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ORIGINAL ARTICLE

The importance of robotic-assisted procedures in residency training to applicants of a community general surgery residency program

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Abstract
Surgery is an ever evolving discipline, and robotic-assisted procedures are the next generation of surgical techniques. There is currently no requirement for robotic training in surgical residency programs; thus, general surgery programs have incorporated it into their curriculums to varying degrees, including our recently adopted curriculum. As programs adopt new curriculum, it is unknown how applicants in community general surgery view the importance of robotic surgery for future procedures and its overall value in their training. To answer these questions, a voluntary and anonymous survey was given to all applicants of our community general surgery program and the responses assessed with descriptive statistics. The majority (76.92%) of our applicants believed robotic surgery would be very important in the future; however, less respondents (63.46%) believed that robotics would be very important to their particular career. While most (57.69%) reported being very interested in a program that offers robotic surgery, other respondents (53.85%) were indifferent toward a program that did not offer a robotics curriculum. Therefore, most applicants to our community program believe that robotic surgery will be an important part of surgery in upcoming years and most are very interested in a residency program that includes robotic surgery in the curriculum.

Keywords General Surgery · Survey · Robotics · Applicants · Residency

Background/introduction

Surgery is an ever evolving discipline and continually incorporates new technologies that have improved the ability of the operating room surgeon to perform his or her craft. The next generation of minimally invasive surgery includes robotic-assisted procedures. Robotic general surgery procedures are being implemented at an increasing number of hospitals across the country, and although less common in rural areas, smaller community hospitals have been no exception [1].

Graduating residents may be expected to have the skills to perform common general surgery procedures using these technologies, and residency programs are developing curriculums to teach these skills. General surgery residents are currently required to be trained and certified in laparoscopic and endoscopic procedures, prior to being able to take their surgical board exams, no such requirements for robotic surgery exist at this time. The Society of American Gastrointestinal and Endoscopic Surgeons has released a consensus document on robotic surgery in which they recommend that "specialty training programs include exposure to therapeutic robotic interventions as part of their curriculum. A structured curriculum on therapeutic robotic procedures should be included in programs providing clinical experience to their trainees" [2].

The goal of this study is to determine the opinions of applicants to a community general surgery residency program towards robotic surgery and a robotic surgery curriculum. Our program is a small rural community general surgery program and we recently instituted a structured voluntary robotics curriculum. We wanted to survey our applicants to determine their perceptions on robotic surgery and gage how important they thought robotic surgical procedures would play in their futures as general surgeons. As robotic surgery becomes more prevalent, surveys have shown that both program directors [4] and general surgery residents [3] believe robotics will be important in the future. It is important that we understand what applicants to our programs

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expect in their training and expect for their careers so we can prepare them for the future. We hypothesized that applicants to our community program would be very interested in learning robotic surgery and believed that a robotics curriculum would be something that is important to them when selecting a residency program.

Research design/methods

Our program and survey

Our program is a community-based program situated in a rural community in Marshfield WI, with a local population of 18,000 and catchment population of 750,000. We recently introduced a voluntary structured robotic surgery curriculum. We graduate three general surgery chief residents per year, with many practicing in smaller rural hospitals when they finish.

During the 2017–2018 application years, we gave a voluntary survey (Table 1) to all of our applicants during the course of the interview day. It was carefully explained to them that this was voluntary and confidential, and it would have no impact on their application. It included nine questions to assess their level of exposure to robotic surgery and their level of interest in robotic surgical procedures, both during training and for their future careers.

Statistical analysis

Categorical data were summarized using frequency and percentages.

Results

Survey results are shown in Table 1. We interviewed 52 applicants, all of which completed our anonymous and voluntary survey. Our first question was to gage their exposure to robotic surgery, 80.77% reported only minimal exposure to robotics in their training thus far (Fig. 1).

We then wanted determine how important they believed robotic surgery would be in the future and how much it would impact their particular careers. The majority, 76.92% believed it would be very important in the future (Fig. 2). Less (63.46%), however, responded believing that robotics would be very important to their particular career (Fig. 3).

We then tried to gage their level of interest in robotic training in residency and how important they thought it would be. While most (57.69%) reported being very interested in a program that offers robotic surgery (Fig. 4),

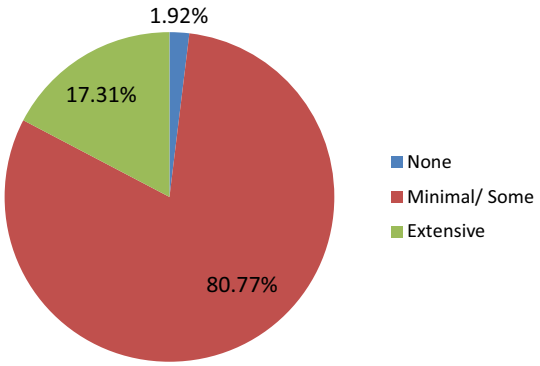

Fig. 1 Have you been exposed to robotic surgery during your medical education?

Table 1 Survey results

	% (*n*)		
1. Have you been exposed to robotic surgery during your medical education?	None	Minimal/some	Extensive
	1.92% (1)	80.77% (42)	17.31% (9)
2. How important do you think robotic surgery will be in the future?	Unimportant	Minimal/somewhat	Very
	0% (0)	23.08% (12)	76.92% (40)
3. Do you think robotic surgery will be important to your career?	No	Minimal/somewhat	Very
	1.92% (1)	34.63% (18)	63.46% (33)
4. Would a program that offers a robotic curriculum be of interest to you?	Indifferent	Mildly/somewhat	Very
	1.92% (1)	38.46% (20)	57.69% (30)
5. Are you interested in pursuing an MIS/robotic fellowship?	Unlikely	Maybe	Very
	30.77% (16)	59.62% (31)	9.62% (5)
6. Would you strongly consider a program that does not offer robotic training?	Yes	Indifferent	No
	23.08% (12)	53.85% (28)	23.08% (12)
7. Did you play video games as a child?	Never	Sometimes	Often
	9.62% (5)	32.69% (17)	57.69% (30)

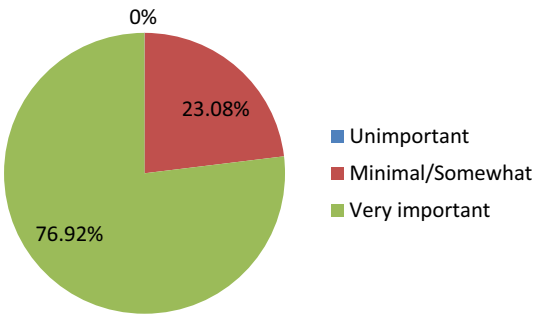

Fig. 2 How important do you think robotic surgery will be in the future?

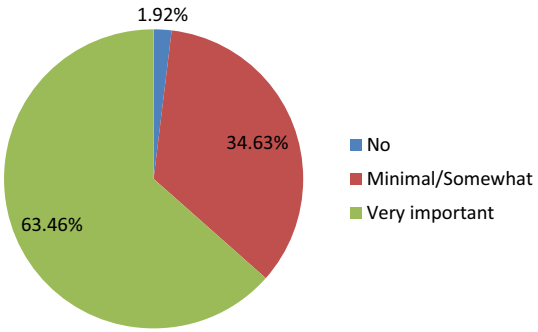

Fig. 3 Do you think robotic surgery will be important to your career?

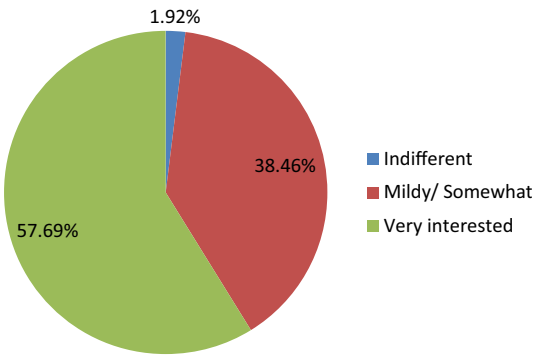

Fig. 4 Would a program that offers a robotic curriculum be of interest to you?

the distribution was much more even when asked if they would consider a program without a robotics curriculum (Fig. 5). Most people (53.85%) were indifferent towards a robotics curriculum with a similar number of people (23.08%) reporting that they either would or would not consider a program without a robotics curriculum.

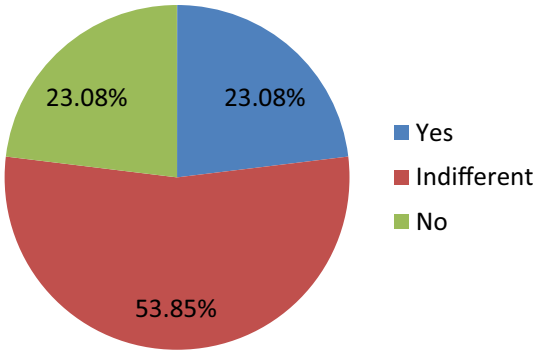

Fig. 5 Would you strongly consider a program that does not offer robotic training?

Discussion

The goal of our study was to determine the interest of applicants to our community program towards robotic surgery. From the results of our study it appears that although most applicants have little exposure to robotic surgery they believe that it will be very important on the future of general surgery and their careers. The majority (57.69%) also indicate that they would be very interested in a residency program with a robotic curriculum, with < 2% not interested in robotic surgery.

Interestingly, although 76.92% of applicant thought robotics would be very important in the future, only 63.46% thought it would be very important to their particular career. This difference may be accounted for by the fact that applicants applying to our program are more likely to be interested in rural/community surgery, and they do not believe that robotic surgery will be as important in the future of that type of general surgery practice, even though it has been shown that robotic surgery can be successful in the community setting [5].

Another interesting observation from our data is that although most applicants (57.69%) expressed that that they would be very interested in a residency program that offers a robotics curriculum, the majority (76.93%) also indicated that they would consider a program that does not offer a robotics curriculum. This is likely related to the fact that many programs still do not offer a structured robotic training model, as it is not required by the ACGME or any other accrediting body. A 2002 survey of program directors indicated that only 23% had plans to incorporate it in their training [4] and some programs that have voluntary curriculums have had some trouble with resident participation [3]. It would appear that many residents are not getting trained in these skills and are left to learn it in post-residency training.

Our study does have limitations as it is a survey of applicants on their interview day, and thus some answers may be influenced by information they were exposed to that day or

if they perceived that their answers would affect their application. The study and survey were thoroughly explained to them, emphasizing that the survey was completely voluntary and all answers would remain anonymous to mitigate any of this potential bias.

Conclusion

It is evident from our survey that most applicants to our community program believe that robotic surgery will be an important part of surgery in the upcoming years and that most are very interested in a residency program that offers a robotic surgery curriculum. There are many benefits of rural surgical training, and it is an important component of our healthcare system as rural surgeons provide an invaluable resource for care of many patients with limited access to tertiary referral medical centers [6]. The programs are also tasked with training residents, which are integral to this access issue, as many of them go on to practice rural areas. Our program has effectively incorporated a voluntary robotic surgery curriculum with success, and it is important that more programs meet the demands of their trainees and continue to produce surgeons with a wide breadth of skills.

Compliance with ethical standards

Conflict of interest William Krause MD, Alfonso Velasco MD, Danial Cullinane MD, James Clay MD and Julio Brid MD declare that they have no conflict of interest.

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