not related)

(C) Junior Doctor

(D) Nurse

(E) Other Hospital Staff

Q2. What is your age?

(A) 18-20 years

(B) 21-40 years

(C) 41-60 years

(D) 61-80 years

(E) >80 years

Q3. What is your gender?

(A) Male (B) Female (C) Others

Q4. What is your highest level of education?

(A) Not Completed School

(B) Completed School

(C) Undergraduate Degree

(D) Postgraduate Degree

(E) NVQ/Diploma

Q5. Are you currently undergoing/ have you undergone any of these following types of surgeries?

(A)Robotic Surgery

(B)Open Surgery

(C)Keyhole Surgery

(D) Not undergoing/ not scheduled for surgery

Q6. Have you heard of Robotic Surgery?

(A) Yes (B) No

Q7. According to you, what will help you understand 'Robotic Surgery' better?

(A) Listening to a surgeon explaining it

(B) Drawings and/or illustrations

(C) Leaflets and/or Brochures

(D) Videos and/or Animations

Q8. What is your understanding of how Robotic Surgery is performed?

(A) The robot performs surgery while a trained surgeon stands by.

(B) The surgeon controls robotic arms and instruments during the surgery.

(C) The surgeon tells the robot what to do, and the robot follows each command.

(D) The surgeon is not present in the operating theater, the robot performs according to pre-programmed software.

(E) I do not know what robotic surgery is.

Q9. Do you have any concerns about robotic surgery? Please select all that apply.

(A) The robot might malfunction during surgery.

(B) Safety of using robotic technology in surgery.

(C) How effective robotic surgery works compared to regular surgery.

(D) I do not have any concerns about robotic surgery.

Results

Out of 212 surveys, 206 were deemed complete, while 6 were excluded from the statistical analysis due to being incomplete. A total of 206 participants's responses were accepted for this study.

Among the participants, 41.3% were patients, 26.7% were the public (including patients' relatives, friends, or unrelated individuals), and the rest were nurses, junior doctors, or other hospital staff (cleaning, IT, administrative). Ages ranged from 18 to over 80, with the majority falling into the 21-40 (37.9%), 41-60 (29.1%), and 61-80 (26.2%) age groups. There were 122 females, 83 males, and 1 participant identifying as another gender. Education levels were varied: 40.3% had undergraduate degrees, 12.1% had postgraduate education, 36.4% completed school, 7.8% had NVQ/Diplomas, and 3.4% did not complete school (Figure 1).

Among the 206 participants, 34.9% (n=72) had undergone or were scheduled for surgery. Of these, 20 had undergone robotic surgery, with 12 exclusively experiencing robotic procedures. 4 had both laparoscopic and robotic surgeries, 2 had both robotic and open surgeries, and 2 had experienced all

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		Count
Identity	Junior Doctor	7
	Nurse	27
	Other Hospital Staff (Sanitization Staff, IT Staff, Administrative St	32
	Patient	85
	Public (Patient's relative/ Patient's friend/ not related to patient)	55
Age	Under 21	9
	21-40 years	78
	41-60 years	60
	61-80 years	54
	>80 years	5
Gender	Female	122
	Male	83
	Other	1
Education	Not Completed School	7
	Completed School	75
	NVQ / Diploma	16
	Undergraduate degree	83
	Postgraduate degree	25

Figure 1: Social demographic

three types: open, laparoscopic, and robotic. Additionally, 24 participants had only open surgery, 25 had only laparoscopic surgery, and 3 had both open and laparoscopic surgeries. The majority, 65% (n=134), had neither undergone nor were scheduled for any surgery (Figure 2).

Of the participants, 68.4% had heard of robotic surgery. Regarding understanding, 46.1% correctly identified that a surgeon controls the robotic arms. However, 16% believed the robot operates autonomously, 6.8% thought it executes commands from the surgeon, 4.4% believed it operates on pre-programmed software, and 26.7% were uncertain. A significant correlation was found between education level and understanding of robotic surgery. Postgraduates had a 68.0% correct answer rate, undergraduates 51.8%, while those with diplomas, school education, or not completed education had 37.5%, 37.3%, and 14.3%, respectively (Figure 3).

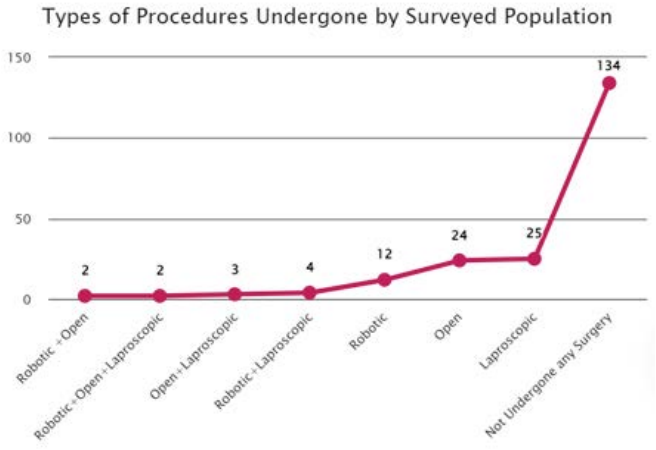

Figure 2: Procedures undergone by the surveyed population

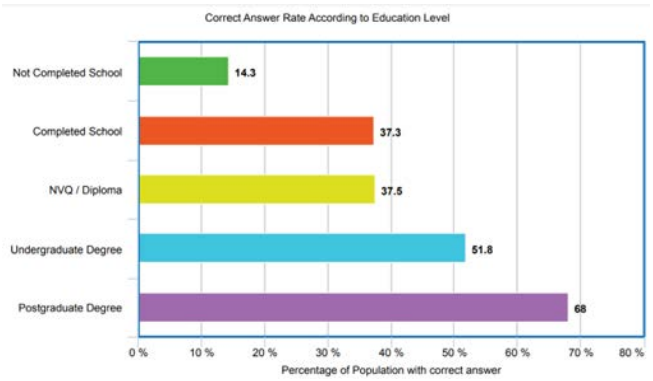

Figure 3: Correlation between education level & understanding of robotic surgery

Among participants with concerns about robotic surgery, 17.5% worried about potential robot malfunction, 19.4% questioned the overall safety, and another 19.4% doubted its effectiveness compared to traditional methods. In contrast, 57.3% reported no concerns. To enhance understanding of robotic surgery, the majority 37.7% preferred direct explanations from the surgeon, 27.8% chose videos and animations,19.2% preferred leaflets and brochures, and 15.3% opted for diagrams and illustrations (Figure 4).

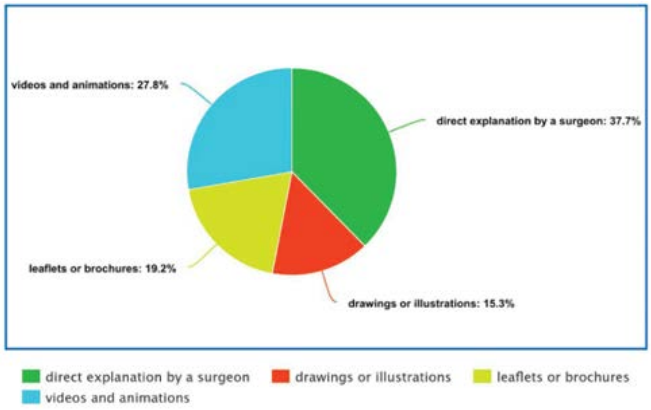

Figure 4: Preferred method of education

Discussion

Our findings in this study reveal both strengths and areas needing improvement in public understanding of robotic surgery.

In this study, it was found that 68.4% of participants were aware of robotic surgery, which is higher than the 53% reported in Singapore by Chan et al. [3]. This result reflects a notable increase in awareness, supported by a 341% rise in robotic-assisted surgeries in the NHS from 2016 to 2022 [4].

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Additionally, 46.1% of participants accurately understood how robotic surgery is performed, in contrast to only 27.1% reported by Buabbas et al. [5]. This disparity may be attributed to the higher proportion of participants with healthcare backgrounds in our study (32%) compared to theirs (21.2%). Notably, the level of education significantly impacted understanding, with postgraduate degree holders showing the highest correct response rate of 68.0%, compared to 51.8% for undergraduates and lower rates for other educational levels.

A significant portion of hospital staff held incorrect perceptions of robotic procedures. Among nurses, 29.6% provided incorrect answers about the procedure, while 46.9% of other hospital staff, including sanitization, IT, and administrative staff, also had misconceptions. This highlights the need for improved education on robotic surgery within hospital environments.

In seeking to improve understanding, participants were asked about their preferred mode of explanation and 37.7% of participants preferred direct explanations from surgeons, while 27.8% favored videos and/or animations. This preference reflects a shift in communication methods, as our study indicates a notable inclination towards video-based learning. This contrasts with Mohammed et al. where 70% preferred physician-led explanations, likely reflecting the era's limited popularity of digital media and social platforms [7]

Despite positive findings, gaps in comprehension persist. While 26.7% of participants lacked understanding completely, and 28% held incorrect views about how robotic surgery is performed. This finding is lower than some previous studies [2,3] but still indicates a need for improved education. Survey results indicate 57.3% of respondents exhibited no concerns about robotic surgery. This positive reception highlights a significant shift towards embracing innovative healthcare interventions, which may facilitate broader adoption and integration of robotic surgery. This contrasts with other studies where a larger percentage of participants had significant safety concerns.

Conclusion

This study establishes a strong baseline of awareness and identifies preferred educational strategies for robotic surgery. However, it reveals significant gaps in understanding and concerns among participants. Limitations include potential bias towards socially desirable responses, accuracy of self-reported data influenced by memory and hospital environment, and limited depth due to survey design and individual question interpretation. Targeted educational interventions and clear communication about safety and efficacy are essential to address these issues and improve public comprehension.

Recommendation

Future research should increase sample size and explore factors influencing robotic surgery perceptions. Enhanced educational tools and broader outreach via media can improve understanding and acceptance. Additionally, investigating demographic biases and exposure to robotic technology will help ensure accurate population representation.

Conflict of interest

During the survey and drafting of this article, the authors declare that there were no conflicts of interest. This ensures the integrity and impartiality of the research process and findings.

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