BACKGROUND

The word “robot” comes from the Czech word “robota” and translates loosely in English to “forced labor.” It was first used in 1921 by Czech playwright, Karel Capek. As computers and electronics continue to miniaturize and further permeate our society, we have to come to rely on the labor performed by these machines. The first robotically assisted surgical procedure was an arthroscopic procedure performed in Vancouver, BC on 5/12/83. The greater precision of movement in this application paved the way for the first robotically assisted laparoscopic procedure, a cholecystectomy, in 1987 utilizing the PUMA 560 system. The first robotic endoscopic system was the AESOP, which was approved by the FDA in 1990. This was followed by the daVinci system, which was approved by the FDA in July 2000. This was the first system that was self-contained, incorporating endoscopic equipment, instrumentation, energy sources, and a control console.

Though the first documented gynecologic robotic case was a microtubal reanastamosis performed in 1998, the daVinci robotic system was not FDA approved for use in gynecology until 2005. Since its approval, its incorporation into the gynecologic surgical market has been meteoric. Some recent estimates suggest that between 35 and 40% of hysterectomies performed in the United States utilize this technology. This includes indications for both benign and malignant disease. Currently, there is no data to suggest that a robotic approach in carefully selected and counseled patients results in poorer outcomes when compared to traditional open or laparoscopic approaches.

The robotic surgery program at Greenville Health System arrived in September of 2010 with the acquisition of our first robot. In the first full year, 370 robotic surgeries were performed with the majority of the procedures being done by gynecologists. With the adoption of robotic technology by thoracic surgery and urology late in 2011, a second robot was needed and acquired in July of 2012. By 2013, 677 robotic surgeries were performed. Currently, there are 6 general gynecologic surgeons, 3 gynecologic oncologists, and 2 urogynecologists who routinely utilize these systems.

As additional attendings adopt this technology and the surgical marketplace becomes more and more permeated with these techniques, resident familiarity and participation in these cases is more critical than ever. This proactive approach to resident education will ensure not only that our patients at GHS are adequately cared for but also that our graduating residents possess a well-rounded and functional knowledge of this technology, giving them the flexibility to incorporate this surgical modality into their practice after graduation.

OBJECTIVES

1. To provide residents with basic knowledge of robotically assisted surgery, its indications, risks, benefits, system components, and troubleshooting techniques through computer based resources, reading materials, and testing.
2. To provide residents with a dry lab and computerized simulations to further familiarize themselves with the components and instrumentation of the robotic operating system and its uses and capabilities.

3. To provide residents with a case log system and focused assessments to track the number of cases performed and demonstrate competency with the opportunity for motivated residents to accumulate an adequate number of cases to obviate the need for much of the additional training needed to obtain privileges to perform these procedures after graduation.

ACGME Core Competencies

1. Patient Care
2. Medical Knowledge
3. Interpersonal and Communication Skills
4. Professionalism
5. Systems-based Practice
6. Practice-based Learning and Improvement

Resource Outline

1. Computer Based Resources
   a. Online lecture and testing materials at www.davincisurgerycommunity.com
   b. Departmental assigned reading on secure SharePoint server
   c. Assigned simulator modules

2. Didactic Resources
   a. Curriculum overview describing goals and objectives and curricular structure
   b. Dry lab training during intern orientation with Intuitive Surgical staff and/or faculty mentor

3. Feedback Resources
   a. Focused assessments
   b. Case log system
   c. Simulator modules

REQUIREMENTS (Basic)

The following requirements are to be completed by all residents sequentially during their residency training. Prior to gaining access to the console, all online training, dry labs, simulator and bedside assist requirements must be met. (The first 4 steps of the below training outline and overview didactic are to be completed during intern orientation)

LEARNING OBJECTIVES

1. Describe risks, benefits, alternatives, and indications for robotic surgery
2. Recognize complications and safety issues unique to robotic procedures
3. Understand the basic components of the robotic system, how they function and interact, and basic troubleshooting
4. Understand the basic principles of proper port placement and the relationship to the target anatomy
5. Demonstrate comfort with basic manipulation of camera and instrument arms and the application of energy sources
6. Demonstrate proper docking and undocking as well as instrument and camera exchange

<table>
<thead>
<tr>
<th>Step</th>
<th>Competency</th>
<th>Item</th>
<th>Prerequisites</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Medical Knowledge</td>
<td>daVinci System on-line training</td>
<td>None</td>
<td>Certificate</td>
</tr>
<tr>
<td>2</td>
<td>Systems-based Practice</td>
<td>daVinci System on-line video and test</td>
<td>None</td>
<td>Print screen of passing score</td>
</tr>
<tr>
<td>3</td>
<td>Medical Knowledge / Professionalism</td>
<td>Assigned readings</td>
<td>None</td>
<td>Self Report</td>
</tr>
<tr>
<td>4</td>
<td>Practice-based Learning and Improvement</td>
<td>Dry lab during intern orientation</td>
<td>1-3</td>
<td>Faculty confirmation</td>
</tr>
<tr>
<td>5</td>
<td>Practice-based Learning and improvement</td>
<td>Simulation Course</td>
<td>4</td>
<td>Score of 75% or greater on each of 6 modules</td>
</tr>
<tr>
<td>6</td>
<td>Patient Care</td>
<td>Bedside assist for 5 cases*</td>
<td>4</td>
<td>Case log report</td>
</tr>
<tr>
<td>7</td>
<td>Patient Care</td>
<td>5 first assistant cases at console*</td>
<td>5 (must have performed 2 bedside assists)</td>
<td>Case log report</td>
</tr>
</tbody>
</table>

* Residents may count themselves as both bedside assist and console first assistant (after a minimum of 2 bedside assist cases have been documented) if the resident participates in port placement and docking and undocking in addition to operating from the console during the same case.

**SIMULATOR TRAINING (Basic)**

The robotic simulator is attached to the dual console and may be used whenever the console is not being used for a surgical case. Its proper use will be reviewed during the intern orientation dry lab session. Each resident will have a unique log on and PIN number to track progress. Resident progress can be downloaded from the console and will be available to the residency leadership and program coordinator. A score of 75% or greater is required for all modules before a resident can participate as first assistant.

**Modules:**

1. Camera and Clutching – Camera targeting 2
2. Endowrist Manipulation 1 – Peg board 2
3. Energy and Dissection – Energy Switching 1
4. Camera and Clutching – Ring Walk 2
5. Needle Control – Thread the Rings
6. Needle Driving – Suture Sponge 2
REQUIREMENTS (Advanced)

Some residents with an interest in robotic surgery or who wish to pursue fellowship training in a field which utilizes robotic techniques will have the opportunity to pursue optional advanced training in robotic surgery. The goal is to allow the resident to advance to the point to where he or she can operate independently. Trainees who complete these objectives will be provided with a certificate at the completion of their training documenting their experience and proficiency. While all hospital systems have different credentialing requirements, documentation of this type generally replaces the need for on-site clinical training once in practice. These requirements may be completed in any order or in concert once all basic training requirements have been met.

LEARNING OBJECTIVES

1. Demonstrate advanced competencies regarding docking, undocking, port placement, and troubleshooting
2. Demonstrate the ability to operate independently at the surgical console
3. Communicate with faculty and teammates to ensure the minimum number of cases are obtained

<table>
<thead>
<tr>
<th>Step</th>
<th>Competency</th>
<th>Item</th>
<th>Prerequisite</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Practice-based Learning and Improvement</td>
<td>Advanced Simulator Course</td>
<td>All Basic Requirements</td>
<td>Score of 75% or greater on all 6 modules</td>
</tr>
<tr>
<td>2</td>
<td>Patient Care</td>
<td>15 Cases as Primary Console Surgeon*</td>
<td>All Basic Requirements</td>
<td>Case Log</td>
</tr>
<tr>
<td>3</td>
<td>Communication</td>
<td>Completion of 5 Focused Assessments*</td>
<td>All Basic Requirements</td>
<td>Focused Assessment</td>
</tr>
</tbody>
</table>

*Focused Assessments to be performed during 15 cases as primary console surgeon (performs ≥ 50% of the case). If 5 Focused Assessments have not been obtained by the trainee after 15 cases, additional cases as primary surgeon will be required to complete this requirement.

SIMULATOR TRAINING (Advanced)

The following 6 modules comprise the advanced training requirements. A score of 75% or greater is needed to demonstrate competency.

Modules:

1. Energy and Dissection -- Energy Switching 2
2. Endowrist Manipulation – Match Board 3
3. Needle Driving – Suture Sponge 3
4. Needle Driving – Tubes
5. Endowrist Manipulation – Ring and Rail 2
6. Camera and Clutching – Ring Walk 3
<table>
<thead>
<tr>
<th>Positioning</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Necessary lines in place (intravenous, foley)</td>
<td>X</td>
</tr>
<tr>
<td>2. Patient positioned correctly on table</td>
<td>X</td>
</tr>
<tr>
<td>3. Proper stirrups/retractor used for exposure</td>
<td>X</td>
</tr>
<tr>
<td>4. Lights positioned</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scrubbing</th>
<th>Rating</th>
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<tbody>
<tr>
<td>5. Technique followed without contamination</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preparation for Procedure</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Properly prepped and draped patient</td>
<td>X</td>
</tr>
<tr>
<td>7. Properly attached energy source and light cord</td>
<td>X</td>
</tr>
<tr>
<td>8. Demonstrated knowledge of equipment and instrumentation</td>
<td>X</td>
</tr>
<tr>
<td>9. Checked instruments for proper working order</td>
<td>X</td>
</tr>
<tr>
<td>10. Asked if assistants and nurses ready</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Docking Procedure</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Properly oriented and placed ports</td>
<td>X</td>
</tr>
<tr>
<td>12. Guided surgical cart into operative field</td>
<td>X</td>
</tr>
<tr>
<td>13. Aligned and docked camera and instrument arms</td>
<td>X</td>
</tr>
</tbody>
</table>

**Strengths:**

- Properly inserted and exchanged instruments
- Efficiently guided instruments into operative field

**Areas for Improvement:**

- Worked well as primary surgeon
- Identified instruments by the correct names
- Camera utilized effectively for maximum visibility of the field
- Knew patient history / surgical indication
- Worked well as primary surgeon
- Kept flow of operation / thought ahead
- Suturing / knot tying performed efficiently and effectively
- Communicated effectively as a team member

**Operative Checklist:**

- 1. Respected tissue
- 2. Identified instruments by the correct names
- 3. Camera utilized effectively for maximum visibility of the field
- 4. Knew patient history / surgical indication
- 5. Kept flow of operation / thought ahead
- 6. Suturing / knot tying performed efficiently and effectively
- 7. Communicated effectively as a team member

**Summary:**

- Respected tissue
- Identified instruments by the correct names
- Camera utilized effectively for maximum visibility of the field
- Knew patient history / surgical indication
- Kept flow of operation / thought ahead
- Suturing / knot tying performed efficiently and effectively
- Communicated effectively as a team member

**GHS Department of Ob/Gyn**

**Surgical Skills Assessment**

**Resident:**

**Evaluator:**

**Date:**

**PGY:** 2 3 4
See Attached Case Log

PRINCIPAL FACULTY

   Jeffrey Elder, M.D
   Jeffrey Garris, M.D.
   Mark Moore, M.D.
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