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

University of Colorado Anschutz Medical Campus

Camille Stewart, MD; Nicole Christian, MD; Brandon Chapman, MD; Yihan Lin, MD; Amber Moyer, MD; Nell Weber, MD; Claire Travis, MA, MBA; Devon Viart, BS; Mark Nehler, MD

University of Colorado School of Medicine Department of Surgery

Background

- Robotics comprises 15% of all general surgery operations
- **There are no ACGME robotic requirements for general surgery residency**
- We asked:
  - How many residents use robotics after graduation?
  - Do we need a formal robotic educational curriculum?
- We conducted a needs assessment to determine if and how our residency alumni used robotics after graduation
- We developed a general surgery robotic educational curriculum

Methods

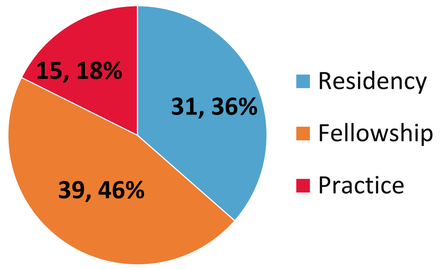
- Web-based surveys were sent to general surgery graduates from the University of Colorado from 2015-2021.
  - Participants received a $10 Amazon gift card for participation
- Support was solicited from Intuitive Surgical, the ACGME, the University of Colorado hospital, and the Department of Surgery
- **A curriculum** including online modules, intern orientation, dry and wet labs, simulation, milestone assessments, and case log minimums was written and executed by the robotic educational committee.

Results

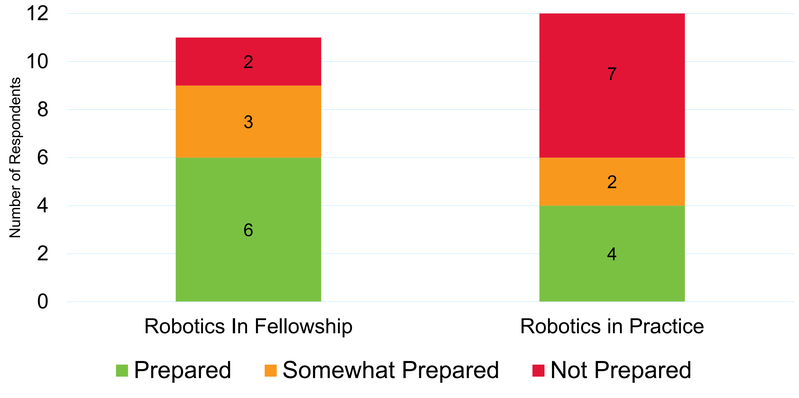
Needs Assessment

- 33/53 respondents (response rate 62%)
  - 64% completed fellowship training
- 54% completed additional robotic training
  - 11/33 (33%) received robotic training in fellowship
- **13/33 (39%) use robotics in their practice**
- Of the robotic users (n=13), 85% reported having robotic certification
  - 31% completed in residency
  - 39% completed in fellowship
  - 15% completed in practice

When Robotic Users Completed Certification



Preparedness after General Surgery residency for robotic use in fellowship vs independent practice

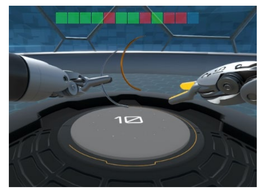


- **Only 30% of residents felt prepared for robotics in practice after graduating from residency**

These findings prompted development of a general surgery robotic educational curriculum at the University of Colorado.

Program Development

- Obtained robotic surgery simulator with support of Intuitive



- Started annual robotic intern orientation with the support of the department of surgery
- Started annual robotic wet labs at the Center for Surgical Innovation
- Wrote and implemented PGY-based curriculum with milestone assessments

Robotic Control				
Level 1	Level 2	Level 3	Level 4	Level 5
Consistently does not optimize view, hand position, or repeated collisions even with guidance	View and hand position is frequently not optimal resulting in collisions and obstruction of assistant requiring frequent guidance	View is sometimes optimal. Occasionally needs to relocate arms. Occasional collisions and obstruction of assistant. Occasional guidance.	View and arm position is mostly optimal. Rare collision and obstruction of assistant. Rare guidance.	Controls camera and hand position optimally and independently. No collisions or obstruction of assistant
Comments:				Not Yet Completed Level 1 ☐

- Supported hiring of robotic RNFAs by the hospital → August 2021
- Petitioned ACGME to enable robotic case logging → enabled January 2022

Implications

- **Of the general surgery residency graduates from 2021 and 2022, 14/21 (67%) obtained robotic certification.**
- **Given the frequency of robotic use in general surgery and current lack of standardization, formal guidance from the ACGME specifically regarding robotic education in general surgery residency is warranted.**