PROFICIENCY BASED TRAINING PROGRAM FOR PERFORMING COMPLEX GASTROINTESTINAL SURGERY – HOW AND WHY TO LEARN THE ROBOTIC ASSISTED LAPARASCOPIC GASTRIC BYPASS IN THE MILITARY

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The views expressed herein are those of the author and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government.
**Funding and Disclosures**

<table>
<thead>
<tr>
<th>Potential Funding Sources</th>
<th>Check all that apply</th>
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<tbody>
<tr>
<td>1 Sim center operational funds</td>
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<td>2 Intramural grant</td>
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<td>3 Clinical Departmental funds</td>
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<td>4 Hospital operations</td>
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<td>5 School of Medicine</td>
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<td>6 Hospital QI/PI Process</td>
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<td>7 Philanthropy</td>
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<td>8 Insurance Company</td>
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<td>9 Industry</td>
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<td>10 NIH/AHRQ or other governmental funding source</td>
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<td>11 DoD</td>
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<td>12 Not for Profit or Professional Society</td>
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<td>Other</td>
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• While RA-RYGB is less common than laparoscopic RYGB, its use is increasing.¹

• The purported advantages of RA-RYGB include:²
  – 3 dimensional vision with a stable and magnified image
  – EndoWrist® instruments that improve dexterity
  – Physiologic tremor filtering and motion scaling
  – Improved surgeon ergonomics

• The reported learning curve for RA-RYGB is 8-94 cases³,⁴,⁵
  – The wide variance in this learning curve suggests that the process used to adopt the robotic approach may reduce the learning curve.
Objectives

• We present the first detailed description of a RA-RYGB curriculum

• Primary
  – Describe our robotic assisted roux-en Y gastric bypass (RA-RYGB) curriculum

• Secondary:
  – Our institution’s volume and outcomes versus benchmarks
  – Other benefits of RA-RYGB:
    • Increased operational readiness through Combat Casualty Knowledge, Skills, and Abilities (KSAs)
    • Resident pursuit of da Vinci™ equivalency certification
    • Future combat general surgeon multiplier
    • Improved surgeon ergonomics
Methods

- **Institution:**
  - U.S. Navy’s largest military GME training facility
  - American College of Surgeons Accredited Education Institute Comprehensive Simulation Center

- **Providers:**
  - Fellowship trained MIS surgeons
  - All surgeons have adopted a standardized technique by consensus

- **Equipment:**
  - Dual console da Vinci™ Xi model surgical system (Intuitive Surgical, Inc, Sunnyvale, CA)
  - Includes the integrated simulation software package
• 6 components, from passive to active learning.

1. Online da Vinci™ Surgical Systems Course
   - Features and function of the surgical system
   - Approximately 2 hours
   - Post-course exam

2. da Vinci™ Surgical System On-Site Training
   - Orienting to controls, haptic and visual exercises, ergonomics
   - Approximately 3 hours

3. da Vinci Xi console Skills Simulator™ curriculum
   - Preset skills modules reinforce surgical system operation and techniques

4. Bedside Assistant Cases
   - Learning bedside surgical system operation and allows for case observation
   - At least 10 cases*

5. Cases as Assistant Console Surgeon
   - Mastering surgical system console and transition to primary surgeon
   - Variable number of cases*

6. Primary Surgeon Cases on Console
   - Monitored independence (side-by-side attending monitoring)
   - At least 20 cases*

* Minimum number of cases. These numbers can increase at the discretion of a robotic working group made up of staff surgeons if additional learner experience is required to reach the next milestone.
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• RA-RYGB adopted in 2009
• 100 cases total by 5 surgeons
Results - Outcomes

• Our institution: (median follow up 1.6 years)
  - % EBWL at 1-2 years: 66.7%
  - Median LOS: 2 days (IQR 2-2, 0)
  - 30 day readmission rate: 11%
  - Reoperation rate: 8%

• Published benchmarks: 6,7,8
  - % EBWL at 1 year: 66%
  - Average LOS: 2-2.7 days
  - 30 day readmission rate 7%
  - Reoperation rate: 2.4-4%
Results – Other benefits of RA-RYGB

- Combat Casualty Knowledge Skills and Abilities (KSAs)
  - 491 KSAs for general surgeons caring for combat casualty patients
  - 8 domains
  - 42 sub-domains

<table>
<thead>
<tr>
<th>Domain:</th>
<th>Sub-Domain:</th>
<th>KSAs Likely Met</th>
<th>KSAs Not Met</th>
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<tbody>
<tr>
<td>Airway &amp; Breathing</td>
<td>Trauma Anesthesia</td>
<td>43%</td>
<td>57%</td>
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<tr>
<td>Critical Care/Prevention</td>
<td>Critical Care</td>
<td>18%</td>
<td>82%</td>
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<td>Critical Care/Prevention</td>
<td>Hypothermia Prevention, Monitoring, and Management</td>
<td>100%</td>
<td>0%</td>
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<td>Critical Care/Prevention</td>
<td>Infection Control</td>
<td>71%</td>
<td>29%</td>
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<td>Critical Care/Prevention</td>
<td>Prevention of Venous Thromboembolism</td>
<td>33%</td>
<td>67%</td>
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<td>Torso Trauma</td>
<td>Blunt Abdominal Trauma</td>
<td>13%</td>
<td>87%</td>
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<td>Universal Domains</td>
<td>Interpersonal Skills &amp; Communication</td>
<td>100%</td>
<td>0%</td>
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<tr>
<td>Universal Domains</td>
<td>Professionalism</td>
<td>71%</td>
<td>29%</td>
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<td>Universal Domains</td>
<td>Practice-Based Learning &amp; Improvement</td>
<td>80%</td>
<td>20%</td>
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<td>Universal Domains</td>
<td>Systems-Based Practice</td>
<td>60%</td>
<td>40%</td>
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<tr>
<td>Wound &amp; Amputation</td>
<td>Management of War Wounds</td>
<td>19%</td>
<td>81%</td>
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Residents able to pursue da Vinci™ equivalency certification

Possible future combat surgeon multiplier

Improved ergonomics

But, with certain caveats
Conclusion

• Our six stage curriculum has prepared our Surgeons and interested Residents as independent RA-RYGB providers.

• For a moderate size program, our curriculum has led to outcomes similar to those seen at larger institutions despite far fewer cases.
  – We hypothesize that our structure RA-RYGB curriculum achieves this by reducing the learning curve.

• Adopting RA-RYGB helps achieve some of the KSAs required to maintain military readiness to care for trauma patients

• Further validation could help modify and improve this curriculum.


