Development of a Thoracic Robotic Program for Lung Cancer Surgery

William Tisol, MD
Thoracic Surgery
Aurora Health Care
Milwaukee, WI

Milwaukee, WI February 10, 2018
Disclosures

- Intuitive Surgical - Education
Overview

- Robotic History
- Robotic Lobectomy Outcomes Data
- Robotic Financials
- Successful Program Development
Robotic history and an old Grand Rounds presentation...
2006 Grand Rounds...
Following a 1 ½ day pig lab in Hackensack, NJ

Robotic Surgery: A Technology Looking For An Application?

William B. Tisol, MD
Division of Cardiothoracic Surgery
Medical College of Wisconsin
2006 Grand Rounds…
Following a 1 ½ day pig lab in Hackensack, NJ

**Brief History of Surgical Robots**

- 1985 – Puma 560 used by Kwoh et al for neurosurgical biopsies
- 1988 – PROBOT for prostate resection
2006 Grand Rounds...
Following a 1 ½ day pig lab in Hackensack, NJ

**Brief History of Surgical Robots**

- Late 80’s – NASA and DOD begin work on telepresence surgery

- Early 90’s - Stanford Research Institute develops dexterous telemanipulator
2006 Grand Rounds…
Following a 1 ½ day pig lab in Hackensack, NJ

Brief History of Surgical Robots

- 1998 – ZEUS surgical robot system
- 1999 – da Vinci surgical robot system
Failed application of proven technology...

- October 14, 1947, Bell X-1 accelerated to a speed of Mach 1.06
- 24 October 2003 British Airways operates last commercial services
2006 Grand Rounds…
Following a 1 ½ day pig lab in Hackensack, NJ

Proven technology failing to meet expectations…
2006 Grand Rounds...
Following a 1 ½ day pig lab in Hackensack, NJ
2006 Grand Rounds...
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2006 Grand Rounds...
Following a 1 ½ day pig lab in Hackensack, NJ

What will the surgical robot become?
Why I became a robotic thoracic surgeon
2006...

• I wanted to evaluate and understand the technology for myself
  • How does this work in my practice
  • Already believed in the benefits of MIS/VATS
• Improved instrument motion
  • 6 Degrees of “wristed” motion versus “sticks”
• 3D optics and 10x magnification
  • Steady and always positioned where you want it
• Improved ergonomics
  • No more “looking over your shoulder”
• Benefits not fully realized until I gained robotic proficiency
  • Need to accept a learning curve
Evolution of Robotic Thoracic Surgery

2006

2009

2014

*da Vinci® S™*

*da Vinci® Si™*

*da Vinci® Xi™*
Aurora Healthcare Robotic Production

17,146 All time cases completed from 2001 through 2017

Aurora All Time Case Total Through 2016

- Aurora St. Luke's Medical Center - WI: 5,336
- Aurora Grafton Medical Center: 1,946
- Aurora BayCare Medical Center: 1,738
- Aurora West Allis Medical Center: 4,003
- Aurora Medical Center - Summit: 490
- Aurora Medical Center - Kenosha: 12
Aurora System 3 Year Robotic Volume Trends

7 Robotic Programs
- 3321 cases 2017
- 52% increase from 2016

13 daVinci Systems
- 10 Xi Systems
- 3 Si System

Variable case mix
- URO, GYN, GYO, GS, THOR, CARD
2R, 4R and 10R Lymphadenectomy
Why minimally invasive surgery benefits patients

Oncologic equivalent to open technique

• Less post operative pain
  • Less post operative pain medication administration
  • Fewer analgesic side effects
    • Nausea
    • Dizziness
    • Constipation
  • Increased mobility
• Fewer complications
  • Pneumonia
  • Ileus
  • DVT
• Shorter LOS
• Accelerated recovery and return to work/recreation
Outcomes data
Aurora Robotic Lobectomy Outcomes

Demographics

N = 256
Male – 38.7%
Mean age – 68.5
Mean BMI – 28.4
Co-morbidities
  DM – 16.9%
  HTN – 62.1%
  CVD – 32.7%
  COPD – 33.5%
  Smoking (former) – 62.5%
  Smoking (current) – 25.4%
Preop CRT – 6.1%
Aurora Robotic Lobectomy Outcomes
Lobectomy Breakdown

RUL - 91
RML - 26
RLL - 35
LUL - 68
LLL - 36
Bi-lobes - 8
Aurora Robotic Lobectomy Outcomes

Pathology

Adenocarcinoma 149 (60.8%)
Squamous cell carcinoma 68 (27.8%)
Other (11.4%)
  Neuroendocrine 3
  Carcinoid 8
  Mixed 2
  Small cell carcinoma 3
  Bronchiectasis 1
  MAC 2
  Metastasis 2
  NED 2
Aurora Robotic Lobectomy Outcomes

Intraoperative

Single Surgeon/Dedicated OR teams
  Median op time – 125 min
  Median console time – 102 min
  Mean Total LN’s – 14.1
  Conversion rate – 2.4%
    Inadequate single lung ventilation – 3 (1.2%)
    Bleeding – 3 (1.2%)
Xi times
Improving…

Xi Console Times (median 99 min)
Operative times

Improving…

![Bar chart showing operative times for 2014, 2015, and 2016. The chart compares OP Time, Console Time, and Non-Console Time. The data shows a trend of improvement over the years.]
Aurora Robotic Lobectomy Outcomes

M&M

A-fib – 7.3% (10.6% - STS)
Pneumonia – 1.6% (3.9%)
30d mortality – 0.4% (0.8%)
LOS 3.0d (4.0d)
Post op transfusion 0.4%
Chest tube >5d – 23.3% (11.5%)
CT duration
  Median 3d
  Mean 6.4d
Chest tube > 5 days, LOS and conversions

Seems intertwined…
Robot Financials
**Robot Finance South East Wisconsin**

I am not a finance expert...

<table>
<thead>
<tr>
<th>Service Line</th>
<th>Cases</th>
<th>Days</th>
<th>Charges</th>
<th>Paid</th>
<th>Direct Cost</th>
<th>Indirect Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>GASTROENTEROLOGY</td>
<td>12</td>
<td>25</td>
<td>$447,407</td>
<td>$219,987</td>
<td>$110,639</td>
<td>$87,656</td>
</tr>
<tr>
<td>GENERAL</td>
<td>119</td>
<td>266</td>
<td>$4,001,564</td>
<td>$1,749,478</td>
<td>$729,573</td>
<td>$533,259</td>
</tr>
<tr>
<td>UROLOGY</td>
<td>50</td>
<td>75</td>
<td>$1,656,302</td>
<td>$862,053</td>
<td>$263,949</td>
<td>$175,798</td>
</tr>
<tr>
<td>WOMEN'S HEALTH</td>
<td>203</td>
<td>239</td>
<td>$5,655,853</td>
<td>$2,240,809</td>
<td>$1,064,771</td>
<td>$933,660</td>
</tr>
</tbody>
</table>

| Total               | 384   | 605  | $11,961,126 | $5,072,327 | $2,168,992 | $1,730,373 |

**Per Case Average**

<table>
<thead>
<tr>
<th>ALOS</th>
<th>Charges</th>
<th>Paid</th>
<th>Reimb%</th>
<th>Direct Cost</th>
<th>Contribution Margin</th>
<th>Contribution Margin %</th>
</tr>
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<tbody>
<tr>
<td>2</td>
<td>$37,264</td>
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<td>52.0%</td>
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<tr>
<td>1</td>
<td>$28,847</td>
<td>$11,038</td>
<td>38.3%</td>
<td>$5,245</td>
<td>$5,793</td>
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Robot Finance South East Wisconsin

I am not a finance expert…

Reimbursement
Outpatient 26-39%
Inpatient 30-49%
All 31-42%

Contribution Margin
Outpatient 36-77%
Inpatient 48-69%
All 49-76%
Financial Advantage
Open v. VATS v. Robotic Lobectomy

Potential Cost Offsets
Clinical Measures - Lobectomy

- **Length of Stay (days)**
  - OPEN (N=5,913)*
  - VATS (N=4,612)*
  - DAVINCI (N=108)

- **Transfusions (percentage)**
  - OPEN
  - VATS
  - DAVINCI

- **Major Complications (percentage)**
  - OPEN
  - VATS
  - DAVINCI

- **OR Room Time (minutes)**
  - OPEN
  - VATS
  - DAVINCI

Cost:
- $1,553 (per bed day)
- $1,142 (per transfusion)
- $7,657 (per complication)
- $11 (per minute)

Estimated Cost Savings Per Procedure
- $5,508 vs. Open
- $1,523 vs. VATS

Estimated Total Cost Savings
- $563,823 vs. Open
- $161,426 vs. VATS

Be aware of your environment

Abbas Abbas, MD

Cost of Care

- Capital cost
- Instrument cost
- OR time

- Salaries
- Administrative overhead
- Non-robotic instrument expense
- Length of Stay
- Conversions
- Complications
- Readmissions
- Surgical Infections
Revenue and Return

- Contribution margin
- Net margin

- Marketing return
- Competitive tool
- Educational tool
- Research tool
Robot Lobectomy Program and Successful Program Development
Development areas requiring attention

Surgeon

Team

Program
Room Set up
Planning and dry run essential.
Lobectomy Maps

RUL and LUL
## MIS Pathway

We can do cool stuff in the OR but…

### MIS Lobectomy Pathway

<table>
<thead>
<tr>
<th>Period</th>
<th>Pre-Operative Clinic</th>
<th>Intra-Operative</th>
<th>Post-Op Day of Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assess</strong></td>
<td>- Clinic: CT scan (3mo) - ECOG - smoking hx/cessation counseling - dx/stage (if known) May order if not done pre-clinic - PET (60d) - PFT (6mo) - needle bx for dx</td>
<td>Pre-op testing - EKG (6mo) M&gt;40, F&gt;50 - CBC, CMP, INR (30d) - A1C # DM (3mo) - T&amp;S (14d) - UA w/ reflex (30d) - MRSA swab (14d)</td>
<td>Update H&amp;P with EKG review - Mark correct surgical site - Patient bed status (inpt vs obs) - Signed consent - CXR (reviewed and documented w/in 4hr of anesthesia end time) - PACU - Anesthesia for pain control - Transfer to floor (3W/3/9ST) - Higher acuity patients to ICU - Patient will have 5 incisions, 1 with chest tube</td>
</tr>
<tr>
<td><strong>Consults</strong></td>
<td>- Cardiology for clearance if appropriate PT</td>
<td>Anesthesia</td>
<td>Pulmonary/Critical Care as needed</td>
</tr>
<tr>
<td><strong>SCIP measures</strong></td>
<td>- Beta-blocker am of surg if appropriate Antibiotics ordered</td>
<td></td>
<td>Foley d/c HS</td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td>- Nutrition class - NPO after midnight</td>
<td></td>
<td>Clear 第二天 - Up in chair for all meals</td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td>- Ad lib</td>
<td></td>
<td>Ambulate within 4-6 hrs of arrival from PACU - Progressive ambulation every 4h around the clock</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>- Stop ASA/anticoagulation 5 days before surgery (unless starts) Hibiclens scrub pm before and am of surgery</td>
<td>Clip surgical site - Foley placed (if surg &gt;1.5h) - Peripheral IV - Time Out</td>
<td>CT to gravity (-8cm suction) - Mucinex - RT/HHN per order - I5, cough and deep breathing q1h/every TV commercial - IVF @100 ml/h - Tele for 72h</td>
</tr>
<tr>
<td><strong>Pain Mgmt</strong></td>
<td>- Paravertebral block by anesthesia</td>
<td></td>
<td>Oxycodone for pain (PCA if uncontrolled) - NO Toradol unless ordered by thoracic surgery</td>
</tr>
<tr>
<td><strong>D/C needs</strong></td>
<td>- Patient and family education about surgery and expectations of hospitalization</td>
<td>Patient extubated in OR</td>
<td>Resume home meds as appropriate</td>
</tr>
</tbody>
</table>

*Note: The table above outlines the pre-operative, intra-operative, and post-operative phases of a MIS lobectomy pathway. The table includes specific procedures, diagnostics, and guidelines for patient care.*

Aurora Health Care®
# MIS Pathway

We can do cool stuff in the OR but…

## MIS Lobectomy Pathway

<table>
<thead>
<tr>
<th>Period</th>
<th>POD #1-D/C</th>
<th>D/C Criteria</th>
<th>Post-op Clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assess</strong></td>
<td><strong>POD #1-D/C</strong></td>
<td><strong>1. CT out or to pneumostat/mini-atrium</strong></td>
<td><strong>F/U in 2 weeks with CXR (appt. made prior to d/c)</strong></td>
</tr>
<tr>
<td></td>
<td>CXR, portable, daily while CT in CT for flow and output, document output q shift Physical assessment/VS per protocol</td>
<td><strong>Criteria for CT removal:</strong> Stable CXR No flow Drainage &lt;400/24h</td>
<td><strong>Post-op CXR</strong> <strong>Wound check</strong> <strong>Pain control</strong> <strong>Discuss pathology and staging</strong> <strong>Discuss surveillance</strong> <strong>Smoking cessation</strong></td>
</tr>
<tr>
<td><strong>Consults</strong></td>
<td><strong>POD #1-D/C</strong></td>
<td><strong>2. Tolerating diet</strong></td>
<td><strong>Oncology as needed</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PT/OT Cardiac rehab for thoracic exercises</td>
<td></td>
</tr>
<tr>
<td><strong>SCIP measures</strong></td>
<td><strong>POD #1-D/C</strong></td>
<td><strong>3. Ambulating safely</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td><strong>POD #1-D/C</strong></td>
<td><strong>4. Voiding</strong> <strong>(BM not required)</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td></td>
<td><strong>5. Tolerating oral pain meds</strong></td>
<td></td>
</tr>
<tr>
<td><strong>POD #1-D/C</strong></td>
<td><strong>PO narcotics</strong> <strong>Muscle relaxants</strong> <strong>Lidoderm patch</strong> <strong>Massage therapy</strong> <strong>Ice</strong> <strong>Aromatherapy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D/C needs</strong></td>
<td><strong>POD #1-D/C</strong></td>
<td><strong>Social services as needed</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CT site occlusive dressing remains on for 48 hrs</strong> <strong>May shower once occlusive dressing off, no baths</strong> <strong>Wash incisions daily with soap and water</strong></td>
<td></td>
</tr>
</tbody>
</table>
Surgeon Development

• Patience, practice and perseverance
• Learn the surgeon console
  • Use the simulator
• Assist another surgeon
  • Learn from other’s experiences
  • Understand being at the bedside
• Overcome being away from the table
• Have a plan and set goals
• Accept the learning curve
  • It will take longer at first
What’s the Learning Curve?

Learning to ski…

Figure 1: Learning by Breakthroughs

Figure 2: Continuous Learning

Figure 3: Textbook Learning Curve

Figure 4: Reality
What’s the Learning Curve?

Dr. Lyle Anderson (72) Harrisburg, PA

Learning robotics at a Luminary course today.

What's more impressive he spent >100 hours on the simulator with his CSR Joel Sweigart before the course /

A role model - we never stop learning.
He's going to join RSC later today!
Team Development

- Find volunteers as team members that want to learn the robot
  - Teach your thoracic team the robot
- Build team rapport
- Open communication
- Debrief after case
  - What went right/wrong?
  - What could we do better?
- Be encouraging
- Team sport
# Team Development

## Knowing your role

<table>
<thead>
<tr>
<th>Robotic Roles</th>
<th>RN</th>
<th>ST</th>
<th>Support (RN)</th>
<th>Assist (ST)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Team Arrives</strong></td>
<td>Robot Cords</td>
<td>Wiping flat surfaces/moving equipment</td>
<td>Setting room around</td>
<td>Starting to open supplies</td>
</tr>
<tr>
<td>Set Up</td>
<td>Look up Pt, Pull up films, Make bed, Pull med, Go for Pt and Pre-case Check-in with Surgeon</td>
<td>Open back table, gowning table, pans, Scrub and Count with RN</td>
<td>Open sterile supplies, count with ST, Drape robot</td>
<td>Open sterile supplies, drape robot</td>
</tr>
<tr>
<td>Patient In Room</td>
<td>Assist Induction, Foley, Clip, Position and Prep</td>
<td>Organize back table, Drape robot</td>
<td>Assist with Positioning, Clipping and Prepping</td>
<td>Assist with Positioning, Clipping and Prepping</td>
</tr>
<tr>
<td>Draping</td>
<td>Plug in cords, lights and Do Time out</td>
<td>Drape Patient, Throw off cords, Port placement</td>
<td></td>
<td>Assist in draping and Port placement</td>
</tr>
<tr>
<td>Ports Placed</td>
<td>Drive in Robot</td>
<td>Instrument arms</td>
<td></td>
<td>Docking, Insert Instruments</td>
</tr>
<tr>
<td>Console Time</td>
<td>Start recording case, Charting, Prepare for next robot (Meds/Look up Pt)</td>
<td>Assist with surgery</td>
<td></td>
<td>Assist with surgery</td>
</tr>
<tr>
<td>Surgeon Off Console</td>
<td>Gas off, Lights up, Switch bowie, Count, Procedure check out, Burn CD and Undrape robot (cords up if last case/moving Robot)</td>
<td>Counts, Help close, Clean instruments and Breakdown table</td>
<td>Help undrape robot and clean up</td>
<td>Help undrape robot and clean up</td>
</tr>
<tr>
<td>Incision Closed</td>
<td>Call PACU and EVS, Dressings get the patient bed to move them off the OR table</td>
<td>Break down tables, Help move the patient onto bed, Take garbage to decontam</td>
<td>Help move Patient onto bed and breakdown room</td>
<td>Help move Patient onto bed, breakdown room</td>
</tr>
<tr>
<td>Pt Transfer to PACU</td>
<td>Drop off Pt, Start next set up</td>
<td>Help housekeeping, Start next set up</td>
<td>Help housekeeping, Start next set up</td>
<td>Help housekeeping, Start next set up</td>
</tr>
</tbody>
</table>
# Team Development

## Knowing your role

<table>
<thead>
<tr>
<th>Role</th>
<th>Anesthesia</th>
<th>Anesthesia Technician</th>
<th>Surgeon</th>
<th>PA/ NP/ Resident</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Robotic Roles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team Arrives</td>
<td>See Patient</td>
<td>Check Anesthesia machine</td>
<td>See Patient, Mark site, Sign consent and Do H&amp;P update</td>
<td>See Patient, Mark site if in procedure and do H&amp;P update</td>
</tr>
<tr>
<td>Set Up</td>
<td>Set up medications set out needed supplies for intubation, See Patient, do lines and blocks</td>
<td>Collect needed supplies for intubation (difficult airway cart) help with lines and blocks</td>
<td>Pre Case Check in</td>
<td>Put films up</td>
</tr>
<tr>
<td>Patient in Room</td>
<td>Induction, OG, Bronchoscope (if needed) and help position the patient</td>
<td>Help with induction, (Bronchoscope), Positioning and Placing warming on Patient</td>
<td>Arrive in room, Oversee positioning of patient and Scrub</td>
<td>Oversee positioning of patient and Scrub</td>
</tr>
<tr>
<td>Draping</td>
<td>Draping and table positioning</td>
<td>Check with Anesthesiologist if a blood gas needs to be tested</td>
<td>Draping, Port placement</td>
<td>Draping, Port placement</td>
</tr>
<tr>
<td>Ports Placed</td>
<td>Monitor patient</td>
<td></td>
<td>Docking</td>
<td>Docking, Insert Instruments</td>
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<tr>
<td>Console Time</td>
<td>Monitor patient</td>
<td></td>
<td>At console</td>
<td>Assist with surgery</td>
</tr>
<tr>
<td>Surgeon Off Console</td>
<td>Monitor patient</td>
<td></td>
<td>Procedure Check out (Sign out Time out) Determine to save recording or not, Scrub and Close</td>
<td>Undock and close</td>
</tr>
<tr>
<td>Incision Closed</td>
<td>Extubation and Transfer Patient onto bed</td>
<td>Help with extubation, Transfer monitoring (if needed) and move Patient onto bed.</td>
<td>Dictate, Orders, See Patient’s family and See next Patient</td>
<td>Dictate, Orders, See Patient’s family and See next Patient</td>
</tr>
<tr>
<td>Pt Transfer to PACU</td>
<td>Drop off Pt, See next Patient</td>
<td>Help drop off patient in ICU (if needed) and Turnover room</td>
<td>See next Patient</td>
<td>Check post op films and See next Patient</td>
</tr>
</tbody>
</table>

*Note: The table above outlines the roles and responsibilities for different medical professionals during a procedure.*
Achieving Proficiency and Finding Success
Team Sport...

### Robotic Surgery Daily Wrap Up Sheet

<table>
<thead>
<tr>
<th>DATE:</th>
<th>ISSUE</th>
<th>SOLUTION</th>
<th>OWNER</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Was any needed equipment missing from the room?</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Did you have to remove any unn needed equipment from the room?</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Were any stocked items missing?</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Were any items from preference card missing from case cart?</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Where there any changes that need to be made to the preference card or cards?</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Did you have any issues/problems with the DaVinci system today? Was assistance accessible?</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
<tr>
<td></td>
<td>Was the case picked or scheduled properly?</td>
<td>Yes ☐</td>
<td>No ☐</td>
</tr>
</tbody>
</table>

**Comments:**

<table>
<thead>
<tr>
<th>Case 1 Scheduled Time</th>
<th>Surgeon:</th>
<th>Case 2 Scheduled Time</th>
<th>Surgeon:</th>
<th>Case 3 Scheduled Time</th>
<th>Surgeon:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Previous case wheels out:**

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rm Ready in room</td>
<td>Rm Ready in room</td>
<td>Rm Ready in room</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Start</th>
<th>Docked</th>
<th>Console</th>
<th>Undock</th>
<th>Staff</th>
</tr>
</thead>
</table>

**Comments:**
Program Development

• Create a Robotic Committee
  • Outcomes and safety
  • Resource utilization
  • Training
• Horizontal integration between surgical specialties including Anesthesia
• Vertical integration from OR to Administration
• Promote milestones and results
Effective Robot Committee Structure

President
  └── C-Suite
  └── Foundation
    └── GS – URO – GYN – GYO – TS – ANES
    └── OR Dir/MGR
      └── Robot Coordinator
          └── ISRG
AURORA MEDICAL CENTER IN GRAFTON
A NATIONAL CASE OBSERVATION SITE FOR
THORACIC ROBOT-ASSISTED SURGERY

• Established January 2016
• 1 of 19 national programs (1 of 2 in Midwest)
• Most visited thoracic observation site in the world - 2017
  • 88 outside visitors hosted
  • 100+ total guests
• Highest rated thoracic observation site
  • Score 9.91/10
• Locations of Visitor’s Home Institution: Wisconsin, Illinois, Indiana, Minnesota, Iowa, California, Nebraska, North Carolina, Ohio, Colorado, Kentucky, Michigan, Arizona, South Dakota, Florida, Georgia, Washington, Texas, Tennessee and China.
Questions?
Surgeon Development

Robotic Case Volume

Aurora Health Care
LLL Pulmonary Artery Stapling – Curved Tip