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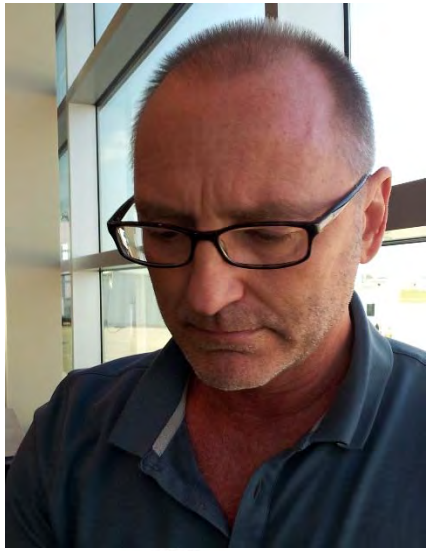
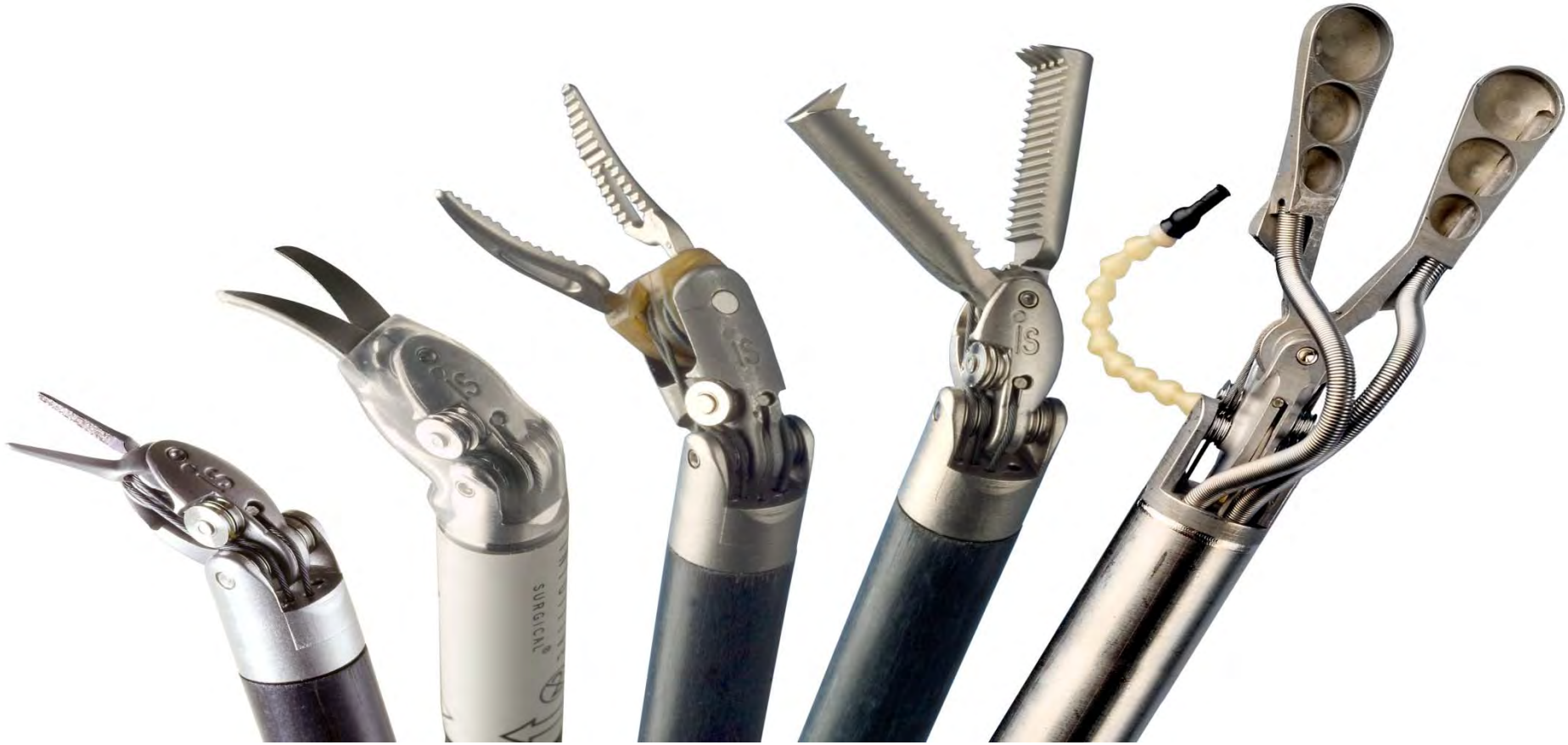
ROBOTICS IN SURGERY – THE BIG PICTURE





DISRUPTIVE INNOVATION

- A business term which refers to an innovation that creates a new market and value network and eventually disrupts an existing market and value network, ***displacing*** established market leading firms, products, and alliances.

THINKING ABOUT DISRUPTIVE INNOVATION

- Disruptive innovation happens all of the time – it is a process that is embedded in the field of medicine.
- To be a Surgeon one must be constantly prepared for change – not just "waiting for something to happen" – but rather looking ahead to what is predictably *going to happen.*
- ***A Surgeon's best trait is adaptability. See the future and move toward it. Make changes early to prepare for what you know is around the corner.***
- ***A Surgeon's worst enemy is fear. Fear equals negativity and paralysis. Paralysis leaves the surgeon behind.***

KNOW *WHERE* YOU ARE IN HISTORY

- Read “The Century of the Surgeon” by Jurgen Thorwald ©1957
- What is General Surgery today? What was it in 1846? 1890? 1950? In 1990? In 2018?
- How has the history of increased knowledge and technological progress changed the General Surgeon and Surgery in general?
- General Surgeons are the originators of: Heart Surgery, Plastic Surgery, Orthopedic Surgery, Trauma Surgery, Endoscopy, Oncologic Surgery, Urology, Gynecologic Surgery, ENT, Hand Surgery, Burn Surgery, Thoracic Surgery, Pediatric Surgery, Transplant Surgery – and more.
- What effect has the shedding of surgical specialties and sub-specialties had on the role of the General Surgeon at the University? At the Private Urban Hospital? At the Community Hospital? WHAT is a General Surgeon today?

OPPORTUNITIES WILL ARISE

BE READY

- My personal experience since 1986:
- GREAT open surgery training at IMMC that prepared me for literally anything.
- The advent of new disruptive technology for laparoscopic surgery in 1990 at the start of my career created an open vista of possibilities.
- A new field opened up – Bariatric Surgery – in 2000. We were ready and expanded to include it.
- 2010 Recognition that another disruptive technology - robotic surgery - had advanced to the point of broad application in General Surgery and had to be reckoned with.
- BE READY! Something important will change the way you utilize your skills in the future.

WHAT YOU NEED TO KNOW TODAY…

- **How and when to operate using an open approach, a laparoscopic approach, a robotic approach, and (perhaps) an endoscopic approach.** Unless you have chosen to confine your practice to a narrow niche you will need to be capable of all of these approaches to do the best surgery all the time as a General Surgeon. That means full facility with the instruments for each approach.

WHY ROBOTICS, AND WHY NOW?

- The FDA approved the DaVinci system 18 years ago; the first robotic case in the world was done 33 years ago (PUMA, AESOP, others). Robotics has been under development for a LONG TIME. And now…
- Visibility is superior. 3D
- Communication is superior. Microphones, multiple screens, verbal feedback from the instrument itself, monitor feedback on instruments.
- Instrumentation is vastly superior. Wristed.
- Its EASIER.
- The surgeon is in control of every instrument and the camera.
- The learning curve is short.
- Special added technologies keep coming – new instruments, new types of light, injectables that make tissue margins clear, haptic feedback, etc.
- It allows the surgeon to do cases that cannot be done with regular laparoscopy. This is a big deal for sick patients.
- It is as safe and efficient as regular laparoscopy for regular cases.
- Its better for the surgeon's neck and back.

GENERAL SURGERIES SUITED FOR ROBOTICS

- Ventral hernia, inguinal hernia, Spigelian hernia, hiatal hernia, diaphragm hernia, etc.
- Low anterior resection, total proctectomy, colon resection
- Adrenalectomy
- Splenectomy
- Partial liver resections
- Whipple, distal pancreatectomy
- Nissen fundoplication, Toupet fundoplication, Collis gastroplasty
- Heller Myotomy, esophageal diverticulectomy, esophagectomy
- Sleeve gastrectomy, gastric bypass, Bariatric revision, all other gastric procedures
- Cholecystectomy, common bile duct exploration, choledochoduodenostomy, other biliary bypass procedures
- Small bowel resections, adhesiolysis
- ***Complex revisions of previous surgeries***
- Other: GYN, Urology, Thoracic, Cardiac, Neuro…

UNKNOWN ROLE FOR ROBOTICS

- Trauma
- C-Section (just kidding, though I've been threatening…)

ADVICE

- Train everyone on the General Surgery Team on the set-up and operation of the robotic instrument.
- Plan to do every case on the robot if possible, easy ones first.
- Have a robotic block time for surgery.
- Discuss a plan with anesthesia and staff to reduce room turnover times. It should take 15 minutes to turn the room.
- Use an assistant such as a P.A. on complex cases.
- Maintain a data base of all cases. Enroll in NSQIP through the American College of Surgeons and document outcomes of all major operations, robotic or otherwise.
- Case Review Conference is mandatory and should be paired up with NSQIP so that morbidities are monitored in real time and trends are identified early.

MBSAQIP

30-Day Morbidity and Mortality Report

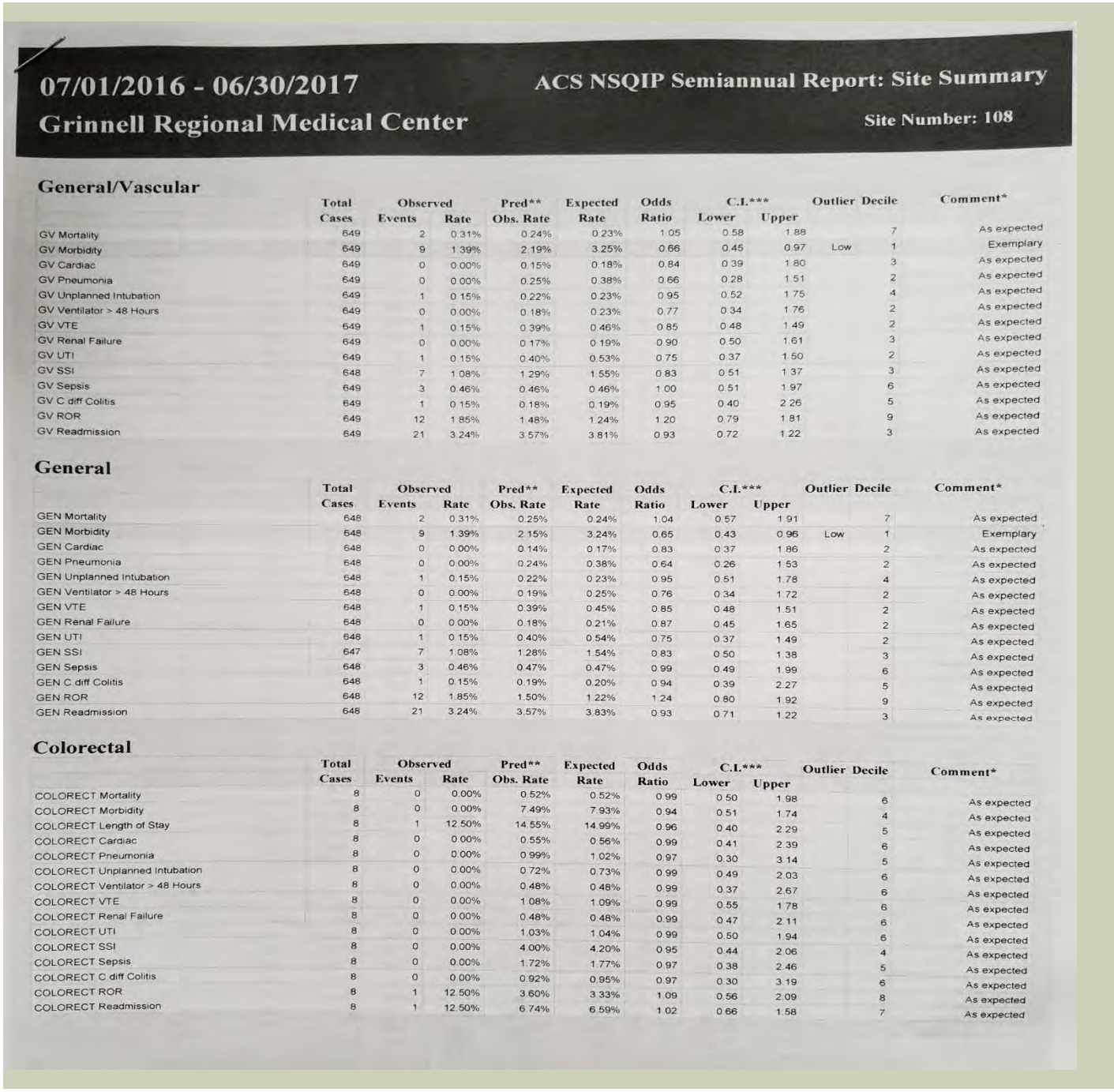
Reports case counts and percentages of morbidities and mortalities. Displays surgeon specific, site specific, and comparison data by procedure type.

Start Date: 01/01/2017
End Date: 11/30/2017
Physician ID: Coster David (1) 1780655191:Kuiper Nicholas (12) 1972517852:Severidt Mathew (16) 1215191523
CPT® Group: All Operations
Total # of Cases: Site = 270 / Comparison = 176,635

	ALL OPERATIONS	
	Site	Comparison
Total Number of Cases [1]	270	176,634
Mortality		
Mortalities	0 0%	178 0.1%
Morbidity		
Cases with one or more occurrences	13 4.8%	5517 3.1%
GENERAL POSTOPERATIVE OCCURRENCES		
Cases With Wound Occurrences		
Superficial Incisional SSI	1 0.4%	950 0.5%
Deep Incisional SSI	0 0%	183 0.1%
Organ/Space SSI	1 0.4%	539 0.3%
Wound Disruption	0 0%	138 0.1%
Cases With Respiratory Occurrences		
Pneumonia	0 0%	425 0.2%
Intraoperative OR Postoperative Unplanned Intubation	0 0%	252 0.1%
Pulmonary Embolism	0 0%	208 0.1%
On Ventilator > 48 hours	0 0%	159 0.1%
Cases With Urinary Tract Occurrences		
Progressive Renal Insufficiency	0 0%	108 0.1%
Acute Renal Failure	0 0%	119 0.1%

BARIATRIC SCORECARD FROM MBSAQIP

An advantage of NSQIP is that it can be applied to specific operations and specific surgeons to hone in on complication rates and areas for improvement. This data is specific to bariatrics.



07/01/2016 - 06/30/2017

ACS NSQIP Semiannual Report: Site Summary

Grinnell Regional Medical Center

Site Number: 108

General/Vascular

	Total Cases	Observed Events	Observed Rate	Pred** Obs. Rate	Expected Rate	Odds Ratio	C.I.*** Lower	C.I.*** Upper	Outlier	Decile	Comment*
GV Mortality	649	2	0.31%	0.24%	0.23%	1.05	0.58	1.88		7	As expected
GV Morbidity	649	9	1.39%	2.19%	3.25%	0.66	0.45	0.97	Low	1	Exemplary
GV Cardiac	649	0	0.00%	0.15%	0.18%	0.84	0.39	1.80		3	As expected
GV Pneumonia	649	0	0.00%	0.25%	0.38%	0.66	0.28	1.51		2	As expected
GV Unplanned Intubation	649	1	0.15%	0.22%	0.23%	0.95	0.52	1.75		4	As expected
GV Ventilator > 48 Hours	649	0	0.00%	0.18%	0.23%	0.77	0.34	1.76		2	As expected
GV VTE	649	1	0.15%	0.39%	0.46%	0.85	0.48	1.49		2	As expected
GV Renal Failure	649	0	0.00%	0.17%	0.19%	0.90	0.50	1.61		3	As expected
GV UTI	649	1	0.15%	0.40%	0.53%	0.75	0.37	1.50		2	As expected
GV SSI	648	7	1.08%	1.29%	1.55%	0.83	0.51	1.37		3	As expected
GV Sepsis	649	3	0.46%	0.46%	0.46%	1.00	0.51	1.97		6	As expected
GV C diff Colitis	649	1	0.15%	0.18%	0.19%	0.95	0.40	2.26		5	As expected
GV ROR	649	12	1.85%	1.48%	1.24%	1.20	0.79	1.81		9	As expected
GV Readmission	649	21	3.24%	3.57%	3.81%	0.93	0.72	1.22		3	As expected

General

	Total Cases	Observed Events	Observed Rate	Pred** Obs. Rate	Expected Rate	Odds Ratio	C.I.*** Lower	C.I.*** Upper	Outlier	Decile	Comment*
GEN Mortality	648	2	0.31%	0.25%	0.24%	1.04	0.57	1.91		7	As expected
GEN Morbidity	648	9	1.39%	2.15%	3.24%	0.65	0.43	0.96	Low	1	Exemplary
GEN Cardiac	648	0	0.00%	0.14%	0.17%	0.83	0.37	1.86		2	As expected
GEN Pneumonia	648	0	0.00%	0.24%	0.38%	0.64	0.26	1.53		2	As expected
GEN Unplanned Intubation	648	1	0.15%	0.22%	0.23%	0.95	0.51	1.78		4	As expected
GEN Ventilator > 48 Hours	648	0	0.00%	0.19%	0.25%	0.76	0.34	1.72		2	As expected
GEN VTE	648	1	0.15%	0.39%	0.45%	0.85	0.48	1.51		2	As expected
GEN Renal Failure	648	0	0.00%	0.18%	0.21%	0.87	0.45	1.65		2	As expected
GEN UTI	648	1	0.15%	0.40%	0.54%	0.75	0.37	1.49		2	As expected
GEN SSI	647	7	1.08%	1.28%	1.54%	0.83	0.50	1.38		3	As expected
GEN Sepsis	648	3	0.46%	0.47%	0.47%	0.99	0.49	1.99		6	As expected
GEN C diff Colitis	648	1	0.15%	0.19%	0.20%	0.94	0.39	2.27		5	As expected
GEN ROR	648	12	1.85%	1.50%	1.22%	1.24	0.80	1.92		9	As expected
GEN Readmission	648	21	3.24%	3.57%	3.83%	0.93	0.71	1.22		3	As expected

Colorectal

	Total Cases	Observed Events	Observed Rate	Pred** Obs. Rate	Expected Rate	Odds Ratio	C.I.*** Lower	C.I.*** Upper	Outlier	Decile	Comment*
COLORECT Mortality	8	0	0.00%	0.52%	0.52%	0.99	0.50	1.98		6	As expected
COLORECT Morbidity	8	0	0.00%	7.49%	7.93%	0.94	0.51	1.74		4	As expected
COLORECT Length of Stay	8	1	12.50%	14.55%	14.99%	0.96	0.40	2.29		5	As expected
COLORECT Cardiac	8	0	0.00%	0.55%	0.56%	0.99	0.41	2.39		6	As expected
COLORECT Pneumonia	8	0	0.00%	0.99%	1.02%	0.97	0.30	3.14		5	As expected
COLORECT Unplanned Intubation	8	0	0.00%	0.72%	0.73%	0.99	0.49	2.03		6	As expected
COLORECT Ventilator > 48 Hours	8	0	0.00%	0.48%	0.48%	0.99	0.37	2.67		6	As expected
COLORECT VTE	8	0	0.00%	1.08%	1.09%	0.99	0.55	1.78		6	As expected
COLORECT Renal Failure	8	0	0.00%	0.48%	0.48%	0.99	0.47	2.11		6	As expected
COLORECT UTI	8	0	0.00%	1.03%	1.04%	0.99	0.50	1.94		6	As expected
COLORECT SSI	8	0	0.00%	4.00%	4.20%	0.95	0.44	2.06		4	As expected
COLORECT Sepsis	8	0	0.00%	1.72%	1.77%	0.97	0.38	2.46		5	As expected
COLORECT C diff Colitis	8	0	0.00%	0.92%	0.95%	0.97	0.30	3.19		6	As expected
COLORECT ROR	8	1	12.50%	3.60%	3.33%	1.09	0.56	2.09		8	As expected
COLORECT Readmission	8	1	12.50%	6.74%	6.59%	1.02	0.66	1.58		7	As expected

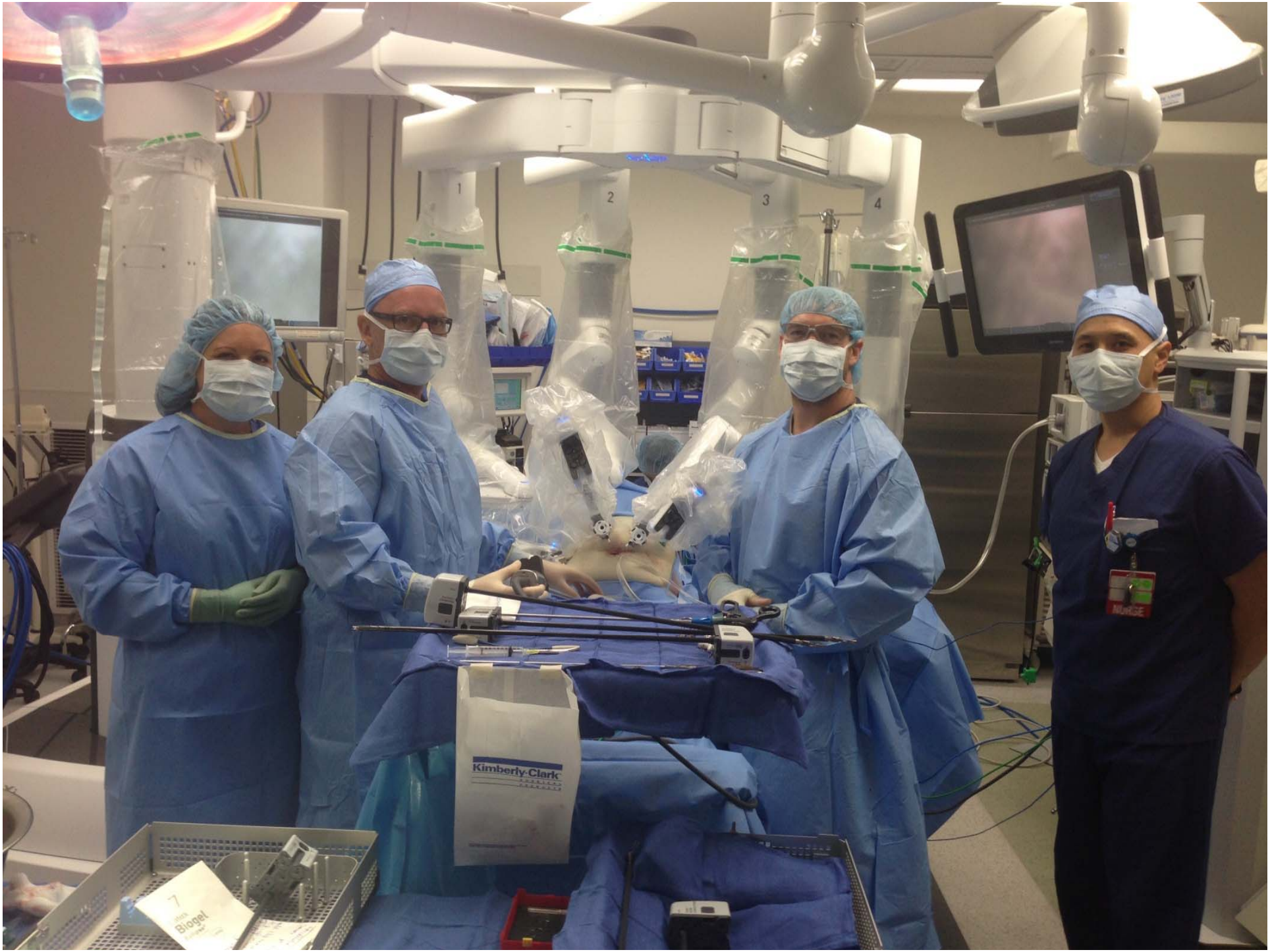
NSQIP IN ACTION

An annual report card from NSQIP – a SAR – comparing your surgical outcomes to other hospitals and surgeons across the nation.

ROBOTIC SURGERY OUTCOMES (OVER 700 CASES)

- NSQIP allows a data collector to compile 29 potential surgical complications as well as track readmissions, length of stay, operative time for surgery, postop follow-up appointments, and more. ***New data fields can be added.***

- My 2015-17 Most Common Procedures:
- Bariatric (All) 263 cases, 6 infections, 3 transfusions
- Anti-reflux Surgery (All) 95 cases, 0 complications
- Gall Bladder (All) 71 cases, 3 transfusions.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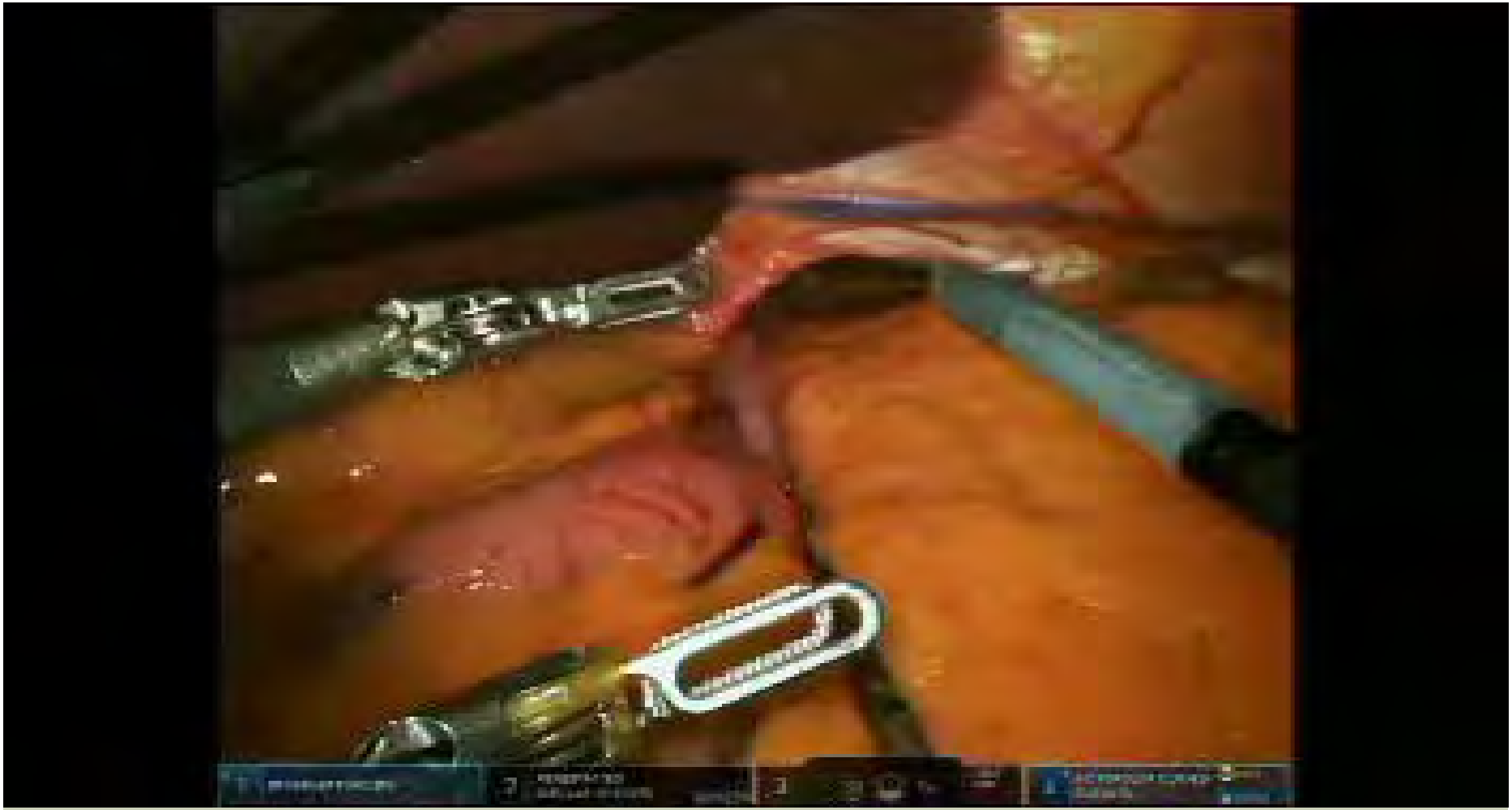
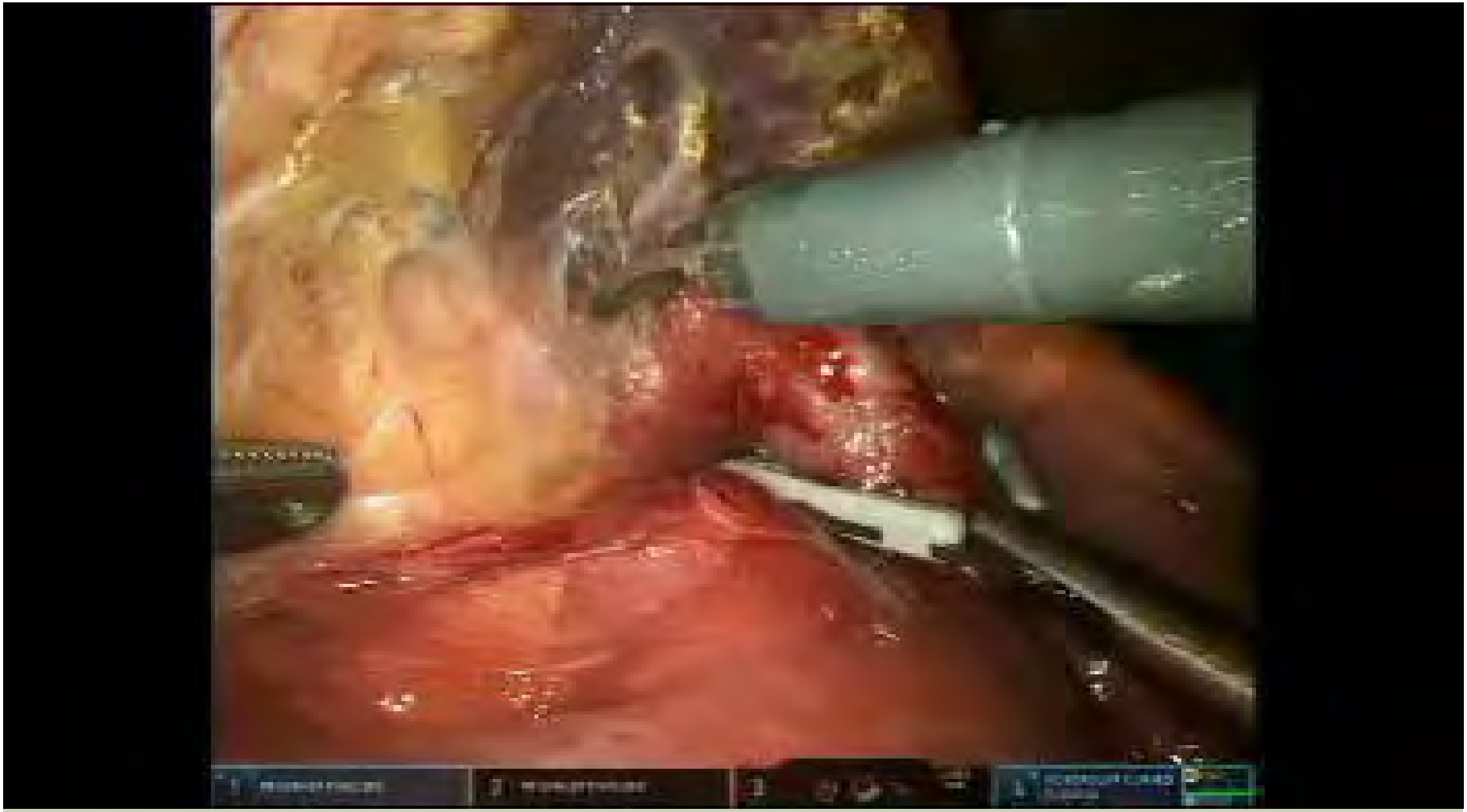
Kimberly-Clark
Biogel

SIMPLE NISSEN FUNDOLPLICATION VIDEO

COLLIS GASTROPLASTY AND GIANT PARAESOPHAGEAL HERNIA REPAIR



REVISION GASTRIC BYPASS WITH LEFT ADRENALECTOMY AND HIATAL HERNIA



SUMMARY

- Robotics is the third wave of big developments in General Surgery in the past thirty years.
- Robotics is the new frontier now but is rapidly becoming the ideal approach for many types of General Surgical procedures. Within five years it will be the first line for almost everything.
- The more complicated the case, the higher the advantage for the robotic approach.
- Expect further advancements in robotic technology and associated technologies that will allow for ever more precision in the performance of surgery. This will be particularly important in the field of Surgical Oncology and ANY area of General Surgery that requires finesse and detailed work.
- Questions of how best to train the modern day surgeon in open, laparoscopic, and robotic technologies will gradually be resolved.

GREETINGS TO THE TSS FROM: SETH COSTER, KEVIN KOPELSON, DIANA ZENG COSTER, JENNY WEI COSTER, SAM COSTER, SAMPADA KANADE COSTER, ADAM COSTER, AND DAVID COSTER