The American Journal of Surgery 221 (2021) 424–426

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

My Thoughts/My Surgical Practice

American Board of Surgery Statement on Assessment and Robotic Surgery

Background

Adoption of robotic systems for minimally invasive surgical procedures has increased in the last two decades. Over 19,000 papers have been written about robotic surgery in many subspecialties including general, thoracic, colorectal, urology, and gynecology. The only robotic interface currently approved by the US Food and Drug Administration for use is the Da Vinci Surgical System (Intuitive Surgical Inc., Sunnyvale, California). By the end 2017, Intuitive Surgical hadshipped 5770 robot systems, and counting for tradeins and returns, 4409 platforms had been installed worldwide. There were estimated to be 877, 000 robotic procedures in 2017, among which there were 252,000 general surgery cases, the specialty with the greatest volume increase as compared to other surgical specialties.[1]

The Education and Training Council Committee (ETCC) of the American Board of Surgery was tasked by the ABS Board of Directors to create a statement regarding robotics as core of surgery training that should apply across specialties. This represents a summary of the recommendations of the ETCC.

Current state of robotic surgery in training

In 2008, the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and the Minimally Invasive Robotic Association (MIRA) wrote a consensus document on robotic surgery. The statement recommended that 'structured curriculum on therapeutic robot procedures should be included in programs providing clinical experience to their trainees."[2] The Fundamentals of Robotic Surgery is a multispecialty proficiency based educational program for basic robotic skills and cognitive modules formed by a multidisciplinary, multinational group.[3] It was jointly sponsored by the Intuitive Surgical and the Department of Defense. Unlike Fundamentals of Endoscopic Surgery and Fundamental of Laparoscopic Surgery, FRS is not a requirement for completion of general surgery residency.

Currently, there is no standard curriculum implemented for general surgery or any surgical subspecialties. There are several recommendations on implementing a standard curriculum in surgical training. Several societies and individual authors have proposed modular training that are similar in nature.[4–6] The elements of proposed robotic training would include, but not limited to baseline evaluation, e-learning module (e.g., FRS), virtual training console, simulation-based training course, supervised bedside assistant training, modular console and structural assessment, transition to full procedural training, and final evaluation.

Literature on contemporary surgical training reveals that there is variable experience available to surgical trainees. Merrill et al.[7] looked at the experience of graduates of urologic training programs from 2011 to 2017 and found an increase in robotic surgery across the board in oncologic, reconstructive, and pediatri c cases. In fact, for urologic oncology, the number of robotic procedures was greater than open surgery. However, there were substantial differences in the number of robotic procedures among institutions. Similar variability in robotic training was noted in the gynecology literature.[8] In this group, it was noted that there was a decrease in minimally invasive hysterectomy numbers in 2017 compared to 2009.

In general surgery, there is no current formal skills curriculum for robotic surgery. Tom et al. sent a survey to 277 general surgery program directors, with a 42% response rate. In this cohort, 92% or respondents stated that their residents participate in robotic surgery, with about 2/3rd of the graduating residents having >20 cases of robotic surgery.[9] In this study, there was no granularity in classifying the cases as console (primary surgeon) versus bedside or docking (assistant) surgeon.

Current ACGME requirements for robotic surgery

In the surgical case logs of the Accreditation Council for Graduate Medical Education (ACGME), there is currently no distinction between laparoscopic and robotic procedures. As such, there is no specific requirement for minimum robotic procedures for any surgical specialties. In general surgery, there is a current requirement for 100 basic and 75 complex laparoscopic procedure requirements. It is typically understood that robotic surgery falls under complex laparoscopic procedure.

In complex general surgical oncology, pediatric surgery, vascular surgery, and trauma/burn/surgical critical care residency training program requirements, there is currently no explicit requirement for robotic surgery. In urology, there is a requirement for 50 minimally invasive cases; laparoscopic or robotic procedures are both counted in this category. For fellowship training in colorectal surgery, there is also no minimum number of robotic cases. The current president of the ABCRS stated that the most competitive programs offer robotic experience, but there is no mandate of having robotic colorectal cases.

https://doi.org/10.1016/j.amjsurg.2020.09.039

Patient outcomes

In general surgery, the data for better outcomes for patients undergoing robotic surgery are not available. The most recent data on robotic colectomy among Medicare patients from 2010 to 2016 was analyzed by Sheets et al.[10] The authors found no difference in the complication rates between robotic and laparoscopic colectomy. They also found that robotic colectomies replaced a higher proportion of MIS laparoscopic surgeries rather than high risk open procedures. Other authors have found no significant differences in outcomes between standard laparoscopic and robotic surgery[11–13] In rectal surgery for cancer, some investigators have shown that compared to laparoscopic surgery, robotic rectal resection is associated with decreased likelihood of successful oncologic resection.[14] At this point, there is no consensus supporting the superiority of robotic surgery for procedures within the realm of the specialties represented by the American Board of Surgery.

Score

The subject of "Robotic Surgery Principles" has been included in the ABS SCORE curriculum and is designated a "Core" knowledge content.

Education and training committee recommendations

Robotic surgery is not a discipline on its own, rather it is an enabling technology. However, the robotic approach for many surgical procedures are being taught in many training programs. Skills in robotic approach may be considered as advantageous when surgeons seek employment.

Knowledge in robotic surgery is a training requirement, included in the SCORE Curriculum for general surgery. Elements of robotic surgery are considered either core or advanced in the ABS SCORE Curriculum. Therefore, knowledge and skills in robotic surgery can and should be assessed in ITE and QE, CE, or even CCA, as deemed appropriate by each subspecialty board. For CCA, the ABS Assessment Committee would need to make sure that the examiners have enough knowledge on robotic surgery that are able to test fairly if a candidate were to incorporate robotic surgical principles during the CE.

The ETCC recommends that the ACGME consider separate documentation of complex laparoscopic surgery and robotic surgery for all surgical specialties. Similarly, we recommend the ABS ask diplomates about robotic surgical experience during the continuous certification process. These steps would inform the ACGME and the ABS regarding the penetration of robotic surgery in general surgery training and in practice.

The ETCC would like the Council of the American Board of Surgery to support the creation of a general framework to use in evaluating whether new surgical techniques or technological innovations should be incorporated into the surgical curriculum. This framework should provide guidance for when to include topics in SCORE and include them in the ABS assessments of residents and practicing surgeons for initial or continuous surgical certification. We believe that the development of this framework should include involvement of other stakeholders including, but not limited to, ACGME, RC, and program directors. Part of the discussion for its development should include discussions on whether the new technological innovation improves the discipline of discipline of surgery in its ability to provide safer and better outcomes for patients. We believe that attention to patient outcomes in the discussion of new technologies in the curriculum of surgery is congruent with the mission of the ABS to provide safe surgical care to the general public.

It should be noted that the members of the ETCC had some trepidation with lending full support to robotic surgery at this time. Robotic surgery is an enabling technology and is an approach to surgical procedures. Its use requires a significant capital investment[1] and many surgical residency programs may not able to purchase a robotic unit for training. Importantly, there is a lack of consensus at this time that robotic surgery is superior to approaches currently available in practice such as standard laparoscopic surgery. As such, our committee stopped short of recommending a formal curriculum on robotic surgery, as its development and implementation should be within the combined purview of the ABS, APDS, AGCME, and RC for Surgery, with possible input from SAGES. This may be a point of discussion for a future Surgical Summit meeting. We also recognize that at this time, there is only one company that has an FDA approved robotic platform and the Intuitive Company is instrumental in the education platform for robotic surgery. This situation raises questions regarding conflict of interest and potential for unintended commercial endorsement by the ABS.

Declaration of competing interest

No Conflict of Interest.

References

1. Childers CP, Maggard-Gibbons M. Estimation of the acquisition and operating costs of robotic surgery. *J Am Med Assoc*. 2018;320(8):835–836.
2. A consensus statement on robotic surgery. A SAGES Publication. Prepared by the SAGES-MIRA Robotic Surgery Consensus Group www.sages.org/publications/guidelines/consensus.
3. www.frsurgery.org.
4. Rusch P, Ind T, Kimming, et al. Recommendations for a standardized educational program in robot assisted gyneacological surgery: consensus from the Society of European Robotic Gynaecological Surgery (SERGS). *Facts views vin obgun*. 2019;11(1):29–41.
5. Road WN, Ayub A, Huang CY, et al. Robotic thoracic surgery training for residency. A position paper for an educational curriculum. *Innovations*. 2018;13(6).
6. Winder JS, Juza RM, Sasaki J. Implementing a robotics curriculum at an academic general surgery training program: our initial experience. *J Robotic Surg*. 2016;10:209–213.
7. Merrill SB, Sohi BS, Thompson RH, et al. The balance between open and robotic training among graduating urology residents: does surgical technique need monitoring. *J Urol*. 2019. https://doi.org/10.1097/JU.0000000000000689, 101097JU0000000000000689. [Epub ahead of print].
8. Hall EF, et al. Variability in gynecologic case volume of OB?GYN residents graduating from 2009 to 2017. Am J Obstet Gynecol Nov 2019 pii: S0002–9378(19)32637-7. doi: 10.1016/j.ajog.2019.11.1258. [Epub ahead of print].
9. Tom CM, Maciel JD, Korn A. A survey of robotic surgery training curricula in general surgery programs: how close are we to a standardized curriculum? *Am J Surg*. 2018;217:256–260.
10. Sheetz KH, Norton EC, Dimick JB, et al. Perioperative outcomes and trends in the use of robotic colectomy for Medicare beneficiaries from 2010 to 2016. *JAMA Surg*. 2019. https://doi.org/10.1001/jamasurg.2019.4083.
11. Merola G, Scuito A, Pizorri F. etc. Is robotic right colectomy economically sustainable? A multicenter retrospective comparative study and cost analysis. *Surg Endosc*. 2019 Oct 12. https://doi.org/10.1007/s00464-019-07193-z [Epub ahead of print].
12. Jayne D, Pigazzi A, Marshall H, et al. Effect of robotic-assisted vs conventional laparoscopic surgery on risk of conversion to open laparotomy among patients undergoing resection for rectal cancer: the ROLARR randomized clinical trial. *J Am Med Assoc*. 2017;318(16):1569–1580. https://doi.org/10.1001/jama.2017.7219.
13. Jeong IG, Khandwala YS, Kim JH, et al. Association of robotic-assisted vs laparoscopic radical nephrectomy with perioperative outcomes and health care costs, 2003 to 2015. *J Am Med Assoc*. 2017;318(16):1561–1568. https://doi.org/10.1001/jama.2017.14586.
14. Kethman WC, Harris AHS, Morris AM. Oncologic and perioperative outcomes of laparoscopic, open, and robotic approaches to rectal cancer resection: a multicenter, propensity score-weighted cohort study. *Dis Colon Rectum*. 2020;63(1):46–52. https://doi.org/10.1097/DCR.0000000000001534.

Marjorie J. Arca[a], Reid B. Adams[b], Peter Angelos[c], Robert D. Fanelli[d], Joshua M.V. Mammen[e], M. Timothy Nelson[f], Michael W. Neumeister[g], Allison J. Robinson[h], Jo Buyske[i,*]

[a] *Medical College of Wisconsin, United States*

[b] *University of Virginia, United States*

[c] *University of Chicago, United States*

[d] *Guthrie Clinic Sayre, United States*

[e] *University of Kansas, United States*

[f] *University of New Mexico, United States*

[g] *University of Southern Indiana, United States*

[h] *PeaceHealth Medical Group, United States*

[i] *The American Board of Surgery, United States*

[*] Corresponding author.
E-mail address: jbuyske@absurgery.org (J. Buyske).

29 September 2020