Providing SSI Prevention Guidance: The SHEA/IDSA Compendium

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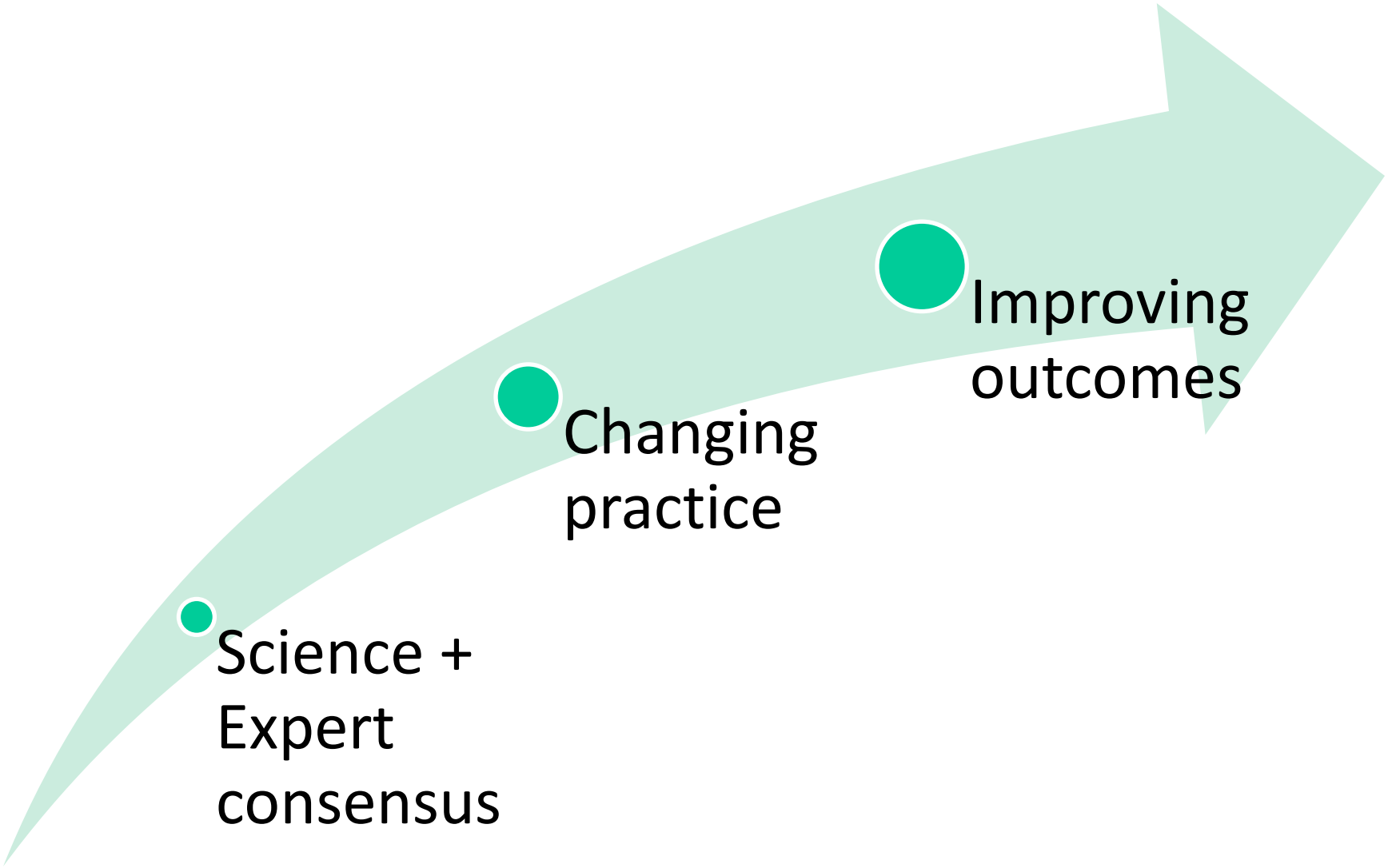
Financial disclosures

- Nothing to disclose


Science +
Expert
consensus
Changing
practice
Improving
outcomes

HICPAC Guidelines

Compendium guidance

Pragmatic lessons and tools

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY JUNE 2014, VOL. 35, NO. 6

SHEA/IDSA PRACTICE RECOMMENDATION

Strategies to Prevent Surgical Site Infections in Acute Care Hospitals: 2014 Update

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http://www.shea-online.org/PriorityTopics/CompendiumofStrategiestoPreventHAIs.aspx

Rationale for the *Compendium*

- Hospitals are straining to accommodate an increasing number of infection prevention initiatives, regulatory obligations, and requirements for collecting and reporting performance measures
- Create a set of documents that hospitals can use to help prioritize their HAI prevention efforts
- Help all stakeholders to work together to implement and sustain strategies to improve patient care

The *Compendium* process

- Implementation-focused
- Collaborative effort involving experts in infection prevention and control

- Written in partnership with implementation-focused organizations

http://www.shea-online.org/PriorityTopics/CompendiumofStrategiestoPreventHAIs.aspx

Section Leads and Panel members

- Involved organizations with content expertise
  - Pediatric ID Society
  - The Joint Commission
  - APIC
  - CDC
  - Society for Critical Care Medicine
  - Society for Hospital Medicine
  - Institute for Healthcare Improvement
  - Surgical Infection Society

NOT a guideline

- Review of relevant literature
- Heavy focus on published guidelines and systematic reviews/meta-analyses

Grading the quality of evidence

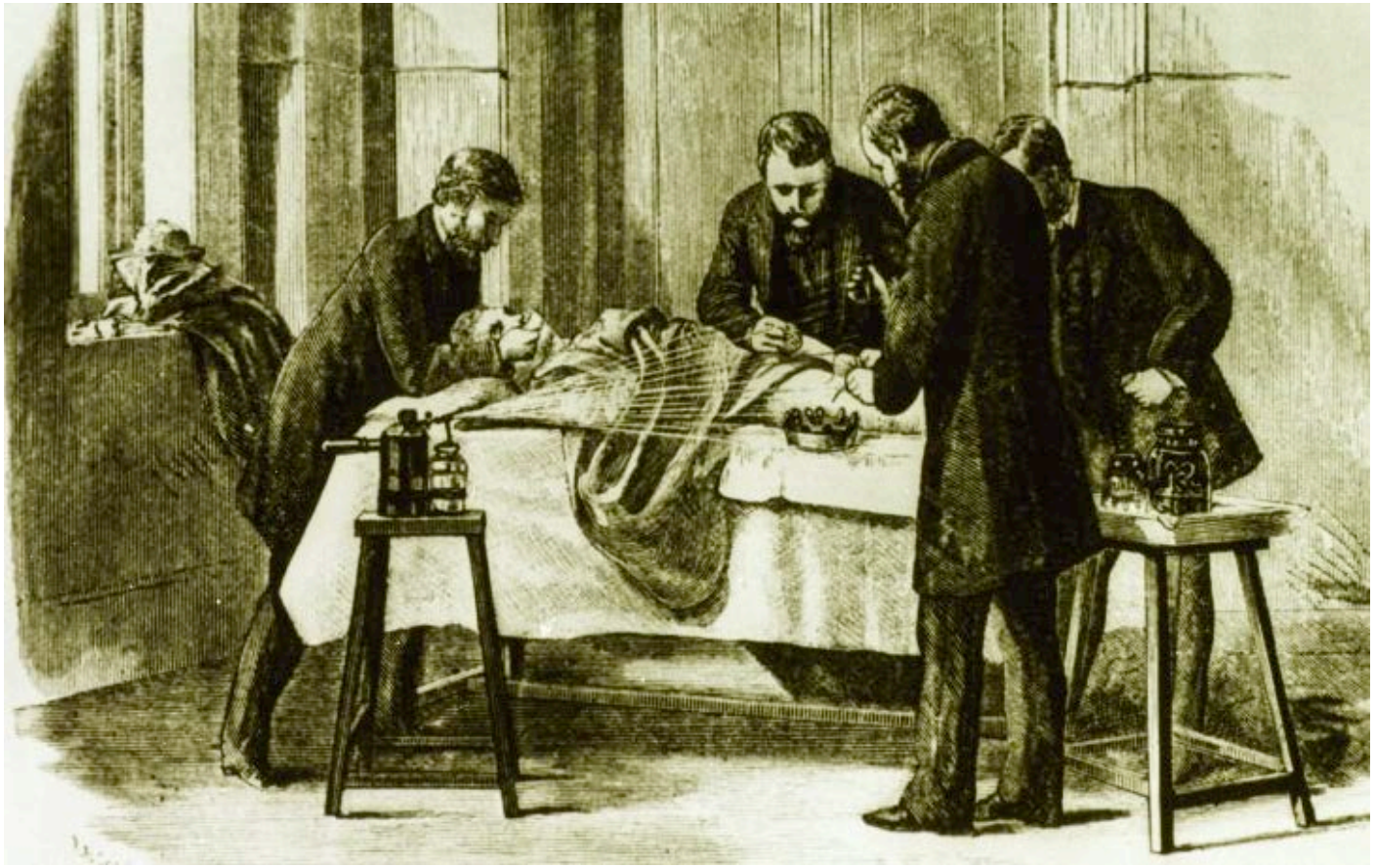
Grade	Definition
High	**Highly confident that the true effect lies close to that of the estimated size and direction of the effect** (e.g., wide range of studies and no major limitations, little variation between studies)
Moderate	**The true effect is likely to be close to the estimated size and direction of the effect, but there is a possibility that it is substantially different** (e.g., only a few studies and some have limitations but not major flaws, variation between studies)
Low	**The true effect may be substantially different from the estimated size and direction of the effect** (e.g., supporting studies have major flaws, important variation between studies, no rigorous studies, only expert consensus)

Recommended strategies

- Two levels of recommendations based on balancing of potential benefits and risks
  - ✓***Basic Practices:*** Recommended for all acute care hospitals
  - ✓***Special Approaches:*** Strategies to consider if basic practices are in place but there's still a problem based on risk assessment or surveillance data

Multi-level review

- Many organizations and societies contributed
- Many organizations and societies invited to review the drafts and to consider endorsement or support
- Reviewed and cleared by the CDC
- Approved by the SHEA Guidelines Committee and IDSA Standards and Practice Guidelines Committee
- Approved by the Boards of the major partnering organizations



BASIC PRACTICES TO PREVENT SSI

Perioperative antimicrobial prophylaxis

HICPAC	Compendium
• Administer preoperative antimicrobial agent(s) only when indicated, based on published clinical practice guidelines and timed such that a bactericidal concentration of the agent is established in the serum and tissues when the incision is made (IB)	• Administer antimicrobial prophylaxis according to evidence-based standards and guidelines (Basic Practice; Quality of evidence=high)

Updated perioperative antimicrobial prophylaxis guidelines

Clinical practice guidelines for antimicrobial prophylaxis in surgery

DALE W. BRATZLER, E. PATCHEN DELLINGER, KEITH M. OLSEN, TRISH M. PERL, PAUL G. AUWAERTER, MAUREEN K. BOLON, DOUGLAS N. FISH, LENA M. NAPOLITANO, ROBERT G. SAWYER, DOUGLAS SLAIN, JAMES P. STEINBERG, AND ROBERT A. WEINSTEIN

Am J Health-Syst Pharm. 2013; 70:195-283

Available at:
http://www.idsociety.org

SHEA The Society for Healthcare Epidemiology of America

ASHP American Society of Health-System Pharmacists® TOGETHER WE MAKE A GREAT TEAM

IDSA

Surgical Infection Society

Perioperative antimicrobial prophylaxis

HICPAC	Compendium
• In clean and clean-contaminated procedures, do not administer additional prophylactic antimicrobial agent doses after the surgical incision is closed in the operating room, even in the presence of a drain (IA)	• Discontinue antimicrobial prophylaxis within 24 hours after surgery

Perioperative antimicrobial prophylaxis

HICPAC	Compendium
• No further refinement of timing can be made for preoperative antimicrobial agent…, based on clinical outcomes (No recommendations/ Unresolved issue)	• Begin administration within 1 hour before incision to maximize tissue concentration. Two hours are allowed for the administration of vancomycin and fluoroquinolones

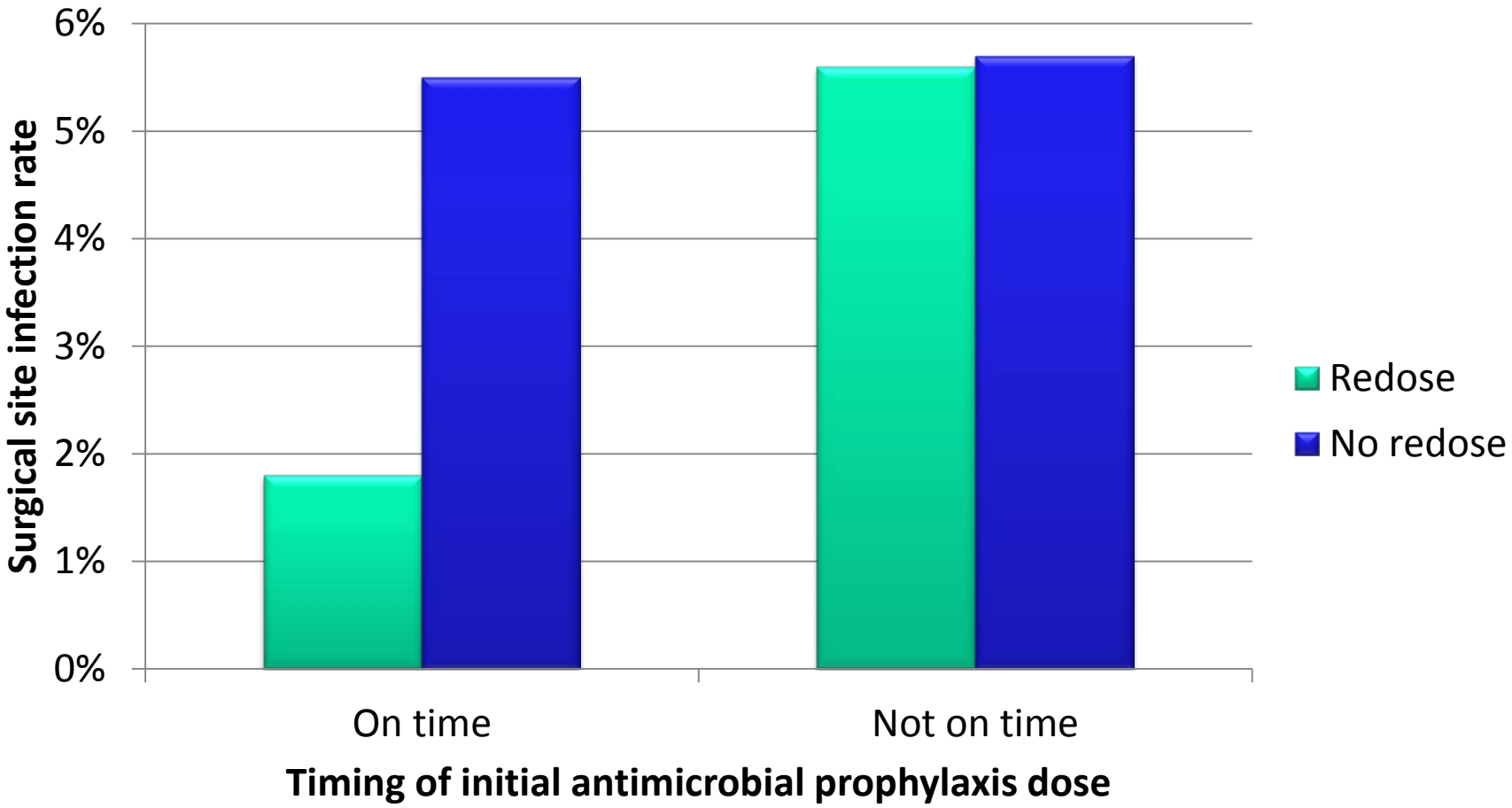
Perioperative antimicrobial prophylaxis

HICPAC	Compendium
• Our search did not identify RCT evaluating weight-adjusted AMP dosing and its impact on the risk of SSI (No recommendation/ Unresolved issue)	• Adjust dosing on the basis of patient weight (examples: pediatric patients, vancomycin, gentamicin, morbidly obese patients)

Perioperative antimicrobial prophylaxis

HICPAC		Compendium
• Our search did not identify sufficient RCT evidence to evaluate intraoperative redosing of parenteral prophylactic antimicrobial agents for the prevention of SSI (No recommendation/ Unresolved issue)	≠	• Redose prophylactic antimicrobial agents for long procedures (intervals of ~every 2 half-lives) and in cases with excessive blood loss during the procedure

Redose prophylactic antibiotics for long procedures



Steinberg JP, et al. Trial to Reduce Antimicrobial Prophylaxis Errors. Ann Surg 2009; 250:10

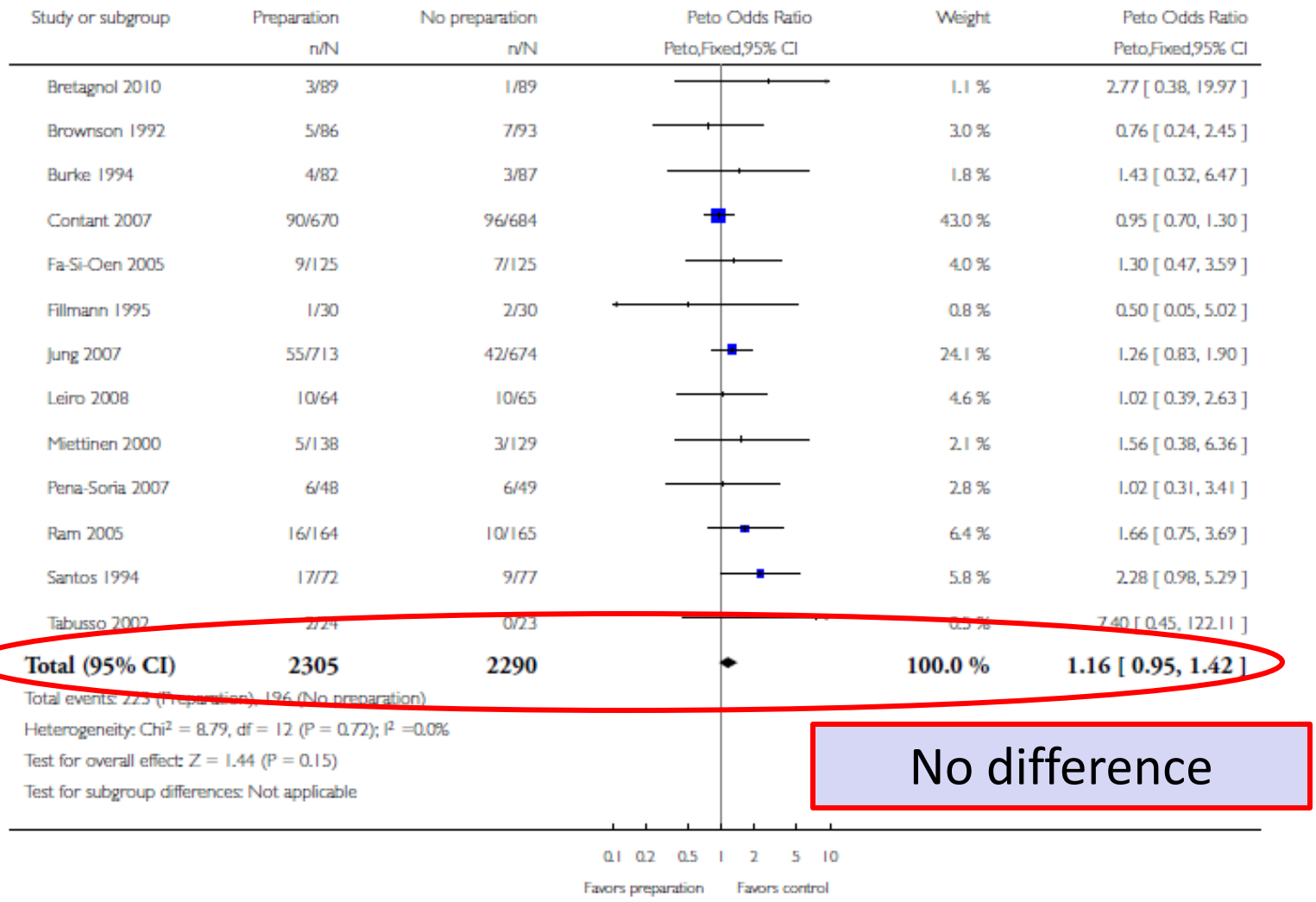
Perioperative antimicrobial prophylaxis

HICPAC	Compendium
• Does not address	• Use a combination of parenteral antimicrobial agents and oral antimicrobials to reduce the risk of SSI following colorectal procedures

Strategies to consider: Oral antibiotics and mechanical bowel prep for colorectal surgery

- Two interrelated issues:
  - ✓Mechanical bowel prep
    - –Fleet™ enema
    - –Polyethylene glycol
    - –Phospho-soda
    - –Magnesium citrate
  - ✓Oral antimicrobial prophylaxis
    - –Neomycin + erythomycin
    - –Neomycin + metronidazole

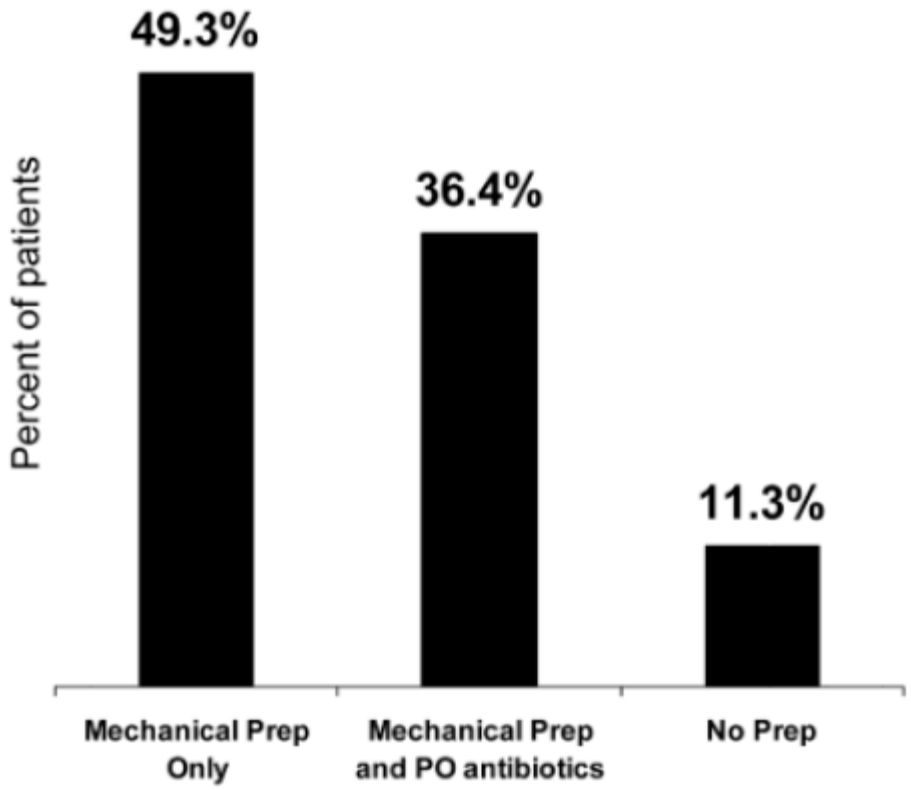
Impact of mechanical bowel prep on SSI risk



No difference

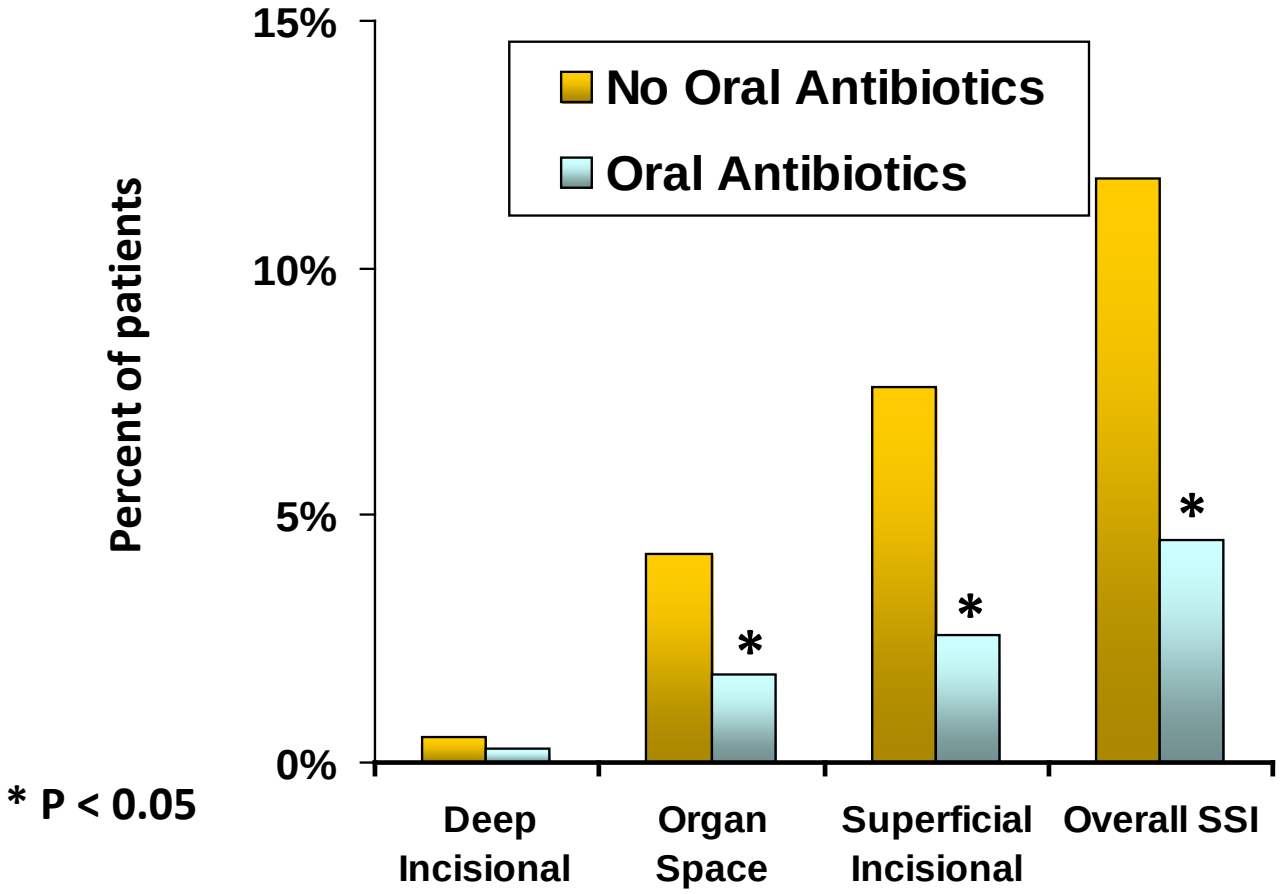
Guenaga KF, et al. Cochrane Database Syst Rev, 2011

Despite this, how often is a bowel prep used?



Englesbe, et al. Ann Surg 2010;252: 514–520

Oral antibiotics with mechanical bowel preparation--propensity matched analysis



Englesbe, et al. Ann Surg 2010;252: 514–520

Impact oral antibiotic prophylaxis on SSI risk

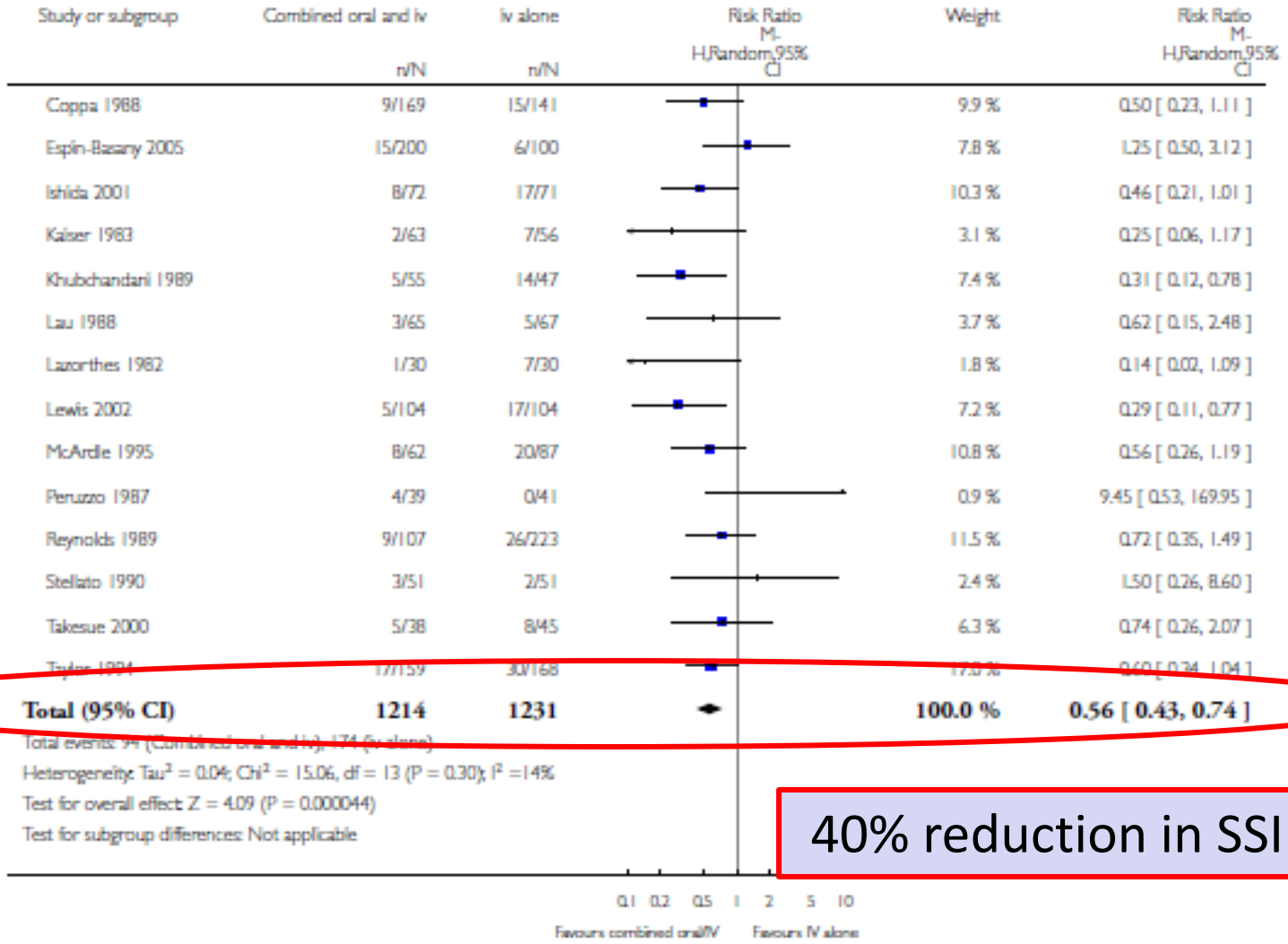
IV antibiotic agent	Overall cohort	
	Odds ratio[adj]*	95% CI
Cefazolin/metronidazole	ref	ref
Ampicillin/sulbactam	2.16	1.35–3.58
Cefotetan	2.53	1.51–4.22
Cefoxitin	2.56	1.73–3.81
Ertapenem	1.48	0.79–2.78
Fluoroquinolone/plus anaerobic	1.89	1.01–3.51
Oral antibiotic	0.37	0.29–0.46

*Adjusted odds ratio for oral antibiotic, age, body mass index, procedure work relative value units, operation duration, and dyspnea.

60% reduction in SSI risk

Deierhoi RJ, et al. J Am Coll Surg 2013;217:763

Impact oral antibiotic prophylaxis on SSI risk



40% reduction in SSI risk

Nelson, et al. *Cochrane Database Syst Rev*, 2014

Bottom line: Mechanical bowel prep and oral antimicrobial prophylaxis

- Difficult to tease out the impact of mechanical bowel prep and oral antibiotic prophylaxis in these studies
- Adding preoperative oral antibiotic prophylaxis (in addition to perioperative IV prophylaxis) decreases SSI risk when mechanical bowel prep is used
- Further studies are needed

Glycemic control

HICPAC	Compendium
• Implement perioperative glycemic control and use blood glucose target levels of <200 mg/dL in diabetic and non-diabetic patients	• Control blood glucose during the immediate postoperative period (≤180 mg/dL)

Normothermia

HICPAC	Compendium
• Maintain perioperative normothermia (IA)	• Maintain normothermia during the perioperative period (Basic Practice: Quality of evidence=high)

Supplemental oxygenation

HICPAC	Compendium
• For patients with normal pulmonary function undergoing general anesthesia with endotracheal intubation, administer increased FiO2 both intraoperatively and post-extubation in the immediate postoperative period. (IA)	• Optimize tissue oxygenation by administering supplemental oxygen during and immediately following surgical procedures involving mechanical ventilation (Basic Practice; Quality of evidence=high)

Preoperative skin prep

HICPAC	Compendium
• Perform intraoperative skin preparation with an alcohol-based antiseptic agent, unless contraindicated (IA)	• Use alcohol-containing preoperative skin preparatory agents if no contraindication exists (Basic Practice; Quality of evidence=high)

Additional *Compendium* Basic Practices: Surgical safety checklist

- Use a checklist to ensure adherence to best practices to improve surgical patient safety

A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population

Alex B. Haynes, M.D., M.P.H., Thomas G. Weiser, M.D., M.P.H., William R. Berry, M.D., M.P.H., Stuart R. Lipsitz, Sc.D., Abdel-Hadi S. Breizat, M.D., Ph.D., E. Patchen Dellinger, M.D., Teodoro Herbosa, M.D., Sudhir Joseph, M.S., Pascience L. Kibatala, M.D., Marie Carmela M. Lapitan, M.D., Alan F. Merry, M.B., Ch.B., F.A.N.Z.C.A., F.R.C.A., Krishna Moorthy, M.D., F.R.C.S., Richard K. Reznick, M.D., M.Ed., Bryce Taylor, M.D., and Atul A. Gawande, M.D., M.P.H., for the Safe Surgery Saves Lives Study Group*

Haynes AB, et al. NEJM 2009;360:491

Surgical Safety Checklist

World Health Organization | Patient Safety
A World Alliance for Safer Health Care

Before induction of anaesthesia

(with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?
- ☐ Yes

Is the site marked?
- ☐ Yes
- ☐ Not applicable

Is the anaesthesia machine and medication check complete?
- ☐ Yes

Is the pulse oximeter on the patient and functioning?
- ☐ Yes

Does the patient have a:

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway or aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
- ☐ No
- ☐ Yes, and two IVs/central access and fluids planned

Before skin incision

(with nurse, anaesthetist and surgeon)

- ☐ **Confirm all team members have introduced themselves by name and role.**
- ☐ **Confirm the patient's name, procedure, and where the incision will be made.**

Has antibiotic prophylaxis been given within the last 60 minutes?
- ☐ Yes
- ☐ Not applicable

Anticipated Critical Events

To Surgeon:
- ☐ What are the critical or non-routine steps?
- ☐ How long will the case take?
- ☐ What is the anticipated blood loss?

To Anaesthetist:
- ☐ Are there any patient-specific concerns?

To Nursing Team:
- ☐ Has sterility (including indicator results) been confirmed?
- ☐ Are there equipment issues or any concerns?

Is essential imaging displayed?
- ☐ Yes
- ☐ Not applicable

Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

Nurse Verbally Confirms:
- ☐ The name of the procedure
- ☐ Completion of instrument, sponge and needle counts
- ☐ Specimen labelling (read specimen labels aloud, including patient name)
- ☐ Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:
- ☐ What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

http://www.who.int/patientsafety/safesurgery/en/

Table 5. Outcomes before and after Checklist Implementation, According to Site.*

Site No.	No. of Patients Enrolled		Surgical-Site Infection		Unplanned Return to the Operating Room		Pneumonia		Death		Any Complication	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
							percent					
1	524	598	**4.0**	**2.0**	**4.6**	**1.8**	0.8	1.2	**1.0**	**0.0**	**11.6**	**7.0**
2	357	351	2.0	1.7	0.6	1.1	3.6	3.7	1.1	0.3	7.8	6.3
3	497	486	5.8	4.3	4.6	2.7	1.6	1.7	0.8	1.4	13.5	9.7
4	520	545	3.1	2.6	2.5	2.2	0.6	0.9	1.0	0.6	7.5	5.5
5	370	330	**20.5**	**3.6**	1.4	1.8	0.3	0.0	**1.4**	**0.0**	**21.4**	**5.5**
6	496	476	4.0	4.0	3.0	3.2	2.0	1.9	3.6	1.7	10.1	9.7
7	525	585	**9.5**	**5.8**	**1.3**	**0.2**	1.0	1.7	2.1	1.7	**12.4**	**8.0**
8	444	584	4.1	2.4	0.5	1.2	0.0	0.0	1.4	0.3	6.1	3.6
Total	3733	3955	**6.2**	**3.4**	**2.4**	**1.8**	1.1	1.3	**1.5**	**0.8**	**11.0**	**7.0**
P value			<0.001		0.047		0.46		0.003		<0.001	

* The most common complications occurring during the first 30 days of hospitalization after the operation are listed. Bold type indicates values that were significantly different (at $P<0.05$) before and after checklist implementation, on the basis of P values calculated by means of the chi-square test or Fisher's exact test. P values are shown for the comparison of the total value after checklist implementation as compared with the total value before implementation.

Haynes AB, et al. NEJM 2009;360:491

Additional *Compendium* Basic Practices: SSI surveillance

- Perform surveillance for SSI
- Measure and provide feedback to providers regarding rates of compliance with process and outcome measures

Additional *Compendium* Basic Practices: Education

- Educate healthcare personnel about strategies to prevent SSIs
- Educate patients and their families, as appropriate

FAQs
(frequently asked questions)

about
"Surgical Site Infections"

What is a Surgical Site Infection (SSI)?

A surgical site infection is an infection that occurs after surgery in the part of the body where the surgery took place. Most patients who have surgery do not develop an infection. However, infections develop in about 1 to 3 out of every 100 patients who have surgery.

Some of the common symptoms of a surgical site infection are:

- Redness and pain around the area where you had surgery
- Drainage of cloudy fluid from your surgical wound
- Fever

- Quit smoking. Patients who smoke get more infections. Talk to your doctor about how you can quit before your surgery.
- Do not shave near where you will have surgery. Shaving with a razor can irritate your skin and make it easier to develop an infection.

At the time of your surgery:

- Speak up if someone tries to shave you with a razor before surgery. Ask why you need to be shaved and talk with your surgeon if you have any concerns.
- Ask if you will get antibiotics before surgery.

SPECIAL APPROACHES TO PREVENT SSI

Compendium Special Approaches: Preoperative *S. aureus* decolonization

- Screen patients for *Staphylococcus aureus* (SA) carriage and decolonize SA carriers prior to selected surgical procedures

Does *S. aureus* decolonization prevent SSIs?

Theoretical benefit:

- Nasal *S. aureus* carriers are at higher risk for *S. aureus* SSIs
- Intranasal mupirocin eradicates nares *S. aureus* carriage
- Topical chlorhexidine decreases bioburden on skin

Impact of nasal decolonization: Systematic review and meta-analysis

- Nasal decolonization was associated with lower risk of *S. aureus* SSI for cardiac and orthopedic surgery

	RR* Gram positive SSIs (95% CI)	RR* MRSA SSIs (95% CI)	RR* MSSA SSIs (95% CI)
Cardiac surgery studies	0.46 (0.32 to 0.67)	0.69 (0.36 to 1.31)	0.46 (0.29 to 0.72)
Orthopedic surgery studies	0.32 (0.21 to 0.47)	0.16 (0.09 to 0.28)	0.58 (0.31 to 1.01)
All studies	0.41 (0.30 to 0.55)	0.30 (0.15 to 0.62)	0.50 (0.37 to 0.69)

*RR = Pooled relative risk

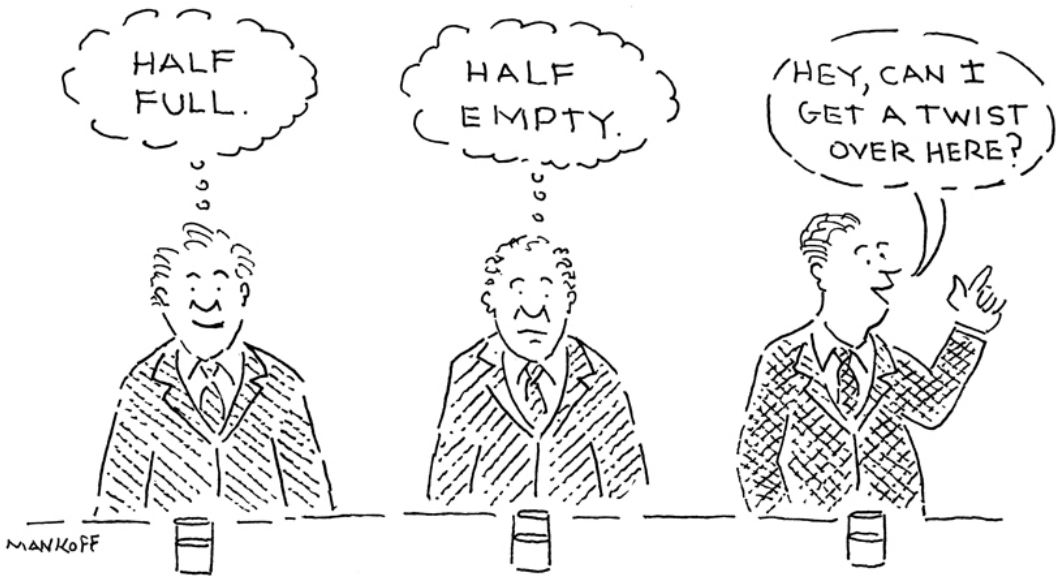
Schweizer M, et al. BMJ 2013;346:12743

Possible *S. aureus* decolonization strategies

- Target procedures where *S. aureus* SSIs are common and potentially devastating
  - ✓Orthopedic surgery involving implants
  - ✓Cardiac surgery
- Consider screening these patients for *S. aureus* nasal carriage (MSSA and MRSA)
- Decolonize with intranasal mupirocin +/- CHG bathing

Conclusions

- Guidance documents allow flexibility
- Multidisciplinary, multi-society ownership can facilitate implementation
- Guidelines, guidance documents, and other SSI prevention tools are useful and ideally synergistic



OPTIMIST

PESSIMIST

PRAGMATIST (Healthcare Epidemiologist/Infection Preventionist)

Questions?