



Colorectal SSI Bundle, Cleveland Clinic

Review of the evidence: wound protection, skin preparation, bowel preparation with oral antibiotics

June 9, 2013

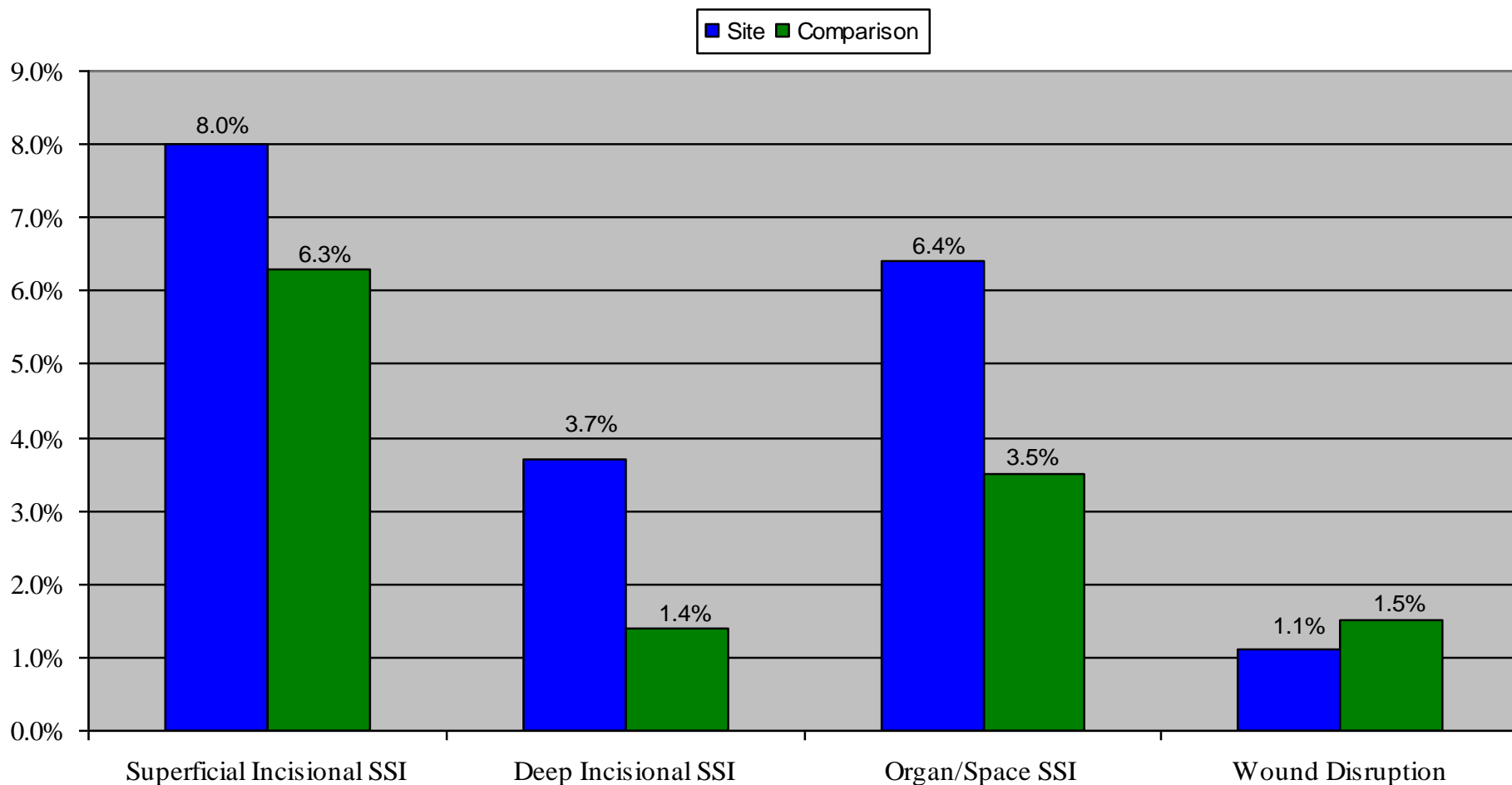
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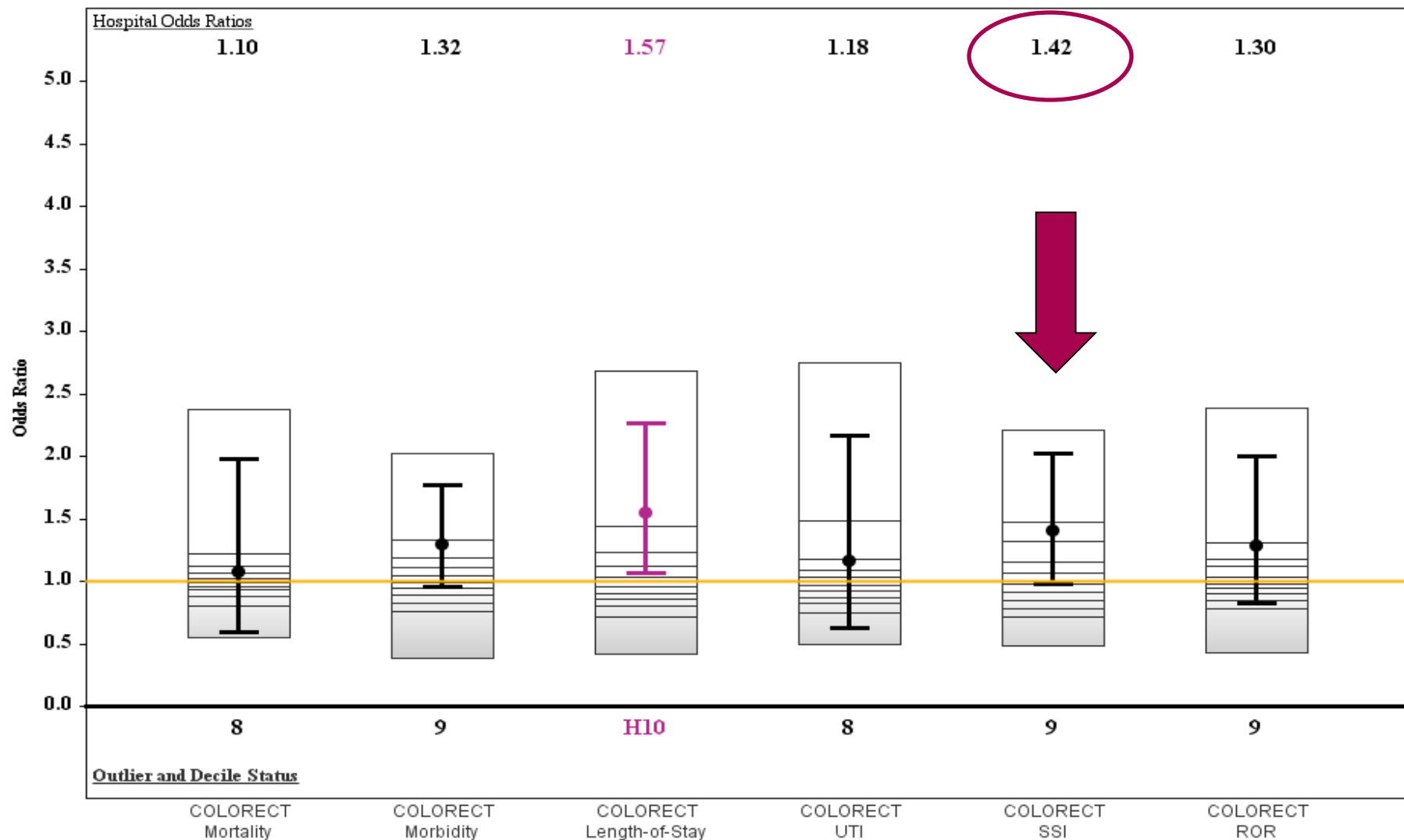
ACS-NSQIP COLORECTAL WOUND OCCURRENCES

Raw Data: July 2011 through June 2012



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NSQIP: SSI Risk Factors

- Age > 40
- Smoker
- Alcohol abuse
- Steroids
- Diabetes
- Dyspnea
- Recent radiotherapy
- Alb < 3.5 g/dl
- ↑ Total bilirubin
- ASA>2
- Emergency Surgery
- GI Surgery
- RVU>17 (all CORS)
- Wound Class >1

L Neumayer, J Am Coll Surg 2007

Protective Factors for SSI in CORS?

- Laparoscopic Surgery?
- SCIP Compliance?
- Mechanical Bowel Preparation?
- Oral Antibiotic Bowel Preparation?
- Skin Preparation?
- Wound Edge Protection?
- Blood glucose control, Warming, Culture Change?

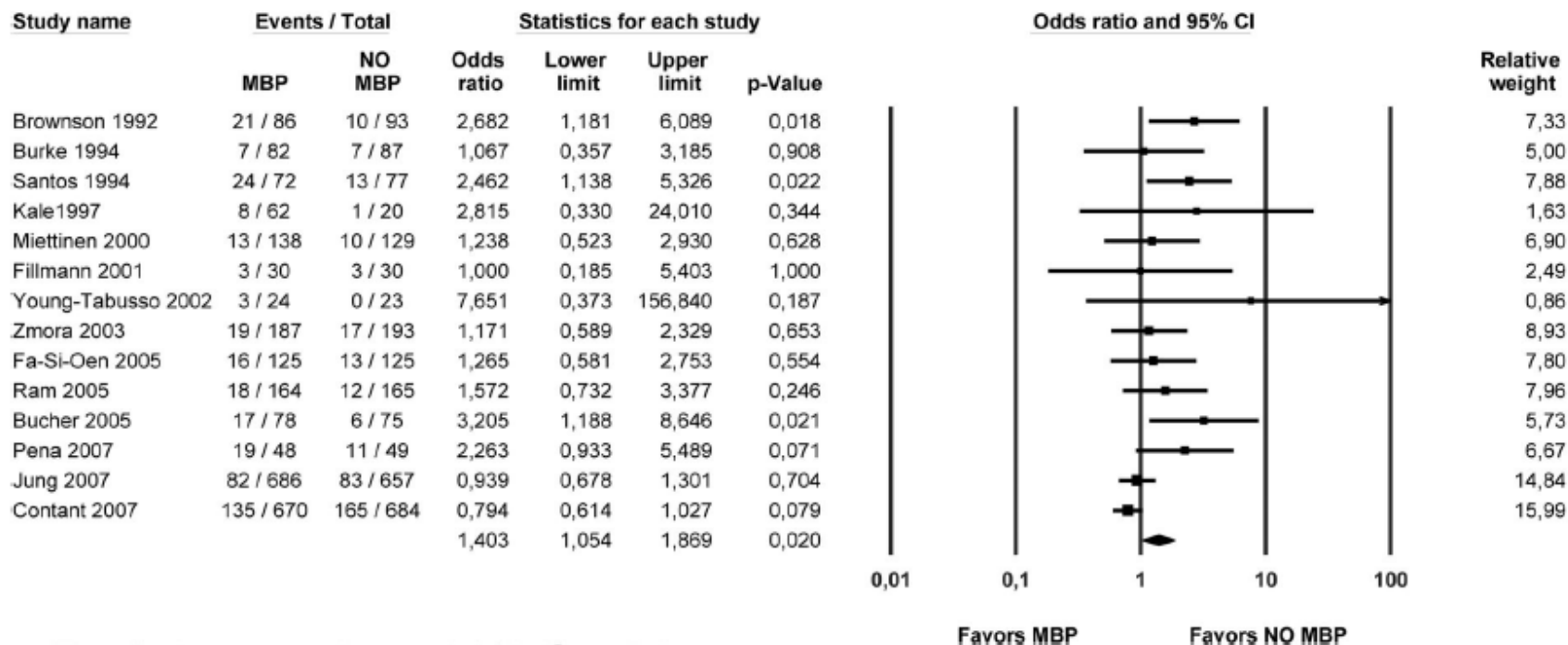
Mechanical Bowel Prep in CORS

L E A K		No MBP	MBP	P value
	LAR	7.5%	9.8%	NS
	Colon	1.6	2.9	NS
	All	3.2	6.2	P<.05
	SSI (All)	5.4	7.4	NS

Cochrane Database of Systematic Reviews, 2005
Meta-analysis, N =1592 patients, elective CORS

Mechanical Bowel Preparation in CORS

Surgical Site Infection



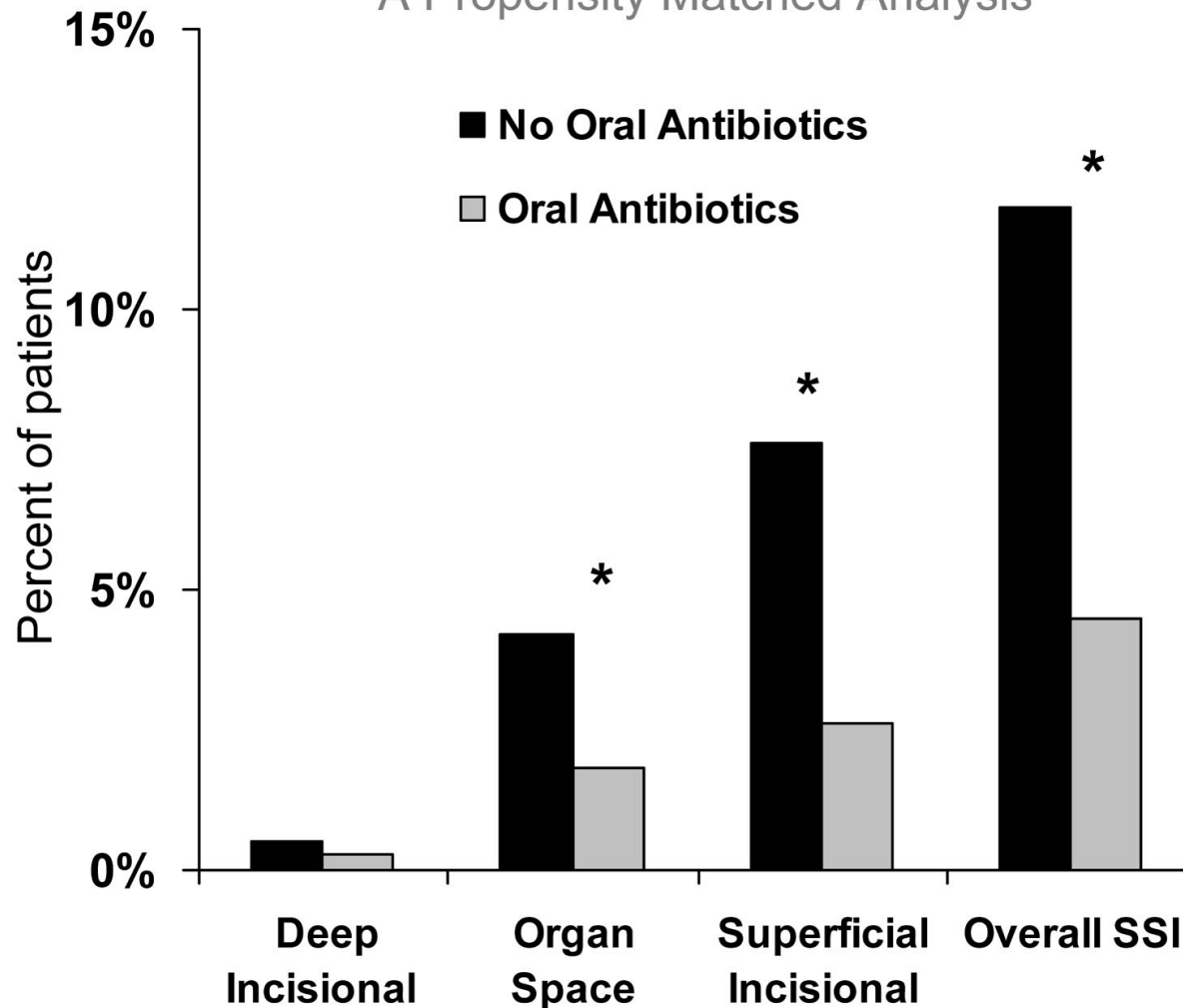
Test for heterogeneity $p = 0.016$, $I^2 = 50.4$

FIGURE 5. Meta-analysis of the 14 included trials for the outcome "all SSI" showing a significant effect in favor of no MBP.

K. Slim, Annals Surgery 2009

Oral Antibiotics with a Bowel Preparation Prior to Elective Colon Surgery

A Propensity Matched Analysis



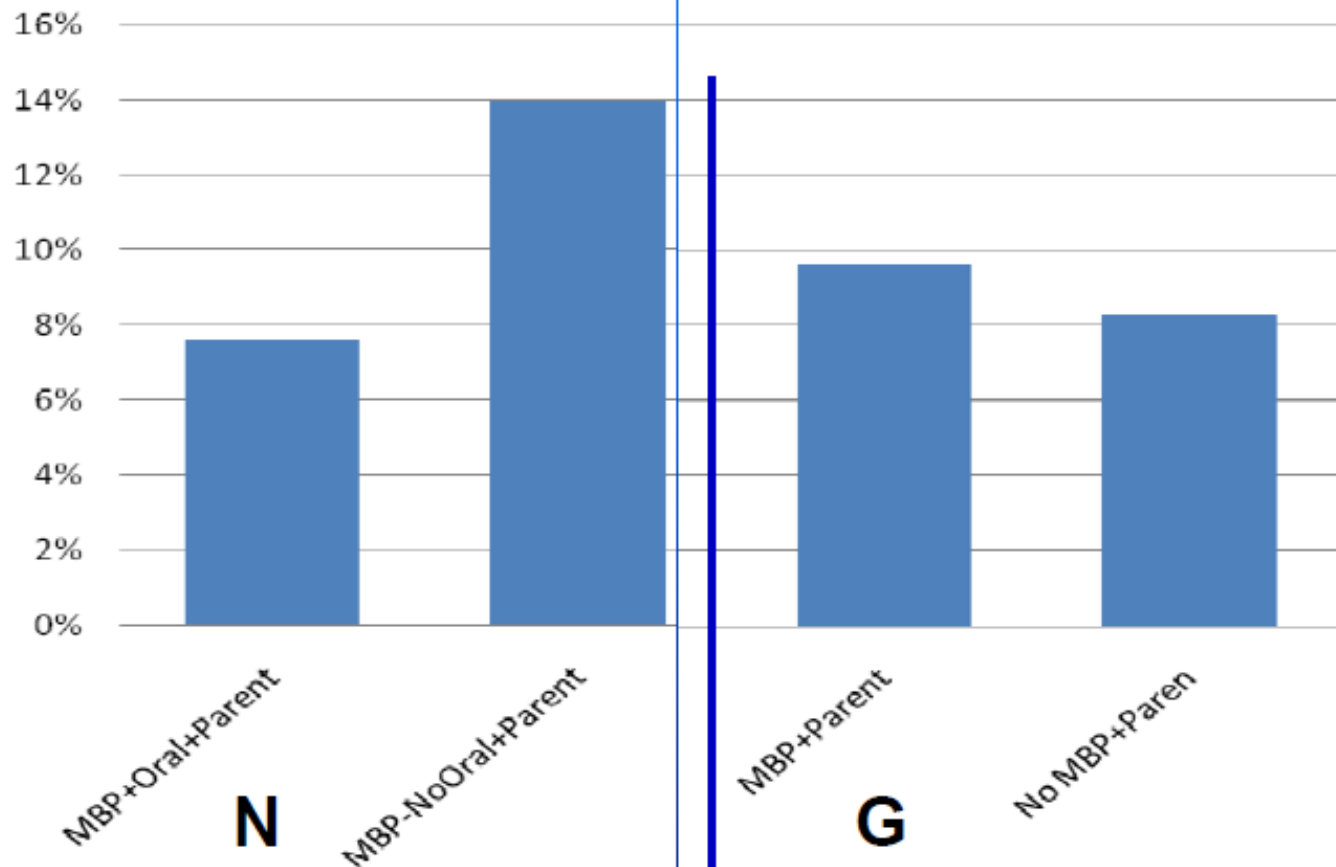
* P < 0.05

More support for oral antibiotic bowel preparation

<i>N</i> = 9940	<i>Unadjusted logistic</i>		<i>Adjusted best fit^a</i> <i>N</i> = 6070	
	<i>OR</i>	<i>CI</i>	<i>OR</i>	<i>CI</i>
No preparation	REF		REF	
Abx only	0.41	0.31–0.55	0.33	0.21–0.50
Mech only	1.13	0.99–1.30	0.99	0.80–1.22
Mech + abx	0.46	0.39–0.54	0.43	0.34–0.55
Ileocolic resection	REF		REF	
Partial colectomy	1.90	0.89–1.33	1.05	0.77–1.42
Rectal resection	1.66	1.33–2.07	1.50	1.10–2.06
Total colectomy	2.08	1.52–2.84	1.52	1.01–2.29
SCIP-1 (timely)	0.78	0.62–0.99	0.76	0.60–0.96
SCIP-2 (appropriate)	0.79	0.63–0.98		
SCIP-3 (discontinued)	1.01	0.82–1.24		
SCIP-6 (hair removal)	1.51	0.72–3.16		
SCIP-7 (normothermia)	1.05	0.91–1.23		

SSI Rate

All Trials from Cochrane Analyses



Guenaga. Cochrane Database Syst Rev,2009(1):p.C001544
Nelson. Cochrane Database Syst Rev, 2009,(1): p.CD001181

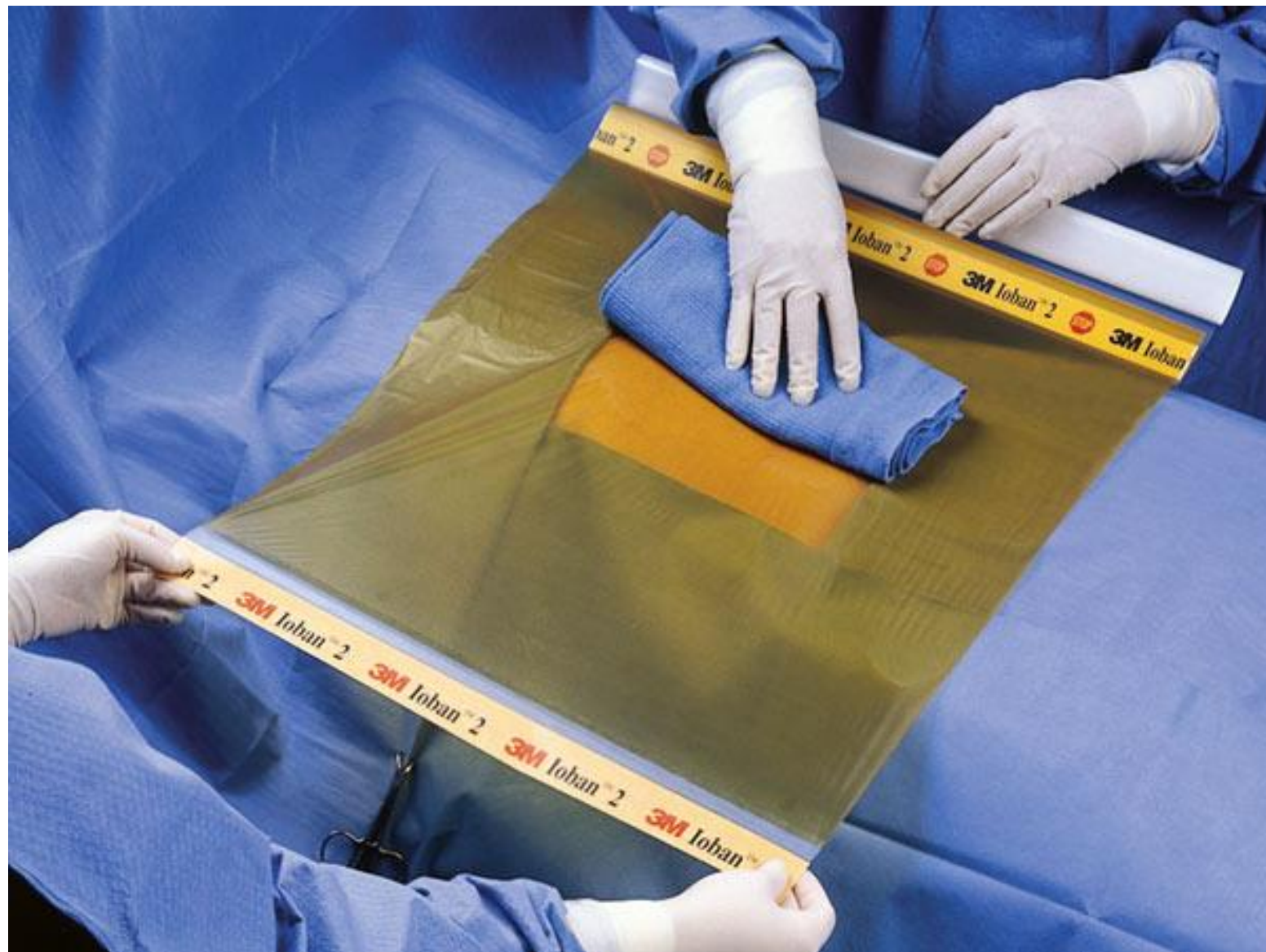
OR Skin Prep: Iodine is the winner...

TABLE 4. Surgical-Site Infections (SSIs) and Wound Classifications, by Preparation Solution Actually Received

Variable	No. of SSIs	No. of surgical procedures	Povidone-iodine (<i>n</i> = 1,514 procedures)	Chlorhexidine (<i>n</i> = 827 procedures)	Iodine povacrylex (<i>n</i> = 794 procedures)	<i>P</i> ^a
SSIs						
All ^b	178	...	72 (4.8)	68 (8.2)	38 (4.8)	.001
Superficial	120	...	49 (3.2)	45 (5.4)	26 (3.3)	.019
Deep	11	...	6 (0.4)	4 (0.5)	1 (0.1)	.49
Organ/space	49	...	18 (1.2)	19 (2.3)	12 (1.5)	.12
Wound classification						
Clean	...	1,154	6/714 (0.84)	5/224 (2.2)	3/216 (1.4)	.21
Clean-contaminated	...	1,409	44/541 (8.1)	46/454 (10.1)	27/414 (6.5)	.15
Contaminated	...	204	9/82 (11.0)	5/65 (7.7)	6/57 (10.5)	.78
Dirty	...	278	13/150 (8.7)	12/77 (15.6)	2/51 (3.9)	.076

OR Skin Prep: Chlorhexidine is the winner...

NEJM 2010 Study	Chlorhex-Alcohol	Povidone-Iodine	P-value
Any SSI	9%	16%	0.004
Superficial SSI	4	8	0.008
Deep incisional SSI	1	3	0.05
Org SSI	4	4	NS
CORS SSI	15%	22%	NA
Small Bowel SSI	10%	29%	0.004

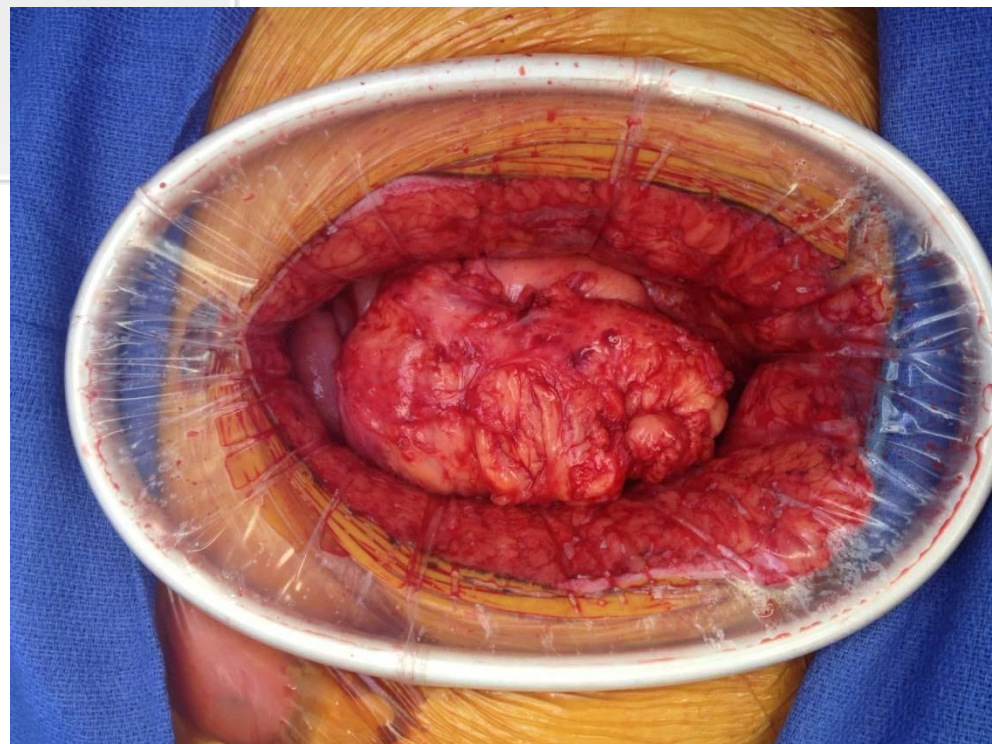


Incise drapes and SSI

- Abdominal hernia repair with mesh
- ACS-NSQIP dataset, 2002-06
- Retrospective study: Incise drape vs. no drape and SSI
- 506 hernia repairs, 206 with Incise drapes
- 42 mesh infections (8%)
- ↑ mesh infection: recurrent hernia, smoker, OR time
- Cochrane review 2011: Iodine-impregnated adhesive drapes had no effect on SSI

Swenson BR, Surg Infect 2008; Webser J, Cochrane Database Review 2011



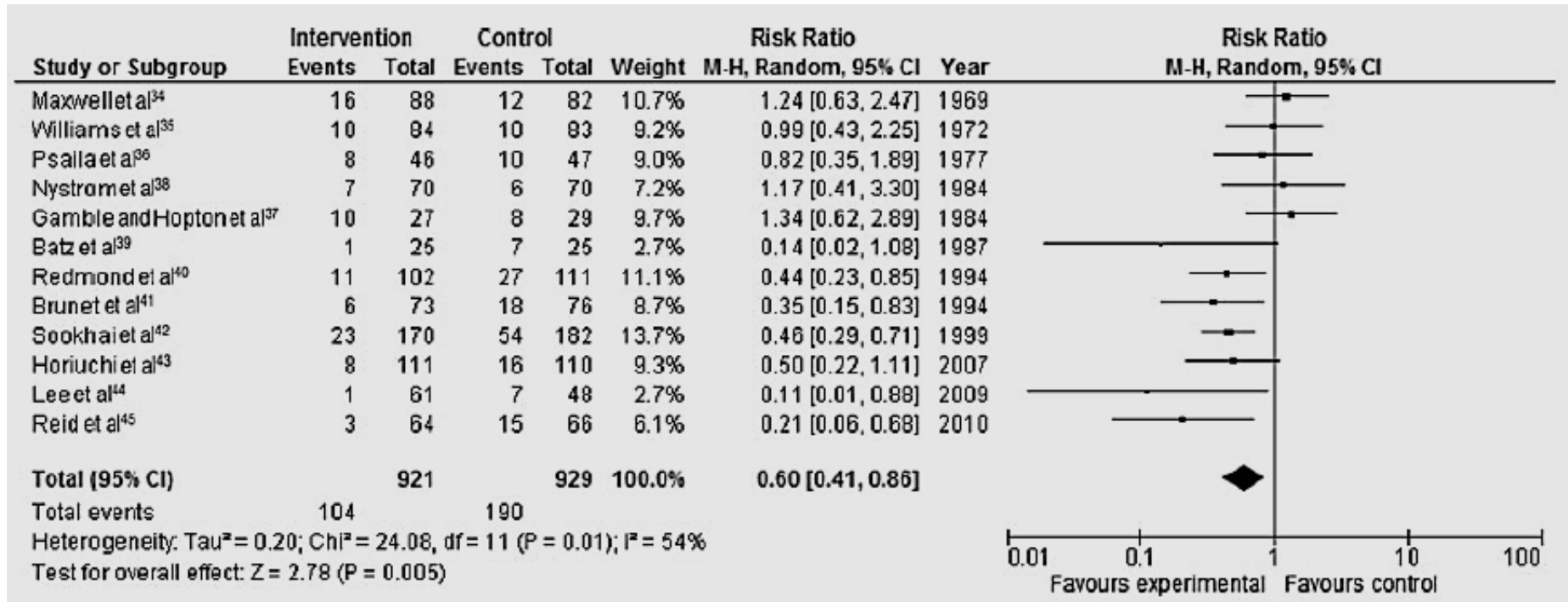


Fixed-ring wound protection in CORS

TABLE 3. Results			
	Control (n = 66)	Intervention (n = 64)	P
SSI: as per CDC guidelines, n (%)	15 (22.73)	3 (4.69)	.004
Reoperation for SSI	1	0	1.000
Readmissions for SSI	3	2	1.000
Formal wound drainage for SSI	3	1	.619
Purulent wound drainage	12	2	.009
Intravenous antibiotic (no. of courses used to treat SSI)	10	3	.077
Oral antibiotics (no. of courses used to treat SSI)	10	3	.077
Total length of stay: mean days (SD)	12.3 (6.2)	13.7 (14.1)	.463
SSI = surgical site infection; CDC = Centers for Disease Control and Prevention.			

130 open colorectal resections, Applied Med Alexis Wound Retractor

Fixed-wing Wound Edge Protection and SSI



- Study: device eligible if it covered the incision edges with impervious plastic sheet
- In 4/12 studies, Alexis wound retractor used- all with >50% reduction in SSI

Gheorghe, Ann Surgery 2012



CORS SSI Prevention: Next step at the Cleveland Clinic

1. Bowel Preparation

For all colon and rectal resections

Mechanical bowel preparation completed by 9 pm on day before surgery

Neomycin 1g and Metronidazole 1g PO at 1hr and 2hrs after completion of mechanical preparation

2. Alexis wound edge protector for class 2, 3, 4 wounds

3. Monitor results with ACS NSQIP data

1



2



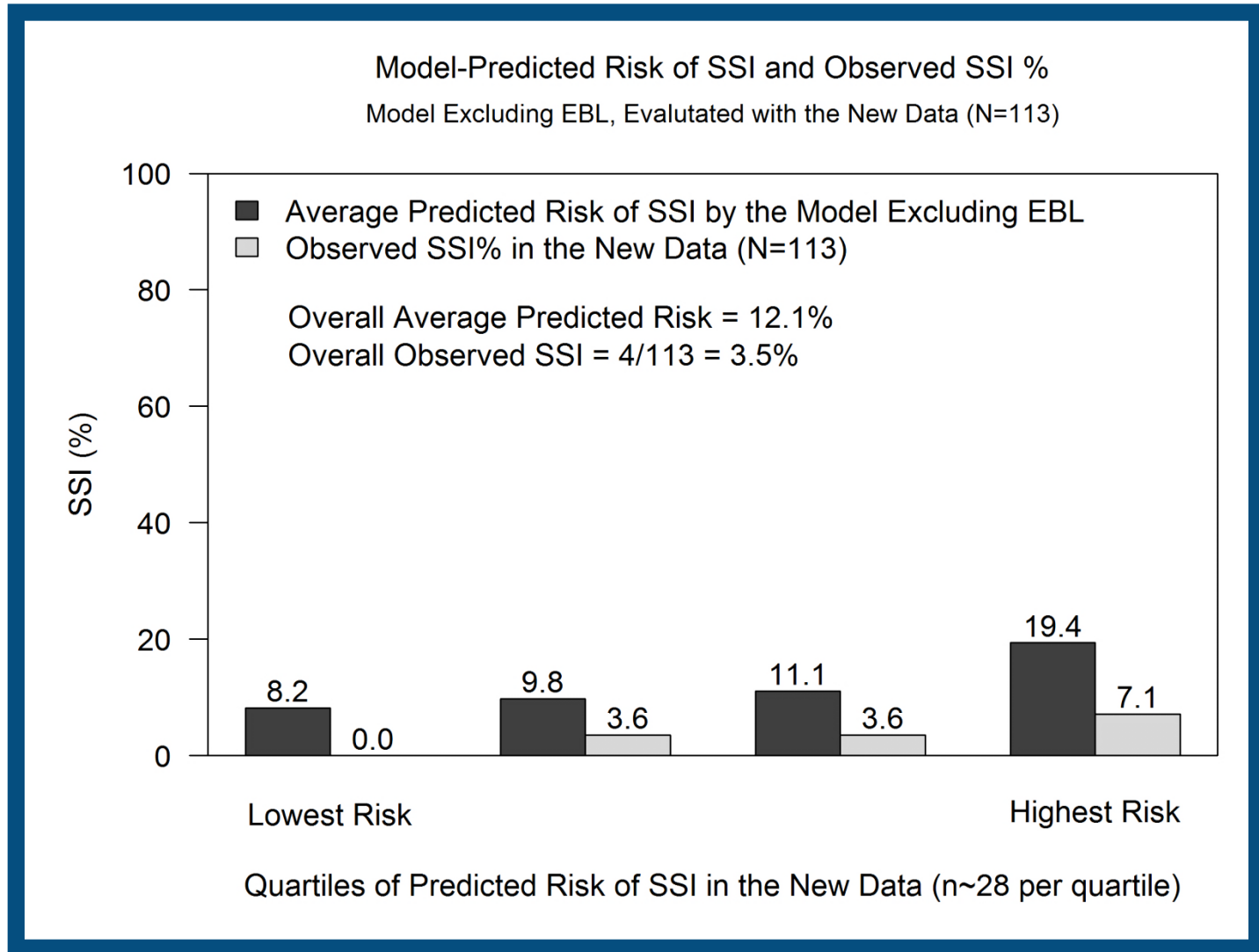
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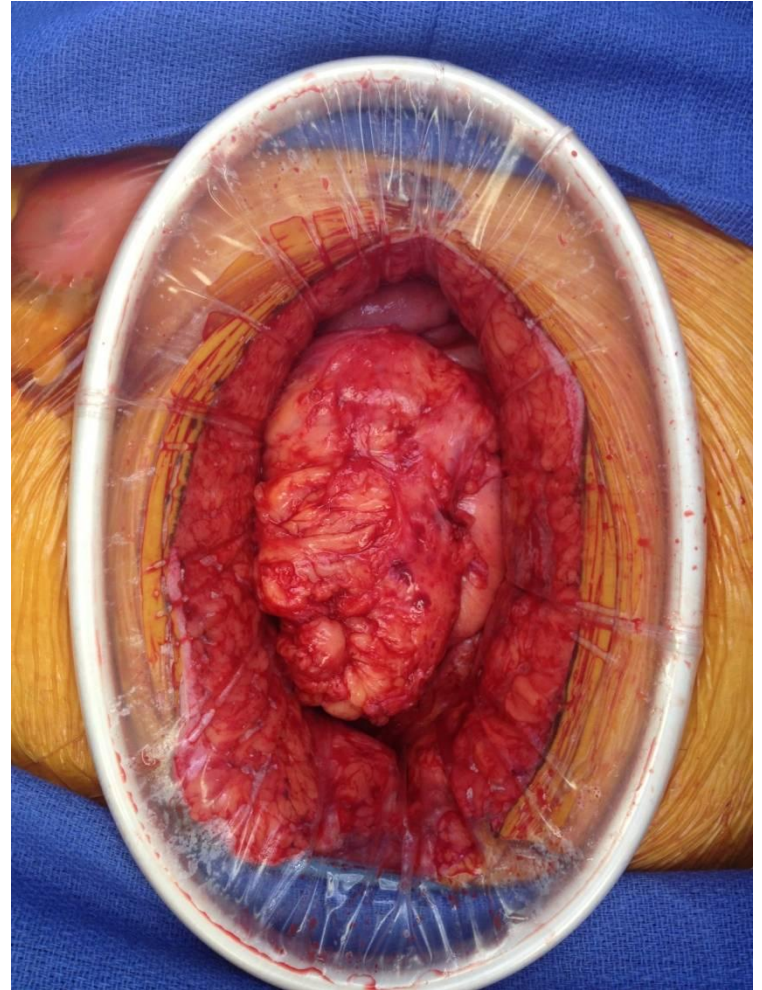


CCF CORS SSI Reduction Bundle Study



Summary: SSI Reduction in colorectal surgery

- **Antibiotic Bowel Prep**
- **Laparoscopy**
- **Alexis Wound Protector**
- **Best Anesthesia Care**
 - Active warming
 - Blood glucose control
 - IV fluid control
- **Culture Change**





Cleveland Clinic

Every life deserves world class care.