



# Avoiding Common, Complicated and Costly Procedures With Intraoperative Endoscopy (IOE)

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## Agenda

### I. Identifying the most Common, Complicated and Costly Procedures

- Identify why they can add almost \$30,000 per patient

### II. Using Intraoperative Endoscopy to avoid the complications and cost

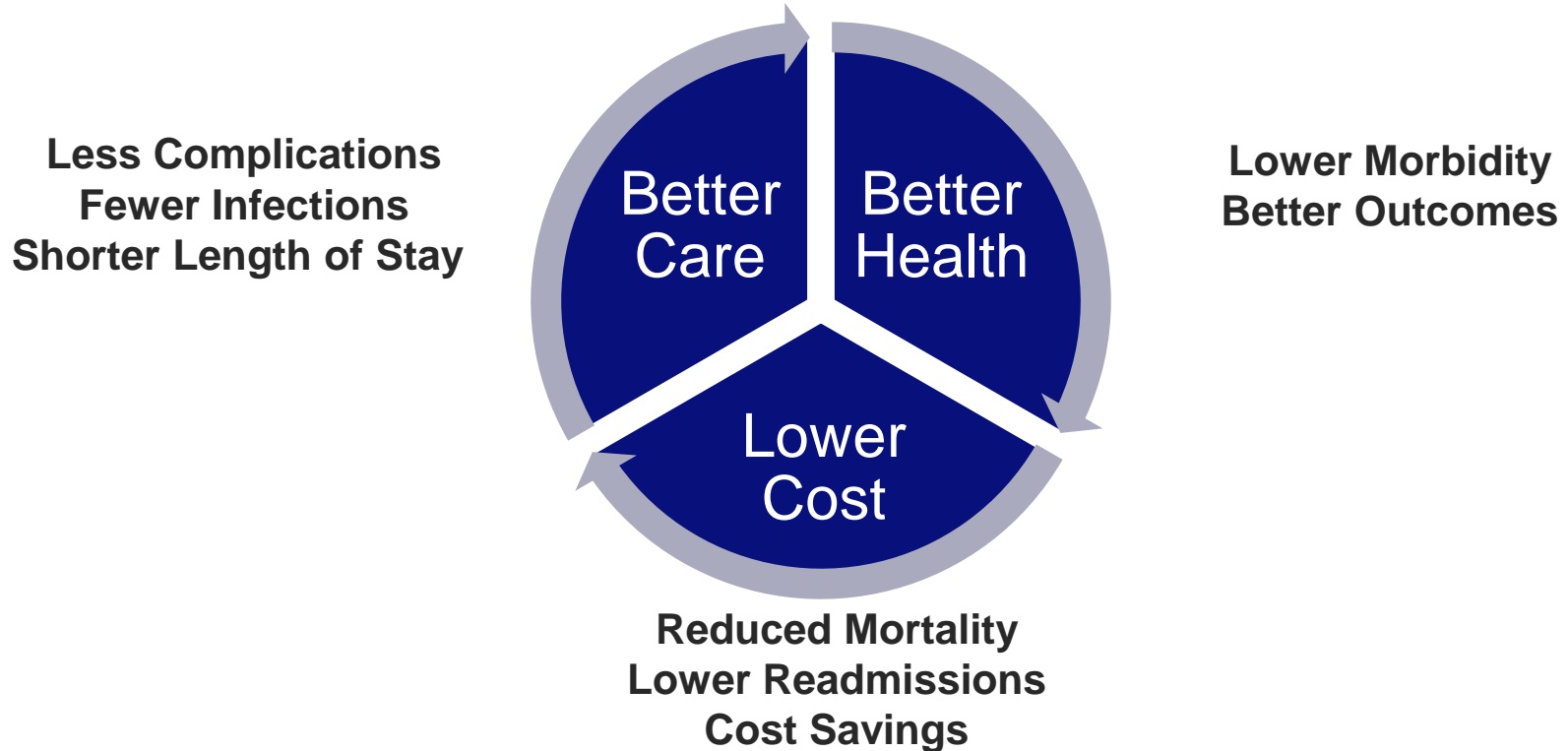
- How one change can make a big difference to your patients and facility

### III. Impact - What is it worth?

- Value Based Programs

### IV. Questions

# Optimizing Health System Performance: Triple Aim<sup>1</sup>



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**WHAT ARE THE MOST COMMON,  
COMPLICATED AND  
COSTLY PROCEDURES?**

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## Common, Complicated and Costly Procedures

- Small Bowel Resection
  - 8.1% readmission rate<sup>2</sup>
  
- Colorectal Resection
  - 14.8% readmission rate<sup>2</sup>
  - 9<sup>th</sup> most common procedure<sup>3</sup>
  
- Gastrectomy
  - 13.7% readmission rate<sup>2</sup>
  - Procedure with the highest growth rate 10.9% annually<sup>3</sup>

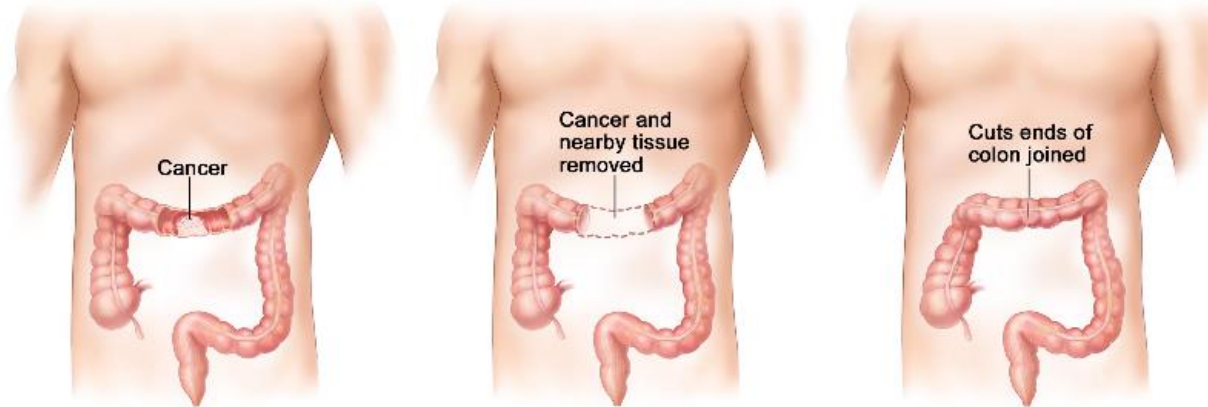
2: Audrey J. Weiss, Ph.d., Anne Elixhauser, Ph.d., And Claudia Steiner, M.d., M.p.h. *Readmissions to U.S. Hospitals by Procedure, 2010* (n.d.): n. pag. Web.  
<https://www.hcup-us.ahrq.gov/reports/statbriefs/sb154.pdf> . Accessed August 19<sup>th</sup>, 2016

3: Fingar P. et al December 2014 Most Frequent Operating Room Procedures Performed in US Hospitals , 2013 – 2012 .-<https://www.hcup-us.ahrq.gov/reports/statbriefs/sb186-Operating-Room-Procedures-United-States-2012.pdf> . Accessed August 19<sup>th</sup>, 2016

## What do these Procedures have in Common?

- All involve removal of a section and rejoining (creation of an anastomosis)
- Whether in the upper or lower GI

### Resection of the Colon with Anastomosis<sup>4</sup>



## Anastomotic leaks: The Magnitude of the Problem

- **It is a common complication:**
  - Reported leaks can range anywhere from 1.5% to 16% globally <sup>5</sup>
  
- **It is often unpredictable:**
  - Between two given surgeons, anastomotic breakdown rates can vary by as much as a factor of 60<sup>6</sup>
  
- **It can happen in any Operating Room:**
  - The vast majority of GI leaks likely occur in the absence of a technical error that could have been recognized at the time of the initial procedure <sup>7</sup>
  - All colorectal surgeons are faced from time to time with anastomotic leakage after colorectal surgery

**This complication has been studied extensively without a significant reduction of incidence over the last 30 years.<sup>8</sup>**

5: Hammond, Jeffrey, Sangtaeck Lim, Yin Wan, Xin Gao, and Anuprita Patkar. "The Burden of Gastrointestinal Anastomotic Leaks: An Evaluation of Clinical and Economic Outcomes." *Journal of Gastrointestinal Surgery*. Springer US, 2014. Web. 23 Aug. 2016.. Accessed August 19<sup>th</sup>, 2016.

6: Hyman NH, [Anastomotic leaks after bowel resection: what does peer review teach us about the relationship to postoperative mortality?](#) J Am Coll Surg. 2009 Jan;208(1):48-52. doi: 10.1016/j.jamcollsurg.2008.09.021. E pub 2008 Nov 7. PMID: 19228502 .Accessed August 19<sup>th</sup>, 2016.

7: Haddad, Ashraf, Nicholas Tapazoglou, Kuldeep Singh, and Andrew Averbach. "Role of Intraoperative Esophagogastroenteroscopy in Minimizing Gastrojejunostomy-Related Morbidity: Experience with 2,311 Laparoscopic Gastric Bypasses with Linear Stapler Anastomosis." *Obesity Surgery*. Springer-Verlag, Dec. 2012. Web. 23 Aug. 2016. Accessed August 19<sup>th</sup>, 2016.

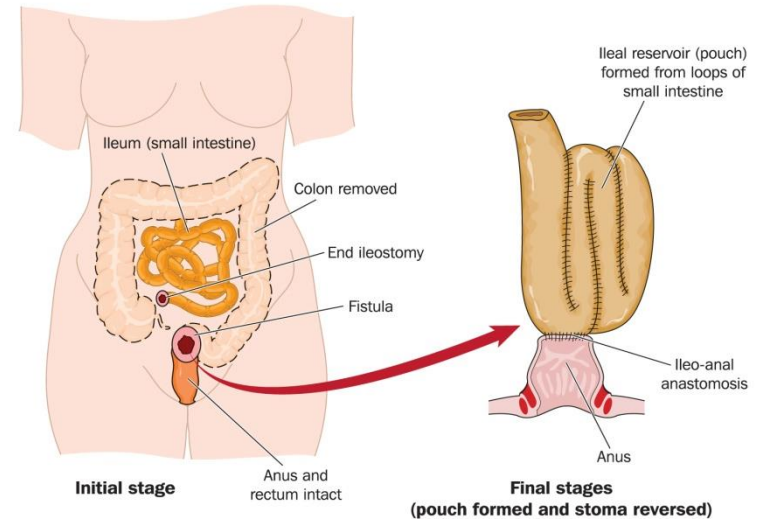
8: "World Journal of Gastroenterology - Baishideng Publishing." *World Journal of Gastroenterology*. Baishideng Publishing, 21 Apr. 2013. Web. 31 Aug. 2016.



# Burden of Anastomotic Leaks in Colorectal Surgery Procedures

## Colorectal Procedures

- **increased** total clinical and economic burden by **60-190%** for a 30-day re-admission, postoperative infection, LOS, and hospital costs<sup>9</sup>
- have devastating implications, with significantly **greater chances of wound infection and mortality rates of up to 32%**<sup>10</sup>
- lead to reoperations, radiological interventions and **permanent stoma in 56%** of patients<sup>11</sup>



9: Hammond, J., Lim, S., Wan, Y., Gao, X., & Patkar, A. (2014). The burden of gastrointestinal anastomotic leaks: an evaluation of clinical and economic outcomes. *Journal of Gastrointestinal Surgery*, 18(6), 1176-1185. Accessed August 19<sup>th</sup>, 2016.

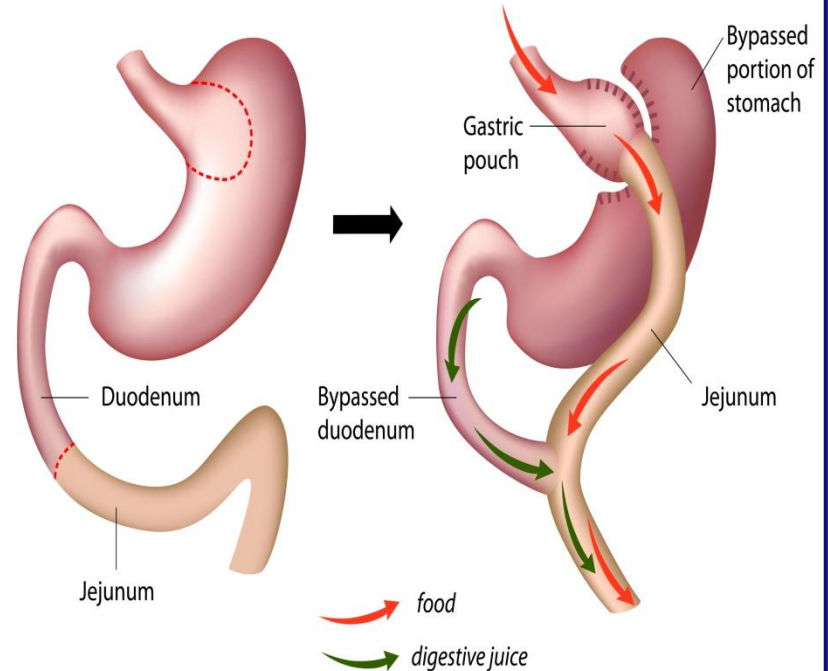
10: Choi HK, Law WL, Ho JW. Leakage after resection and intraperitoneal anastomosis for colorectal malignancy: analysis of risk factors. *Dis Colon Rectum*. 2006;49:1719-1725. Accessed August 19<sup>th</sup>, 2016

11: Lindgren, R., O. Hallböök, J. Rutegård, R. Sjødahl, and P. Matthiessen. "What Is the Risk for a Permanent Stoma after Low Anterior Resection of the Rectum for Cancer? A-year-follow-up of a Multicenter Trial." National Center for Biotechnology Information. U.S. National Library of Medicine, Jan. 2011. Web. 23 Aug. 2016. Accessed August 19<sup>th</sup>, 2016

# Burden of Anastomotic Leaks in Bariatric Surgery

## Gastric Bypass Procedures (RYGB)

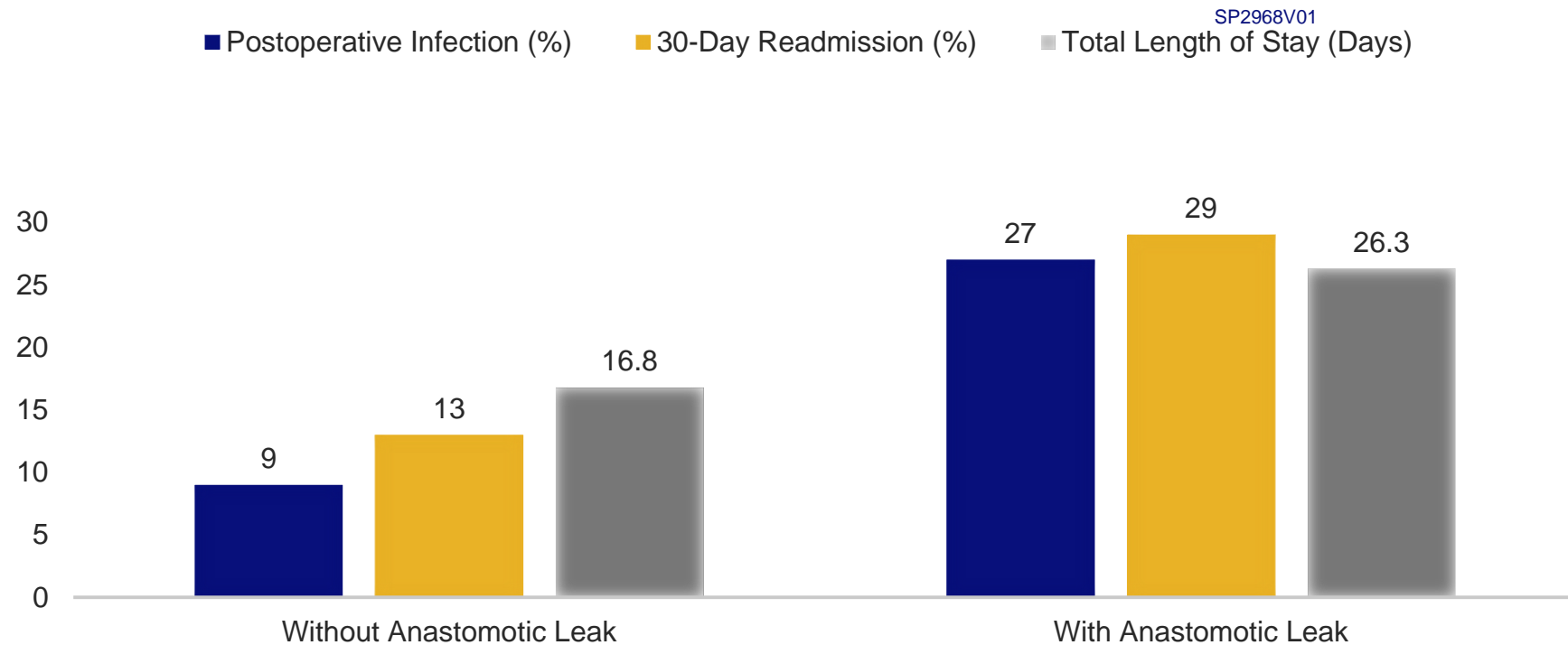
- is one of the strongest independent **risk factors for post-operative death**. Early recognition and treatment is critical.<sup>12</sup>
- is a dreaded and potentially devastating complication, **with a mortality rate of nearly 50%** if not treated quickly.<sup>12</sup>



12: Fernandez AZ Jr, DeMaria EJ, Tichansky DS, et al. Experience with over 3,000 open and laparoscopic bariatric procedures: multivariate analysis of factors related to leak and resultant mortality. Surg Endosc. 2004;18(2):193–7. Accessed August, 19 2016.

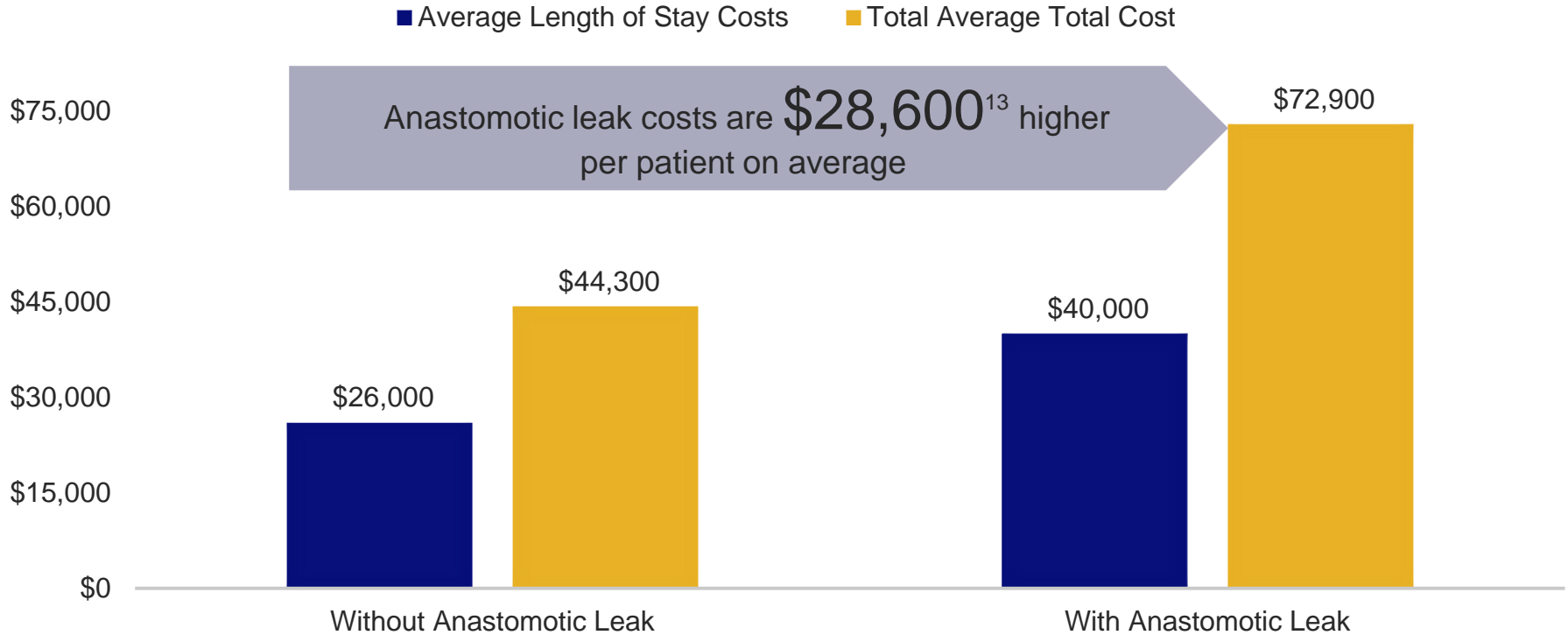
# Anastomotic Leaks: Colorectal Surgery

## Have higher infection, re-admission and length of stay<sup>13</sup>



13:Hammond, J., Lim, S., Wan, Y., Gao, X., & Patkar, A. (2014). The burden of gastrointestinal anastomotic leaks: an evaluation of clinical and economic outcomes. *Journal of Gastrointestinal Surgery*, 18(6), 1176-1185. Accessed August 1, 2016.

# Anastomotic Leaks are a cost burden to your facility <sup>13</sup>



13: Hammond, J., Lim, S., Wan, Y., Gao, X., & Patkar, A. (2014). *Journal of Gastrointestinal Surgery*, 18(6), 1176-1185. Accessed August 1, 2016.

## In Summary, Anastomotic leaks have devastating implications<sup>13</sup>

- Length of Stay & Cost
  - Doubles length of hospital stay<sup>15</sup> and **increases cost by \$28,600 per patient** on average<sup>13</sup>
- Infection & Mortality
  - Significantly greater chances of wound infection and **increased mortality rates of up to 32%**<sup>14</sup>
- Added Cost of Death
  - Hospital costs for patients who **die are approximately 2.7 times higher than for survivors** <sup>16</sup>

13: Hammond, J., Lim, S., Wan, Y., Gao, X., & Patkar, A. (2014). *Journal of Gastrointestinal Surgery*, 18(6), 1176-1185. Accessed August 1, 2016.

14: Choi HK, Law WL, Ho JW. Leakage after resection and intraperitoneal anastomosis for colorectal malignancy: analysis of risk factors. *Dis Colon Rectum*. 2006;49:1719-1725. Accessed August 19<sup>th</sup>, 2016

15: Britton, Julian, 5 Gastrointestinal tract and abdomen, 29 Intestinal anastomosis, ACS Surgery, Dale DC; Federman DD, Eds, New York 2000. Accessed August 19<sup>th</sup>, 2016 .

16: Zhao Y, Encinosa W. The Costs of End-of-Life Hospitalizations, 2007: Statistical Brief #81. [www.hcup-us.ahrq.gov](http://www.hcup-us.ahrq.gov) . Accessed August 19<sup>th</sup>. 2016.

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# **AVOIDING THE COMPLICATIONS AND COST**

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## Can Anastomotic Leak Rates be Reduced?

Good outcomes depend on successful healing of the anastomosis:

- Many leaks are diagnosed late in the postoperative period
  - Commonly after discharge from the hospital.<sup>17</sup>
- Increased awareness of these more subtle leaks may allow for more timely diagnosis and treatment<sup>17</sup>
- Early detection can lead to reduction in delay of diagnosis as long as a standard system is used<sup>18</sup>



17: Hyman, Neil et al. "Anastomotic Leaks After Intestinal Anastomosis: It's Later Than You Think." *Annals of Surgery* 245.2 (2007): 254–258. *PMC*. Web. 10 Aug. 2016. Accessed August 19<sup>th</sup>, 2016 .

18: Daams F, Luyer M, Lange JF. Colorectal anastomotic leakage: Aspects of prevention, detection and treatment. *World Journal of Gastroenterology : WJG*. 2013;19(15):2293-2297. Ramanathan R, Ikramuddin D, Gourash W, et al. The value of intraoperative endoscopy during laparoscopic Roux-en-Y gastric bypass for morbid obesity. *Surg Endosc*. 2000;14:212. Accessed August 19<sup>th</sup>, 2016 .

## How to Promote Good Outcomes - Visualization is Key!

### 1. At the time of performing an anastomosis:

- by adequate mobilization of the bowel
- by joining ends of the bowel only if they appear pink and healthy
- by ensuring two ends of the bowel are tension-free and properly aligned without any twist

### 2. Once the anastomosis is complete:

- Several methods suggested to evaluate the integrity of the anastomosis intraoperatively including methylene blue testing, pneumatic insufflation, and endoscopic evaluation
- A close endoscopic visual inspection of entire circumference of anastomosis should be performed and as a rule, if divided ends appear well apposed, then anastomosis is probably sound.

**Intraoperative Endoscopy (IOE) can play a fundamental role in Visualization.**



## The need for Intraoperative Endoscopy (IOE)

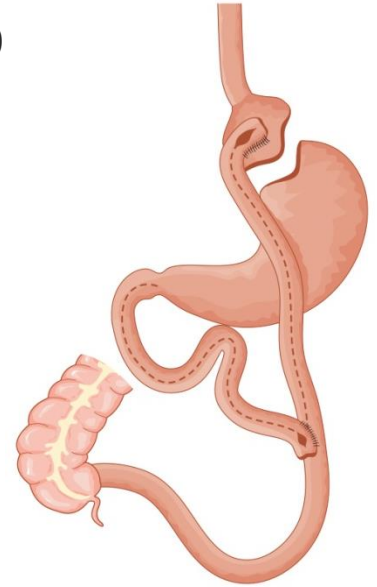
- Intraoperative Endoscopy (IOE) enables intraluminal (internal) visualization
  - To evaluate the patency and integrity of the anastomosis internally
- Laparoscopic Visualization of the anastomosis may be inadequate alone
  - The external surface of the bowel may not be representative of what is happening internally in the mucosa and submucosa
- This can result in detection and treatment of anastomotic leaks immediately
  - While still in the operating room
  - Before they become complications

## Results of Intraoperative Endoscopy (IOE)

- One study using intraoperative endoscopy reported a 0% leak rate in 290 patients<sup>19,20</sup>
- Medical records of 2,311 patients who underwent a LRYGB from 2002-2011<sup>21</sup>

### Routine IOE Use :

- Allowed the **reduction of potential leak rate by 91.8%** compared no testing<sup>21</sup>
- **Added 5–10 min average** to procedure time with low associated morbidity<sup>21</sup>
- Reduced anastomosis related **morbidity from the expected 3.2% to 1.3%**<sup>21</sup>

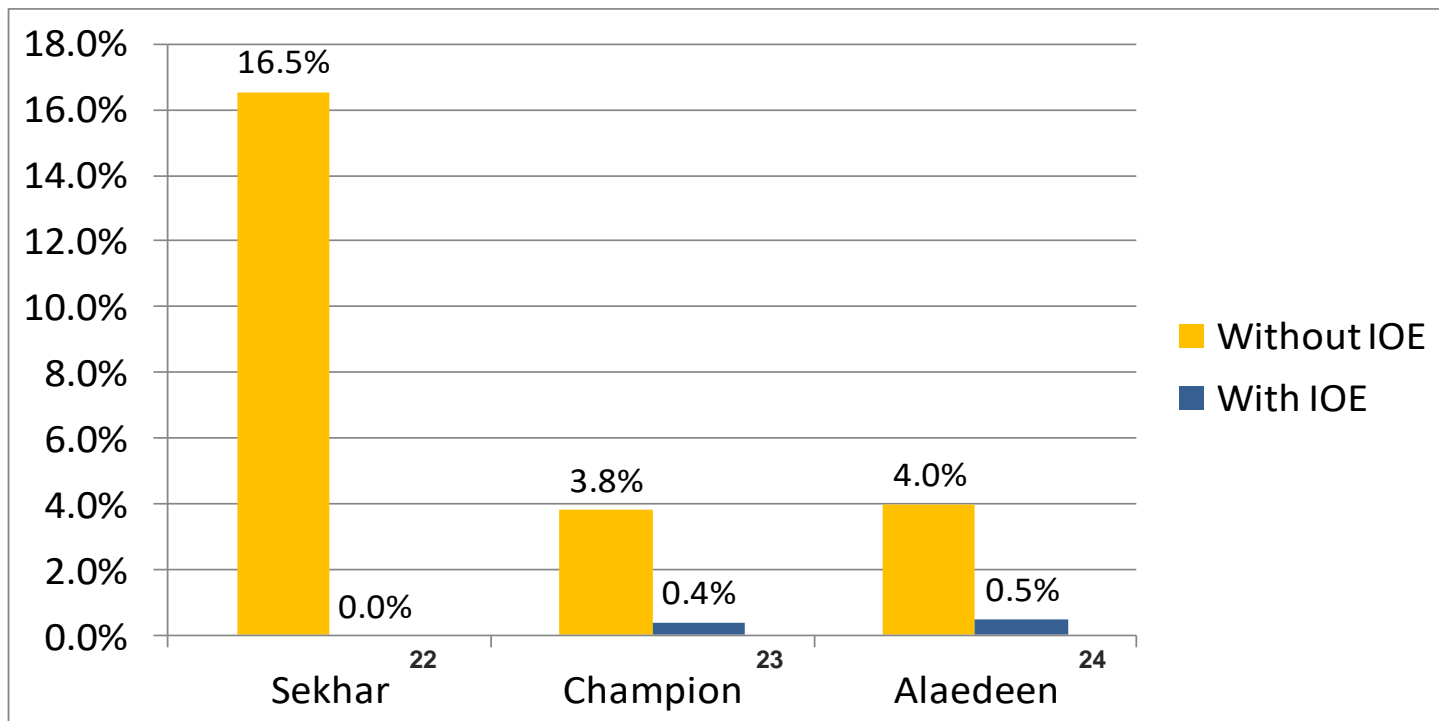


19: Surg Endosc 14:212 Alasfar F, Chand B (2010) Intraoperative endoscopy for laparoscopic Roux-en-Y gastric bypass: leak test and beyond. Surg Laparosc Endosc Percutan Tech 20:424–427 Accessed August 19<sup>th</sup>, 2016.

20: Sekhar N, Tourquati A, Lutfi R et al (2006) Endoscopic evaluation of the gastrojejunostomy in laparoscopic gastric bypass. Surg Endosc 20:199–201 Accessed August 19<sup>th</sup>, 2016.

21: Haddad A, Tapazoglou N, Singh K, Averbach A. Role of Intraoperative Esophagogastroenteroscopy in Minimizing Gastrojejunostomy-Related Morbidity: Experience with 2,311 Laparoscopic Gastric Bypasses with Linear Stapler Anastomosis. *Obesity Surgery*. 2012;22(12):1928-1933. doi:10.1007/s11695-012-0757-2..Accessed August 19<sup>th</sup>, 2016.

## Multiple Studies show a decrease in Anastomotic Leaks with IOE use



22: Sekhar N, Tourquati A, Lutfi R et al (2006) Endoscopic evaluation of the gastrojejunostomy in laparoscopic gastric bypass. Surg Endosc 20:199–201 Accessed August 19<sup>th</sup>, 2016.

23:Champion JK, Hunt T, Delisle N (2002) Role of routine intraoperative endoscopy in laparoscopic bariatric surgery. Surg Endosc 16:1663–1665

24: Alaedeen D, Madan AK, Ro CY et al (2009) Intraoperative endoscopy and leaks after laparoscopic Roux-en-Y gastric bypass. Am Surg 75(6):485–488

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# THE VALUE

What is the worth to your facility, patients, and reputation?

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## Anastomotic Leaks measured in Physician Quality Reporting System (PQRS)

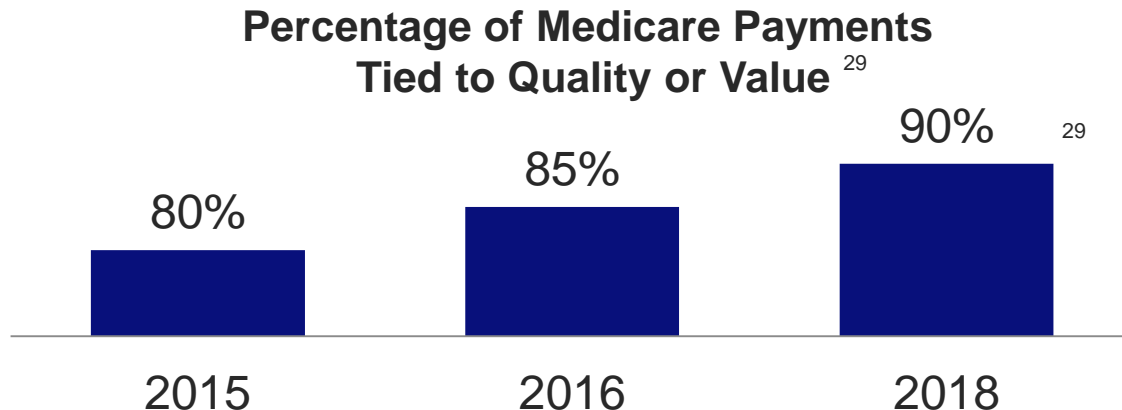
- Physician Quality reporting required by Medicare:
  - PQRS requires reporting on 9 or more measures covering at least 3 National Quality Strategy domains <sup>27</sup>
  
- Reporting these PQRS measures relating to Anastomotic Leaks can help you meet the criteria

PQRS #	2016 Measures
354	Anastomotic Leak Intervention (Gastric Bypass or Colectomy) <sup>28</sup>
355	Unplanned Reoperation within the 30 Day Postoperative Period <sup>28</sup>
356	Unplanned Hospital Readmission within the 30 Days of Principal Procedure <sup>28</sup>

27: "2016 Physician Quality Reporting System (PQRS): Implementation Guide". Centers for Medicare & Medicaid Services 2/18/2016; Revised 3/11/2016. Accessed August, 19<sup>th</sup>, 2016.

28: "Hospital-Acquired Condition Reduction Program." Medicare.gov: The Official U.S. Government Site for Medicare. N.p., n.d. Web. 23 Aug. 2016. Accessed August 19<sup>th</sup>, 2016.

## Avoiding Penalties and Associated Costs with Leaks



Numerous initiatives show **that taking steps to reduce one type of infection** or lower readmissions for patients with a particular condition seems to give facilities the **most bang for their buck** as they begin navigating through the world of value-based reimbursement.<sup>30</sup>

29: "Medicare-seeks-to-expand-alternative-payment-programs." *SAGE Business Researcher* (n.d.): n. pag. Web. : Accessed August 19<sup>th</sup>, 2016.

30: "Value-based Payments: Are Hospitals on Track to Meet Goals?" N.p., 13 June 2016. Web. 23 Aug. 2016..

## Intraoperative Endoscopy

*“Intraoperative endoscopy adds value in the operating room and holds the promise of improved surgical outcomes by providing useful clinical information important to point-of-service decision making that allows surgeons to address technical concerns before they manifest as post-operative complications.”* <sup>31</sup>

R.D. Fanelli; *Techniques in Gastrointestinal Endoscopy*; 15(2013)184–190

## Summary

- Small Bowel Resection, Colorectal Resection, and Gastrectomy make up common, complicated, and costly procedures
- Reported leaks can range anywhere from 1.5% to 16% globally <sup>5</sup>
- Important to perform intestinal anastomoses safely and effectively
- Surgical technique is still one of the significant determinants of outcome after procedures that include intestinal anastomosis
- Anastomotic leak doubles length of hospital stay<sup>15</sup> and increases cost by \$28,600 per patient on average<sup>13</sup>

5: Hammond, Jeffrey, Sangtaeck Lim, Yin Wan, Xin Gao, and Anuprita Patkar. "The Burden of Gastrointestinal Anastomotic Leaks: An Evaluation of Clinical and Economic Outcomes." *Journal of Gastrointestinal Surgery*. Springer US, 2014. Web. 23 Aug. 2016.. Accessed August 19<sup>th</sup>, 2016.

15.: Britton, Julian, 5 Gastrointestinal tract and abdomen, 29 Intestinal anastomosis, ACS Surgery, Dale DC; Federman DD, Eds, New York 2000. Accessed August 19<sup>th</sup>, 2016.

13: Hammond, J., Lim, S., Wan, Y., Gao, X., & Patkar, A. (2014). The burden of gastrointestinal anastomotic leaks: an evaluation of clinical and economic outcomes. *Journal of Gastrointestinal Surgery*, 18(6), 1176-1185. Accessed August 1, 2016.



**QUESTIONS?**

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## **Back-up Slides**

## Technique for IOG During Laparoscopic Gastric Bypass

1. Upper esophageal sphincter is intubated under vision
2. Proximal pouch is inspected; endoscope is gently guided through anastomosis into Roux limb.
3. Bowel clamp is placed on the intestinal limb distal to the GJA.
4. Table is leveled and operative field containing anastomosis is filled with sterile normal saline to cover proximal pouch and anastomosis.

## Technique for IOE During Laparoscopic Gastric Bypass

1. Area is then irrigated until clear of blood and operative debris.
2. Gastroscope is then withdrawn into proximal pouch, and anastomosis reinspected with continuous insufflation.
3. Before withdrawal the air that has been introduced is aspirated completely.
4. In case of persistent air leak, endoscope is left in situ till repair of gastrojejunostomy suture line.
5. The procedure is repeated.

## Technique of IOE During Laparoscopic Colorectal Surgery

1. The colorectal anastomosis is evaluated in four quadrants proximally (61 cm from anastomotic ring) and four quadrants distally (61 cm from anastomotic ring).
2. Each quadrant is carefully examined.
3. The lumen is examined by the endoscopist and the external surface by the operating surgeon
4. To clearly visualize a quadrant and obtain an optimal image, it was important to irrigate the visualized field in order to wash away any blood,
5. Important to also be within 2 cm of the quadrant being visualized and maintain the tip of the scope at 90° to the quadrant being imaged.