Prevention of Surgical Site Infections
Prof. Matthias Maiwald,
A Webber Training Teleclass

Prevention of surgical site infections

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With materials and contributions from Andreas Widmer (University of Basel, Switzerland)

Hosted by Jane Barnett
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Objectives

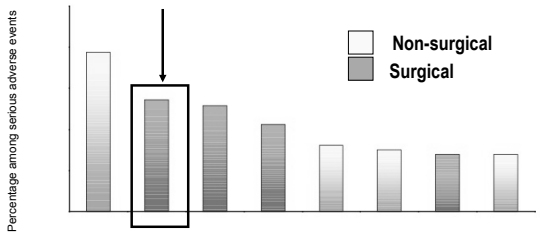
- To provide a brief overview of the impact of surgical site infections (SSIs)
- To highlight the causation of surgical site infections as complex and multifactorial
- To provide an overview of different classes of surgery and different categories of infection
- To highlight important measures for preventing surgical site infections, in particular:
  - Surgical hand and skin antisepsis
  - Surgical antibiotic prophylaxis
- To point out bundles, checklists and SSI initiatives
- To discuss a few areas of controversy and misconceptions:
  - The "Chlorhexidine Myth"
  - Fire risk from flammable skin antiseptics

Frequency and impact of SSIs in the USA

- About 30 million operations annually
- SSIs are the 2nd to 3rd most common nosocomial infection
- Overall SSI rate 2.6% (CDC, 1999)
- Each SSI increases hospital stay by ~7-10 days & costs USD 2-3000 extra
- Overall costs of SSIs > USD 2 bn p.a.

Source: Mangram AJ et al. Guideline for prevention of surgical site infection ('CDC guideline'). Infect Control Hosp Epidemiol 20: 247-78; 1999

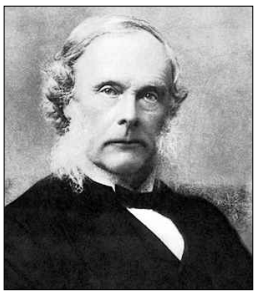
SSIs ranked second in a study of serious adverse events in hospitals in New York State



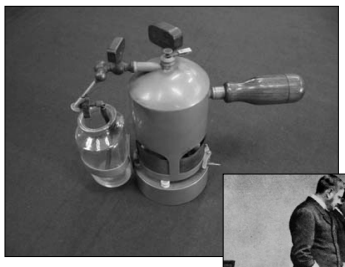
Brennan TA et al. N Engl J Med. 1991; 324: 370-6
Leape LL et al. N Engl J Med. 1991; 324: 377-84

Joseph Lord Lister (1827-1912)

- British surgeon
- Pioneer of antisepsis in surgery
- Observations re. surgical infections
- Approx. 50% of pts. died
- Use of carbolic acid spray



http://encarta.msn.com/media_461522412_761556474_-1_1/Joseph_Lister.html



Carbolic acid sprayer, as used by Lister
http://195.195.163.80/oneinstrument.asp?instnumber=1

Operation, using carbolic spray antisepsis by Lister
http://www.makingthemodernworld.org.uk/stories/the_second_industrial_revolution/02.ST.05/?scene=4

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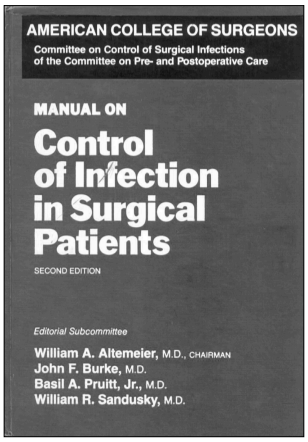
Surgery in the 20th Century

- Listerian principles further developed into 'aseptic surgery' by German, then US surgeons
- Many achievements: sterile field, surgical attire, face masks, etc.
- Prominent surgeon in US: William Altemeier (Cincinnati)

Edition from 1984 (earlier edition 1976)



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Historical developments reducing SSIs

- Before Lister (1867):
  Mortality after amputations ~50%
  Introduction of antisepsis & disinfection
- End of 19th century:
  Introduction of asepsis & sterilization
- 1950-70
  Introduction of antimicrobial prophylaxis
- From 1980
  Laparoscopic & minimally invasive surgery, CT-guided surgery, endoscopes

Slide courtesy of A. Widmer, Basel

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Causes and risk factors of SSIs

- SSIs are complex multifactorial events !
- Many contributing & preventing factors
- Difficult or impossible to pinpoint cause of a given individual SSI
- In 'clean' surgery, patient **skin** is major source
- In surgery - through mucous membranes
  - intestinal surgery
  - contaminated/infected surgery

  . . . other sources assume a greater role

$$\frac{\text{Dose of bacterial contamination} \times \text{virulence}}{\text{Resistance of the host patient}} = \text{Risk of surgical site infection}$$

Mangram et al. 1999, citing: Cruse, 1992; Altemeier 1965

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Risk factors for SSI

Host Factors

- Old age
- Severe underlying illness
- Obesity
- Malnutrition
- Diabetes mellitus
- Smoking
- Immunocompromising diseases or therapies
- Presence of other infections
- Skin diseases

Preoperative Factors

- Remote Infection
- Prolonged pre-op. stay
- Shaving the skin
- Inadequate antib. prophylaxis
- *Staph. aureus* (& MRSA) carriage

Surgical Factors

- Inadequate skin antisepsis
- Emergency procedure
- Surgical volume
- Prosthetic implants
- Prolonged procedure
- Use of drains
- Poor surgical technique
- Unexpected contamination
- Lack of surveillance

Environmental Factors

- Inadequate attire
- Excessive activity
- Inadequate ventilation
- Inadequately sterilised items

Slide courtesy of A. Widmer, Basel

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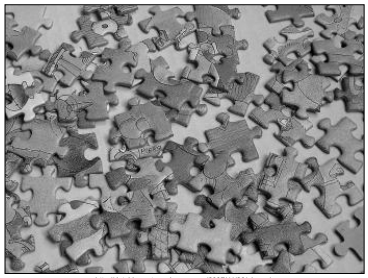
The 'Puzzle Model' of SSI Causation



http://dutchimport.wordpress.com/2007/11/29/pieces/

- There can be contributing or preventing pieces
- They can be of vastly unequal sizes (strong/weak factors)
- The relative amount of contribution is often unknown
- Some factors are suspected, but unproven

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ASA Score

(American Society of Anesthesiologists: Physical Status Classification)
and the risk of SSIs

Code	Patient's Preoperative Physical Status
1	Normally healthy patient
2	Patient with mild systemic disease
3	Patient with severe systemic disease that is not incapacitating
4	Patient with an incapacitating systemic disease that is a constant threat to life
5	Moribund patient who is not expected to survive for 24 hours with or without operation

*Reference 406.
Note: The above is the version of the ASA Physical Status Classification System that was current at the time of development of, and still is used in, the NNIS Risk Index. Meanwhile, the American Society of Anesthesiologists has revised their classification system; the most recent version is available at *http://www.asahq.org/profinfo/physical status.html.*

Mangram AJ et al. 1999 ('CDC Guideline')

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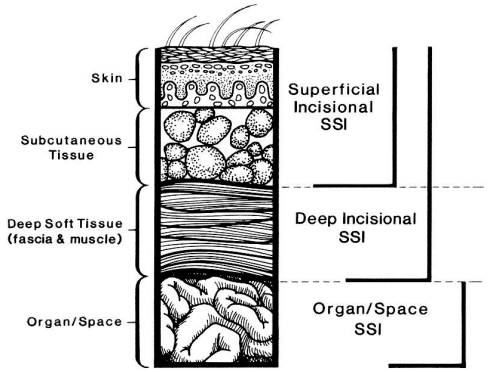
Types of SSIs



Mangram AJ et al. 1999 ('CDC Guideline')

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Diagnosis of SSIs

- Purulent drainage from wound +/- dehiscence
- Organisms isolated from aseptically obtained fluid or tissue
- Pain, swelling, redness, heat +/- fever
- Diagnosis by surgeon or attending physician
- After follow-up for - 30 days, if no implant
  - 1 year with implant

'CDC Criteria': Mangram et al. 1999 and
Horan TC et al. Infect Control Hosp Epidemiol 1992
(Strongly abbreviated version)

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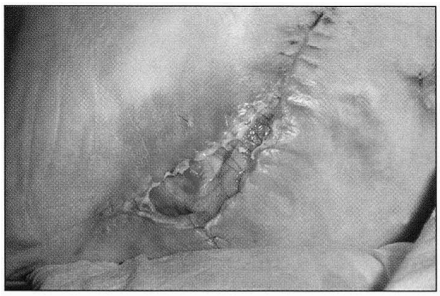
Example of an SSI



Conlon CP, Snydman DR. Color Atlas and Text of Infect. Dis. 2002

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Pathogens involved in SSIs

Percentage (%) of pathogens of SSIs isolated in the US National Nosocomial Infections Surveillance System, 1986-89 & 1990-92

Mangram et al. 1999
('CDC Guideline')

Pathogen	1986-1989	1990-1996
Staphylococcus aureus	17	20
Coag.-neg. staph.	12	14
Enterococcus spp.	13	12
Escherichia coli	10	8
Pseudomonas aeruginosa	8	8
Enterobacter spp.	8	7
Proteus mirabilis	4	3
Klebsiella pneumoniae	3	3
Other *Streptococcus* spp.	3	3
Candida albicans	2	3

- Cardiac, orthopaedic, neurosurgical, vascular surgery: *Staph. aureus* & coag.-neg. staph common
- Gastrointestinal: Gram-negatives & anaerobes common
- Obstetric & gynaecologic: Gram-negatives, anaerobes, B-streptococci, enterococci common

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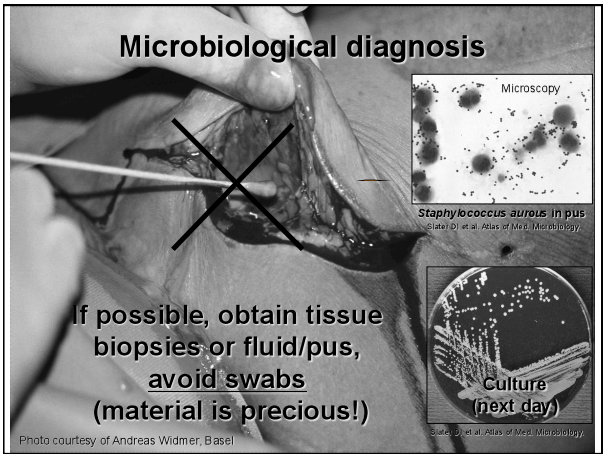

Surgical site classification

Class	Surgical Procedure	Approx. Infection Rate
I Clean	Uninfected wound; gastrointestinal tract & other body cavities not entered; wound primarily closed	1-2%
II Clean-contaminated	Respiratory, gastrointestinal, genital or urinary tract entered under controlled conditions w'out unusual contamination	5-10%
III Contaminated	Fresh, traumatic wounds; spillage from GI tract; acute, non-purulent inflammation	10-20%
IV Dirty-infected	Gross peritoneal soiling; perforated	>20%

American College of Surgeons & Mangram et al. 1999 ('CDC Guideline')

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Rates of SSIs in different wound classes

Wound classification	Cruse & Foord (n=63,000) 1970-75	SENIC (n=59,000) 1975-76	Olson & Lee (n=36,500) 1980-85	Culver et al (n=85,000) 1987-90
Clean	1,5	2,9	1,3	2,1
Clean-contaminated	7,7	3,9	2,4	3,3
Contaminated	15,2	8,5	7,9	6,4
Dirty (established infection)	40,0	12,6	-	7,1

- Risk of infection increases from Class I to IV
- Greatest relative improvements in last 20-30 years in Classes III & IV (surg. antibiotic prophylaxis)

19 Slide courtesy of A. Widmer, Basel

Prevention of SSIs: The 'Race Car Analogy'

Need to optimize:
- Carburetors
- Tyres, brakes
- Aerodynamics
- Fuel/Weight
- Etc., etc.

For SSI Prevention:

- Many factors need to be optimized
- Often, relative contribution of one factor is not known
- Gray zone & discussion: which is important?
- Part of modern 'bundle & checklist' approaches

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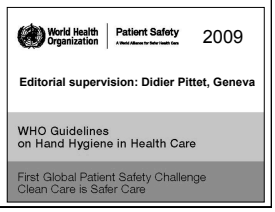
Surgical hand antisepsis ('Scrubbing')

- Goal is to reduce number of microorganisms transferred from the surgical team to the patient during surgery by
  - Unrecognised puncture(s) in the surgical glove (ca. 35%)
  - Accidental touching of the wound after removal of gloves
  - Tiny holes in approx. 0.3-1% in new sealed gloves
- Infectious doses in implant surgery:
  - 100 bacteria (CFU) for *Staph. aureus*
  - 1000 bacteria (CFU) for coag.-neg. staphylococci
- Surgical hand antisepsis has never been tested in randomised controlled trials . . .
- But numerous empirical data & case reports (of infections when protocols were breached) & microbiological data strongly support its use

Trampuz A & Widmer AF *Mayo Clin. Proc.* 2004; 79: 109-16
21 Widmer AF et al. *J. Hosp. Infect.* 2010; 74: 112-22.

Scrubbing Recommendations

- Two major choices:
  (1) Water- and detergent-based (chlorhexidine-soap, povidone-iodine-soap)
  (2) Alcohols with emollients
- Detailed section on surgical hand antisepsis in the 2009 WHO Hand Hygiene Guideline
- Key US reference: AORN J. 2004; 79 (2) 416-31
- Prerequisite for alcohols: hands must be clean and dry
- To do preceding hand wash & cleaning under fingernails for 1st scrub of day



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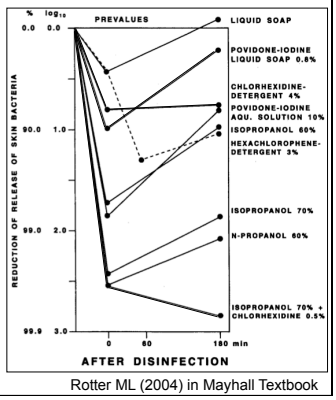
Advantages of alcohol-based scrubbing

- Significantly greater reduction of micro-organisms (~10-100 x)
- Shorter scrubbing times (~3 min vs. ~ 5 min)
- Highly active formulations can do 1.5 min
- Gentler to skin (added emollients)
- **However:** so far, no studies show different SSI rates



23 Rotter ML (2004) in Mayhall Textbook

Pre-surgical skin antisepsis ('skin prep')

Activity of antiseptic agents
From Mangram AJ et al. 1999 ('CDC guideline')

Agent	Mechanism of Action	Gram-Positive Bacteria	Gram-Negative Bacteria	Mtb	Fungi	Virus	Rapidity of Action	Residual Activity	Toxicity	Uses
Alcohol	Denature proteins	E	E	G	G	G	Most rapid	None	Drying, volatile	SP, SS
Chlorhexidine	Disrupt cell membrane	E	G	P	F	G	Intermediate	E	Ototoxicity, keratitis	SP, SS
Iodine/Iodophors	Oxidation/substitution by free iodine	E	G	G	G	G	Intermediate	Minimal	Absorption from skin with possible toxicity, skin irritation	SP, SS

E, excellent; G, good; F, fair; P, poor; SP, skin prep.; SS, surgical scrubs

- Alcohols are generally the most rapid-acting & most effective skin antiseptics
- Combination of alcohol plus chlorhexidine or iodine can add residual activity
- Alcohol is unsuitable for mucous membrane antisepsis (e.g. oral, ENT, eye, vaginal surgery)

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Recent clinical trial

Darouiche RO et al. *N Engl J Med.* 362: 18-26; 2010

- Setting: clean-contaminated surgery in 6 hospitals
- One alcohol-containing vs. one aqueous prep: (1) 70% isopropanol plus 2% CHG; (2) Aqueous PVP-I
- Significantly lower infection rates with (1) than (2), including deep incisional but not org/sp SSIs

Table 2. Proportion of Patients with Surgical-Site Infection, According to Type of Infection (Intention-to-Treat Population).

Type of Infection	Chlorhexidine–Alcohol (N = 409)	Povidone–Iodine (N = 440)	Relative Risk (95% CI)*	P Value†
	no. (%)			
Any surgical-site infection	39 (9.5)	71 (16.1)	0.59 (0.41–0.85)	0.004
Superficial incisional infection	17 (4.2)	38 (8.6)	0.48 (0.28–0.84)	0.008
Deep incisional infection	4 (1.0)	13 (3.0)	0.33 (0.11–1.01)	0.05
Organ-space infection	18 (4.4)	20 (4.5)	0.97 (0.52–1.80)	>0.99
Sepsis from surgical-site infection	11 (2.7)	19 (4.3)	0.62 (0.30–1.29)	0.26

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Another clinical study

Swenson BR et al. *Infect Control Hosp Epidemiol.* 30: 964-71; 2009

- Setting: general surgery
- Three alcohol-containing preps: (1) Aqueous PVP-I alternating w. 70% isopropanol (2) 70% isopropanol plus 2% CHG (3) Iodine povacrylex in isopropanol
- Significantly lower infection rates with (1) & (3) but no difference in deep incisional and org/sp SSIs

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

Variable	No. of SSIs	No. of surgical procedures	Povidone-iodine (n = 1,514 procedures)	Chlorhexidine (n = 827 procedures)	Iodine povacrylex (n = 794 procedures)	P[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

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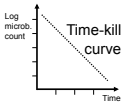
Important issues for skin antisepsis

(1) Good antimicrobial activity of antiseptic
- Alcohol compounds generally best for superficial skin
- Aqueous compounds for mucous membranes

(2) Repeated application with friction (e.g. 3 x)

(3) Sufficient contact time to exert antimicrobial kill
- Commonly recommended: about 5 minutes total
- Rationale: time-kill characteristics of antiseptics



(4) Be aware of fire risk when using alcohols
- Let the antiseptic dry before surgery
- Avoid pooling (e.g. under the patient) & wetting of drapes

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Note: for orientation only; practices vary widely

Antimicrobial prophylaxis

- Empirical choice of antibiotic(s) for type of operation
- Many studies showed reduction of SSIs
- The antibiotic(s) should be given as a single (but full therapeutic) dose before the operation, so that drug levels are sufficient during the operation
- Timing: about 30-60 min before incision
- Extra doses only for extended operations or contamination (e.g. spillage of intestinal content)
- Post-operative doses should not be given
  - No benefit, but bacterial resistance development

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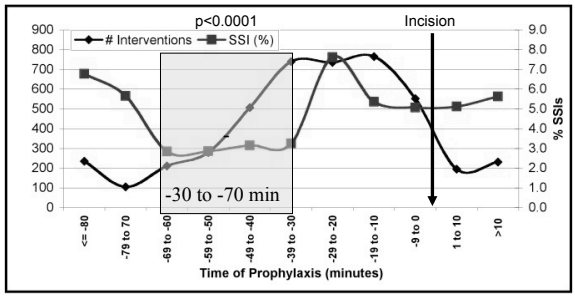
Timing of antimicrobial prophylaxis



Widmer AF et al. ICAAC Meeting, Washington, DC, 2005
Weber W et al. Ann. Surg. 247: 918-926; 2008

--> Similar findings in several other clinical studies

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Timing of antibiotic prophylaxis for Cesarian sections

- Traditionally: after cord clamping of the neonate
- Rationale: avoid abx exposure

New evidence:
- Prior to incision, as in other surgery
- Prevents infections in mothers
- No significant adverse effects found in babies

Antimicrobial Prophylaxis for Cesarean Delivery Before Skin Incision

Stephanie M. Owens, MD, Beverly S. Brozanski, MD, Leslie A. Meyn, MS, and Harold C. Wiesenfeld, MD, OB

VOL. 114, NO. 3, SEPTEMBER 2009 OBSTETRICS & GYNECOLOGY 573

CONCLUSION: Antimicrobial prophylaxis before skin incision, compared with after cord clamping, resulted in lower rates of maternal infections and had no effect on neonatal infections. Antimicrobial prophylaxis for cesarean delivery should occur before skin incision, consistent with basic tenets of surgical antimicrobial prophylaxis.
(Obstet Gynecol 2009;114:573–9)

Evidence-based cesarean technique
Colin A. Walsh

Department of Obstetrics and Gynecology, St George Hospital, University of New South Wales, Sydney, New South Wales, Australia

Correspondence to Dr Colin Walsh, Department of Obstetrics and Gynecology, St George Hospital, University of New South Wales, Kogarah, Sydney, NSW 2217, Australia. Tel: +61 2 9113 2272; e-mail: colwalsh@hotmail.com

Current Opinion in Obstetrics and Gynecology 2010, 22:110–115

. . . There is compelling evidence that antibiotics should be given prior to skin incision rather than the traditional administration after cord clamping.

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Other Measures to Prevent SSIs

- Surveillance program with surgeon feedback
  - Incl. post-discharge surveillance
- Screening for *Staph. aureus* carriage & decolonization before critical elective surgery
  - Recent study: Bode LGM et al. NEJM 362; 9-17; 2010
- Preoperative antiseptic showering (e.g. day before)
  - Unresolved
- Preoperative hair removal
  - If possible, no hair removal, if necessary, clipping is best
- Operating room ventilation & personnel movement
  - Recent discussion whether laminar flow is necessary or not
- Operating room attire and face masks
  - Discussion of face masks in anesthetists
- Avoidance of intraop. hypothermia & hyperglycemia
- Supplemental oxygen (e.g. 80%) respiration
  - Still controversial
- Listing is incomplete; several other measures

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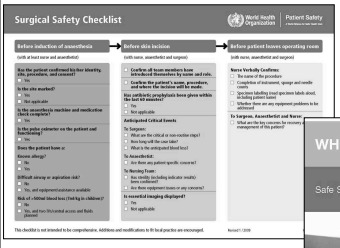
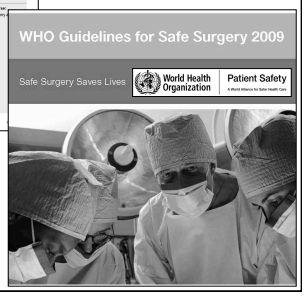
WHO Safe Surgery Saves Lives Campaign



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



- Guideline & Checklist
- However, focused more on general surgical safety, less on SSI prevention

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Bundle and Checklist Approaches

SPECIAL ARTICLE

N Engl J Med 2009;360:491-9.

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*

CONCLUSIONS

Implementation of the checklist was associated with concomitant reductions in the rates of death and complications among patients at least 16 years of age who were undergoing noncardiac surgery in a diverse group of hospitals.

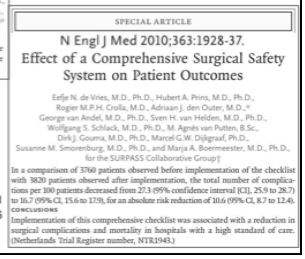
WHO Checklist was used

Both studies: focus on general surgical safety, infections only part

Checklist developed by a Dutch team

de Vries et al. Qual Saf Health Care 2009;18:121–126

- Bundle: set of ~3-5 defined practices that should be performed collectively
- Checklist: set of specific measures to be checked against a list (e.g. WHO)



SPECIAL ARTICLE

N Engl J Med 2010;363:1928-37.

Effect of a Comprehensive Surgical Safety System on Patient Outcomes

Eefje N. de Vries, M.D., Ph.D., Hubert A. Prins, M.D., Ph.D., Rogier M.P.H. Crolla, M.D., Adriaan J. den Outer, M.D., P. George van Andel, M.D., Ph.D., Sven H. van Helden, M.D., Ph.D., Wolfgang S. Schlack, M.D., Ph.D., M. Agnès van Putten, B.Sc., Dirk J. Gouma, M.D., Ph.D., Marcel G.W. Dijkgraaf, Ph.D., Susanne M. Smorenburg, M.D., Ph.D., and Marja A. Boermeester, M.D., Ph.D., for the SURPASS Collaborative Group†

In a comparison of 3760 patients observed before implementation of the checklist with 3820 patients observed after implementation, the total number of complications per 100 patients decreased from 27.3 (95% confidence interval [CI], 25.9 to 28.7) to 16.7 (95% CI, 15.6 to 17.9), for an absolute risk reduction of 10.6 (95% CI, 8.7 to 12.4).

CONCLUSIONS

Implementation of this comprehensive checklist was associated with a reduction in surgical complications and mortality in hospitals with a high standard of care. (Netherlands Trial Register number, NTR1943.)

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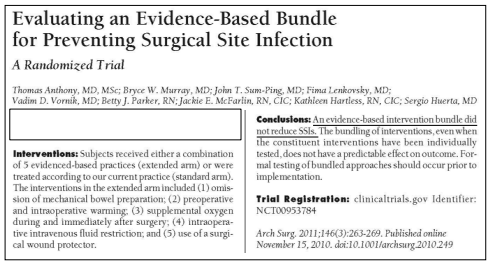
Caution: Bundles are no Guarantee



Evaluating an Evidence-Based Bundle for Preventing Surgical Site Infection

A Randomized Trial

Thomas Anthony, MD, MSc; Bryce W. Murray, MD; John T. Sum-Ping, MD; Fima Lenkovsky, MD; Vadim D. Vornik, MD; Betty J. Parker, RN; Jackie E. McFarlin, RN, CIC; Kathleen Hartless, RN, CIC; Sergio Huerta, MD

Interventions: Subjects received either a combination of 5 evidenced-based practices (extended arm) or were treated according to our current practice (standard arm). The interventions in the extended arm included (1) omission of mechanical bowel preparation; (2) preoperative and intraoperative warming; (3) supplemental oxygen during and immediately after surgery; (4) intraoperative intravenous fluid restriction; and (5) use of a surgical wound protector.

Conclusions: An evidence-based intervention bundle did not reduce SSIs. The bundling of interventions, even when the constituent interventions have been individually tested, does not have a predictable effect on outcome. Formal testing of bundled approaches should occur prior to implementation.

Trial Registration: clinicaltrials.gov Identifier: NCT00953784

Arch Surg. 2011;146(3):263-269. Published online November 15, 2010. doi:10.1001/archsurg.2010.249

- Implementation of a bundle of measures for which moderately good evidence exists, but all are not widely adopted
- Result: increased SSI rate
- Commentary speculated on distraction (multitasking problem)
- Personal interpretation: not only good EBM evidence is required, but also good scientific judgement & experience

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The 'Chlorhexidine Myth'

Background: several clinical trials showed better outcomes with pre-surgical skin antisepsis with
(a) alcohol plus chlorhexidine vs. (b) povidone-iodine alone
E.g. Darouiche et al. *N. Engl. J. Med*. 2010; 362: 18-26

Two recent Systematic Reviews

Conclusion:
"Chlorhexidine is better than Povidone-Iodine for surgical skin antisepsis"

Systematic Review and Cost Analysis Comparing Use of Chlorhexidine with Use of Iodine for Preoperative Skin Antisepsis to Prevent Surgical Site Infection

Infect Control Hosp Epidemiol 2010; 31(12):1219-1229

Ingi Lee, MD, MSCE; Rajender K. Agarwal, MD, MPH; Bruce Y. Lee, MD, MBA; Neil O. Fishman, MD; Craig A. Umscheid, MD, MSCE

Conclusions: "Preoperative skin antisepsis with chlorhexidine is more effective than preoperative skin antisepsis with iodine for preventing SSI and results in cost savings"

Systematic review and meta-analysis of preoperative antisepsis with chlorhexidine *versus* povidone–iodine in clean-contaminated surgery

British Journal of Surgery 2010; 97: 1614–1620

A. Noorani[1], N. Rabey[3], S. R. Walsh[1] and R. J. Davies[2]

Conclusion: "Chlorhexidine should be used preferentially for preoperative antisepsis in clean-contaminated surgery."

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The Chlorhexidine Myth – Continued

- Secondary literature, infection control internet forums and infection control websites conclude:
- "The evidence says that chlorhexidine is better than povidone-iodine and should be used for surgical skin antisepsis"
- Conclusions also made for central venous catheter care and venipuncture for blood culture collection
- Common perception that alcohol is a mere carrier or solvent for chlorhexidine (term "chlorhexidine in alcohol")

Example:

"Survey Shows One-Third of HCWs Don't Follow Evidence-Based Guidelines for Skin Antisepsis"

What does the evidence say:

. . . "to use chlorhexidine for skin antisepsis" (mention of alcohol only further down in text)

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Prevention of Surgical Site Infections

Prof. Matthias Maiwald,
A Webber Training Teleclass

What is wrong?

- Most (but not all) chlorhexidine preparations for skin antisepsis are mixtures of alcohol plus chlorhexidine
- Alcohols are about 10 times (~1 log) more rapid and effective than chlorhexidine (multiple tests since 1970s)
- Combination of alcohol plus CHG or PVP-I is indeed useful because of immediate plus sustained effect
- In the Systematic Reviews:
  - Majority of studies used (a) Alcohol plus CHG vs. (b) Povidone-Iodine alone (i.e. 2 active ingredients vs. 1)
  - Only few studies of CHG alone vs. PVP-I alone or alc. CHG vs. alc. PVP-I; they are inconclusive or methodologically flawed
  - Conclusions are made solely for CHG, alcohol is ignored
- **Assessment:** Reviews and conclusions are seriously flawed by way of ignoring the alcohol component

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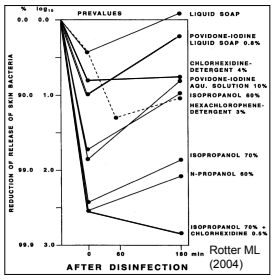
Addressing the 'Chlorhexidine Myth'

British Journal of Surgery
Letters (web & print) by:

(1) Nesseler N, Launey Y, Mallédant Y
Pontchaillou University Hospital, Rennes, France
(2) Maiwald M, Widmer AF, Rotter ML
KK Women's and Children's Hospital, Singapore;
University of Basel, Switzerland; University of Vienna, Austria
(3) Kampf, G, Kramer A
Bode Chemie, Hamburg, Germany;
University of Greifswald, Germany
(4) Turza Campbell K, Swenson BR, Sawyer RG
University of Virginia, Charlottesville, USA

Lack of Evidence for Attributing Chlorhexidine as the Main Active Ingredient in Skin Antiseptics Preventing Surgical Site Infections
Infect Control Hosp Epidemiol 2011;32(4):404-405
Matthias Maiwald, MD, PhD;[1] Andreas F. Widmer, MD, MS;[2] Manfred L. Rotter, MD, Dip Bact[3]

The Importance of Isopropyl Alcohol in Skin Preparation Solutions
Lin M. Riccio, MD;[1] Brian R. Swenson, MD, MS;[1,2] Robert G. Sawyer, MD[1,3]
Infect Control Hosp Epidemiol 2011;32(4):405-406



Conclusions:
- This myth can put patients at serious risk of infections
- It may take years to reverse it

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Flammable Skin Antiseptics and Risk of Surgical Fires

- Concern about fire risk in operating rooms when using alcohol skin antisepsis (several publications)
- However, OR fires are rare
- In USA: ~ 100 fires p.a., 10 severe, 1-2 deaths (Bruley ME. Qual Saf Health Care 2004)
- Majority due to anaesthetic gases & flammable items around airways
- Minority due to skin preps; these almost always due to inadvertent misuse: pooling, wetting of drapes

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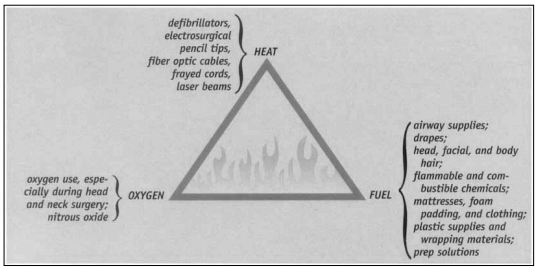
The 'fire triangle'



Salmon L. AORN J. 80: 41-54; 2004

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Some Facts and Calculations (US Data)

- In US, 30 million operations p.a.
- 2.5% SSIs (1/3 deep, severe)
- Result --> 249,000 deep organ/space SSIs
- If skin antisepsis reduces SSI rate 2.5% --> 2.4%
  --> 240,000 deep SSIs
  --> 9,000 deep SSIs avoided
- Contrast: 10 severe surgical fires p.a.
- **Conclusions:**
  - Fire risk is real, but avoidable w. good practices
  - Benefit in SSI prevention outweighs risks

Bruley ME. *Qual. Saf. Health Care* 2004; 13: 467–71.
Maiwald M et al. (Letter). ANZ J Surg 2006; 76: 422-423

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Campaigns & Tools for SSI Surveillance & Prevention

- World Health Organization Alliance for Patient Safety, Safe Surgery Saves Lives, WHO SSI Guidelines & Checklists
  - http://www.who.int/patientsafety/safesurgery/en/
- US Centers for Disease Control, Collection of Guidelines
  - http://www.cdc.gov/hicpac/pubs.html
- US Institute of Healthcare Improvement (IHI)
  - http://www.ihi.org
- UK Surgical Site Infection Surveillance Service (SSISS)
  - http://www.hpa.org.uk/infections/topics_az/surgical_site_infection/SSISS.htm
- UK NICE Surgical Site Infection Prevention Guidelines
  - http://www.nice.org.uk/CG74
- German Krankenhaus-Infektions-Surveillance-System (KISS)
  - http://www.nrz-hygiene.de/
- Note: listing is not intended to be complete!

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Prevention of Surgical Site Infections

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COMING SOON …

14 Apr. 11	**Healthcare-Associated Infection Prevention Bundles – Preventing The Preventable** Speaker: Dr. William Jarvis, Jason & Jarvis Associates
28 Apr. 11	*(Free British Teleclass – A. Denver Russell Memorial Teleclass)* **The Spaulding Classification for Disinfection and Sterilization Is it Time to Reconsider?** Speaker: Dr. Gerry McDonnell, Steris Inc.
05 May 11	*(Free WHO Teleclass)* **The Importance of Worldwide Hand Hygiene Events and Activities** Speaker: Prof. Didier Pittet, University of Geneva Hospitals Sponsored by: WHO Patient Safety Challenge (www.who.int/gpsc/en)
09 May 11	*(Free South Pacific Teleclass)* **Voices of the Australian Infection Control Association** Speaker: AICA Board
12 May 11	**The Faecal Quandary – Bedpan Management in a Modern Age** Speaker: Gertie van Knippenberg-Gordebeke, The Netherlands Sponsored by: MEIKO Maschinenbau GmbH & CO.KG

www.webbertraining.com/schedulep1.php

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