Development of a General Surgery Robotic Educational Curriculum at the University of Colorado

Purpose: Robotic surgery is used by 35% of general surgeons and now comprises >15% of all general surgery operations, but there is limited guidance from the Accreditation Council for Graduate Medical Education (ACGME) regarding this type of training. The General Surgery Robotic Educational Committee at the University of Colorado was created in November 2020 to promote safe use of this technology by our graduates.

Objectives: We sought to evaluate robotics use in graduates, create and implement a robotic educational curriculum enabling robotic certification of trainees at graduation, garner support from industry, the ACGME, hospital, and department of surgery for this curriculum, and determine how our curriculum compared to those at other academic institutions.

Methods: Web-based surveys were sent to general surgery graduates from the University of Colorado from 2015-2021. A curriculum including online modules, intern orientation, dry and wet labs, simulation, milestone assessments, and case log minimums was written by the committee. Support was solicited from Intuitive Surgical, the ACGME, the University of Colorado hospital, and the Department of Surgery. Comparison to 6 other programs (Ohio State, University of California San Francisco, Washington University, Mayo Clinic Rochester, Johns Hopkins, University of Alabama) was conducted.

Results: There were 62% (33/53) graduates who responded to the robotics survey; 39% (13/33) used robotics in their practice and only 31% (4/13) felt prepared from residency. The committee supported the hospital hiring 4 robotic bedside assistants to enable resident operative console training in August 2021. A robotic surgery simulator was also acquired from Intuitive Surgical in August 2021, now used by 38% of clinical residents. Since implementation of the robotic curriculum, 100% of interns have participated in robotic orientation and completed the online robotic modules. Intuitive Surgical has supported wet labs for junior and senior residents annually. Robotic milestones have been reviewed at biannual clinical competency evaluations. After a second request, the ACGME enabled robotic demarcation on general surgery case logs starting in January 2022. Of the general surgery residency graduates from 2021 and 2022, 14/21 (67%) obtained robotic certification. We found common elements in general surgery robotic educational programs included: training beginning intern year, required online modules, robotic simulator use, at least annual dry and wet robotic labs, case minimums, and administrative support. Differences existed regarding how the training intern year was executed, simulations required, number of cases required, how progress was monitored over time, and how case numbers were tracked.

Conclusions: Robotic technology is used by a significant proportion of general surgery graduates from the University of Colorado; prior to formalized training, most felt unprepared to perform robotic surgery at graduation. With industry, hospital, school of medicine, and departmental support, we have established a robust general surgery robotic educational curriculum enabling more than half of graduates to obtain robotic certification over the last two years. Our program is similar to those at large

academic institutions, but considerable variations exist, indicating a need for formal guidance from the ACGME regarding general surgery robotic education."