CDC and HICPAC DRAFT Guideline for Prevention of Surgical Site Infection

Healthcare Infection Control

Practices Advisory Committee Meeting

March 14, 2013

Objectives

- **Achievements since October**
- **Grading/Quality of Evidence/Formulating Recommendations**
- **Achievements since October**
  - Present new Core and Arthroplasty topics
  - Follow up on topics presented in October 2012

Key Topics

CORE

- Antimicrobial prophylaxis
- Glycemic control
- Normothermia
- Oxygenation
- Skin Prep

ARTHROPLASTY

- Transfusion
- Anticoagulation
- Immunosuppresive therapy
- Exhaust Suit
- Antimicrobial prophylaxis duration with drain use
- Biofilm

Achievements since October

- **GRADE Table, Narrative Summary, Recommendations**
- **CORE: Completed NEW**
  - Antimicrobial prophylaxis parenteral, antimicrobial prophylaxis topical, skin preparation
- **Updated:** Glycemic Control, Normothermia, Oxygenation

- **Arthroplasty Completed NEW -pending recommendations**
  - Transfusion, Immunosuppressive Therapy, Anticoagulation, Antimicrobial prophylaxis in presence of a drain
- **Updated:** Exhaust suit

Grading the Evidence

Type of evidence	Initial grade	Criteria to decrease grade	Criteria to increase grade	Overall quality grade
RCT	High	Study quality limitations Serious (-1) or very serious (-2) study quality limitations Inconsistency Important inconsistency (-1) Indirectness Some (-1) or major (-2) uncertainty about directness Imprecision Imprecise or sparse data (-1) Publication bias High risk of bias (-1)	Strength of Association Strong (+1) or very strong evidence of association (+2) Dose-Response Evidence of a dose-response gradient (+1) Confounding Inclusion of unmeasured confounders increases the magnitude of effect (+1)	High Moderate
Observational study	Low			Low
Any other evidence (e.g. expert opinion)	Very low			Very Low

Overall Quality Grades

- **High**
  - Further research is *very unlikely* to change confidence in the estimate of effect
- **Moderate**
  - Further research is *likely* to impact confidence in the estimate of effect and *may change* the estimate
- **Low**
  - Further research is *very likely* to impact confidence in the estimate of effect and is *likely to change* the estimate
- **Very low**
  - Any estimate of effect

FORMULATING RECOMMENDATIONS

Formulating Recommendations

- Three key inputs:
  - Values and preferences used to determine the “critical” outcomes
  - Overall GRADE of the evidence for the “critical” outcomes
  - Net benefits, net harms, or trade-offs that result from weighing the "critical" outcomes
- Recommendations
  - For or against (direction)
  - Strong or weak (strength)

CDC and HICPAC -Updated Categorization Scheme for Recommendations

Category IA	A strong recommendation supported by high to moderate quality evidence suggesting net clinical benefits or harms.
Category IB	A strong recommendation supported by low-quality evidence suggesting net clinical benefits or harms, or an accepted practice (e.g., aseptic technique) supported by low to very low-quality evidence.
Category IC	A strong recommendation required by state or federal regulation
Category II	A weak recommendation supported by any quality evidence suggesting a tradeoff between clinical benefits and harms.
No recommendation	An unresolved issue for which there is low to very low-quality evidence with uncertain tradeoffs between benefits and harms.

- http://www.cdc.gov/hicpac/pdf/guidelines/2009-10-29HICPAC_GuidelineMethodsFINAL.pdfor
- Umscheid CA, et al. , Am J Infect Control 2010;38:264-73.

DRAFT RECOMMENDATIONS

KQ1. ANTIMICROBIAL PROPHYLAXIS (AMP)-PARENTERAL

KQ1 ANTIMICROBIAL PROPHYLAXIS – (AMP) PARENTERAL

- **1999 Guideline**

- Very brief course of an antimicrobial agent initiated just before an operation begins.
- Not an attempt to sterilize tissues, but a critically timed adjunct used to reduce the microbial burden of intraoperative contamination to a level that cannot overwhelm host defenses.
- Not for prevention of SSI caused by postoperative contamination.
- Intravenous infusion mode of AMP delivery used most often in modern surgical practice
- Essentially all confirmed indications pertain to elective operations in which skin incisions are closed in the operating room.
- Not indicated for an operation classified…as contaminated or dirty. In such operations, patients are frequently receiving therapeutic antimicrobial agents perioperatively for established infections.

KQ1. What are the most effective strategies for administering parenteral AMP to reduce the risk of SSI?

- **KQ1A.1** How does the timing of preoperative AMP impact the risk of SSI and what is the optimal timing?
- **KQ1A.2** Cesarean section- How does the timing of preoperative AMP impact the risk of SSI and what is the optimal timing?
- **KQ1B.** How safe and effective is intraoperative redosing and when is it indicated?
- **KQ1C.** How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration?
- **KQ1D.** How safe and effective is weight-based dosing and re-dosing of AMP in non-obese, obese, and morbidly obese patients?

KQ1A.1 How does the timing of preoperative AMP impact the risk of SSI and what is the optimal timing?

Evidence Summary

Our search did not identify studies that evaluated the timing of preoperative parenteral AMP and its impact on the risk of surgical site infection.

Current clinical practice

2002 Surgical Care Improvement Project (SCIP)

2012 The Medical Letter -Surgical Prophylaxis Guidelines

2013 American Society of Health-System Pharmacists (ASHP) Guidelines

- Single IV dose AMP within 60 minutes before the procedure.
- Vancomycin or a fluoroquinolone within 60-120 minutes before the initial incision (for adequate tissue levels at the time of incision and to minimize the possibility of an infusion reaction close to the time of induction of anesthesia)

KQ1A.1 How does the timing of preoperative AMP impact the risk of SSI and what is the optimal timing?

Draft recommendations

1A.1 Preoperative timing

1999 Guideline:

Administer by the intravenous route the initial dose of prophylactic antimicrobial agent, timed such that a bactericidal concentration of the drug is established in serum and tissues when the incision is made. (Category IA)

DRAFT UPDATE

1A.1 Administer by the intravenous route a single dose of the prophylactic antimicrobial agent within 60 minutes prior to surgical incision. Administer vancomycin and fluoroquinolones within 60-120 minutes prior to surgical incision. **(Category IB)**

KQ1A.2 In Cesarean section, how does the timing of AMP impact the risk of SSI and what is the optimal timing? Evidence Summary

- **AMP before skin incision vs. After cord clamping**
  - 1 SR (Constantine 2007): meta-analysis (N=749) 3 RCTs (Sullivan 2007,Thigpen-2005,Wax 1997) (High)
  - laboring and non-laboring women, singleton and multiple births, ± Group B Strep AMP
  - Benefit of administering parenteral AMP before skin incision as compared to after cord clamping (High level evidence)
  - **Post-cesarean endometritis*** (High quality evidence)
    - **RR: 0.47 (95%CI 0.26-0.85); P=0.01** (53% overall reduction)
  - **Abdominal Incisional SSI** (High quality evidence)
    - RR: 0.60 (95%CI 0.30-1.21); P=0.15 (Trend toward reduction but not significant)
  - **Neonatal sepsis, neonatal sepsis workup, NICU admission** (High quality evidence)
    - AMP before skin incision did not affect any of the above

KQ1A.2 How does the timing of preoperative AMP impact the risk of SSI and what is the optimal timing?

Evidence Summary

1A.2 Cesarean section timing

2011American College of Obstetricians and Gynecologists (ACOG)

2012 The Medical Letter -Surgical Prophylaxis Guidelines

2013 American Society of Health-System Pharmacists (ASHP) Guidelines

- AMP for all cesarean deliveries, unless already on antimicrobial treatment (e.g., for chorioamnionitis) should be administered within 60 minutes before the start of the cesarean delivery.

KQ1A.2 How does the timing of preoperative AMP impact the risk of SSI and what is the optimal timing?

Draft recommendations

1A.2 Cesarean section timing

1999 Guideline:

For high-risk cesarean section, administer the prophylactic antimicrobial agent immediately *after the umbilical cord is clamped*. (Category IA)

DRAFT UPDATE

KQ1A.2 Administer the appropriate single dose parenteral prophylactic antimicrobial agent within 60 minutes prior to skin incision in all cesarean sections. **(Category IA)**

- 2011 American College of Obstetricians and Gynecologists (ACOG)
- 2012 Treatment Guidelines from The Medical Letter – Surgical Prophylaxis
- 2013 American Society of Health-System Pharmacists (ASHP)

KQ1B. HOW SAFE AND EFFECTIVE IS INTRAOPERATIVE REDOSING OF AMP AND WHEN IS IT INDICATED?

KQ1B. How safe and effective is intraoperative redosing and when is it indicated? Evidence Summary

- **1 preoperative dose vs. same plus intraoperative redosing**
  - 1 poor quality RCT (Cuthbertson 1991) (Low)
  - 278 elective colorectal surgery patients, all mechanical bowel prep without oral antimicrobials, 271 completed 30 day follow up
  - No benefit of intraoperative redosing as compared to 1 preoperative dose (Low level evidence)
  - **Abdominal incisional SSI*** (Low quality evidence)
    - 10/143 (7%) vs. 7/128 (5%); p=NS
  - **Intra-abdominal abscess*** (Low quality evidence)
    - 8/146 (5%) vs. 10/132 (8%); p=NS
  - **Perineal wound infections** (Low quality evidence)
    - 4/9 (44.4%) vs. 4/9 (44.4%); p=NS

KQ1B. How safe and effective is intraoperative redosing and when is it indicated? Evidence Summary

- **Findings: 1 preoperative dose vs. same plus intraoperative redosing**
  - AMP just before skin incision; redosed at 2h in study group BUT
    - 36/164 (22%) with duration >2h were NOT redosed
    - Must include some patients in the study group
  - Procedure duration >3h significantly higher probability of infection vs. 2-3h, or <2h ($p<0.05$)
  - Fecal contamination almost doubled the infection rate at every level of contamination
  - Study did not stratify procedure duration or fecal contamination results by group

KQ1B. How safe and effective is intraoperative redosing and when is it indicated?

Evidence Summary

1B. Intraoperative redosing

2012 Treatment Guidelines from The Medical Letter – Surgical Prophylaxis

For prolonged procedures (>3 hours) or those with major blood loss, or in patients with extensive burns, additional intraoperative doses should be given at intervals 1-2 times the half-life of the drug …for the duration of the procedure in patients with normal renal function.

2013 American Society of Health-System Pharmacists (ASHP) Guidelines

If the duration of the procedure exceeds two half-lives of the drug or there is excessive blood loss during the procedure

KQ1B. How safe and effective is intraoperative redosing and when is it indicated?

Draft recommendations

1B. Intraoperative redosing

1999 Guideline: Maintain therapeutic levels of the agent in serum and tissues throughout the operation (Category IA)

DRAFT UPDATE

1B. Maintain therapeutic levels of the prophylactic antimicrobial agent in serum and tissues throughout the operation based on individual agent pharmacokinetics; redose when the procedure duration exceeds the half-life of the antimicrobial agent, or when there is excessive blood loss. **(Category IB)**

KQ1C. HOW SAFE AND EFFECTIVE IS POSTOPERATIVE AMP, WHEN IS IT INDICATED AND WHAT IS THE OPTIMAL DURATION?

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration?

Specialty	RCTs	Publication Year
Cardiac	4	2008, 1994, 1980, 1972
Thoracic	1	1994
Vascular	4	1998,1988, 1987,1984
Ear, Nose, Throat	2	2008, 2003
Gynecologic	4	2005 (2), 1993, 1984
Orthopaedics- Fractures	4	2006, 1991,1990, 1987
Orthopaedics-Arthroplasty	2	1992,1989
Colorectal	13	2011, 2007, 1992,1991(3), 1995(2), 1989(2) ,1987(3)
General Surgery-Other	3	2007(2), 2005
Mixed general, urologic, GYN	1	1992
	38	**71% published before 1999**

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration? Evidence Summary

Focused on studies comparing:

- Same agents, same doses, IV route only
- Not all studies reported intraoperative redosing protocols

- **Pre & intraoperative AMP doses** (single preoperative dose ± intraoperative redosing) were NOT included in the "duration" calculations
- **"Duration"=** number of hours or days AMP was continued after the skin incision was closed the operating room

- **Critical Outcome:** SSI*

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration? Evidence Summary

All surgical Procedures: None vs. ≤24h (High quality evidence level)

- **"None" =** single preoperative dose ± intraoperative redosing

  19 RCTs Meta-analysis (High quality evidence level)

  Colorectal (7), orthopaedic (6), gynecologic (3) vascular (1), mixed (1), cardiac (1)

  Publication years: 1984-1995 (17) , 2005 (1), 2008 (1)

- **Critical Outcome:** SSI*

  No benefit of continuing AMP after closing the skin incision in the OR:

OR: 1.28 (95% CI: 0.95 – 1.74); p=0.11

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration? Evidence Summary

Specialty	Study Level	Comparator	SSI*
Cardiac	1RCT Moderate	None vs. ≤24h	Sternal: 35/419 (8.3%) vs. 15/419 (3.6%); **p=0.004**
	3 RCT Moderate	None vs. 72-96h	Sternal: meta-2 RCTs organ/space: No difference Sternal: meta 3 RCTs superficial: No difference Leg: superficial or deep: No difference
Thoracic	1RCT Low	None vs. 2 days	Empyema: 6/102 (6%) vs. 1/101 (1%); **p=0.03** SSI, incisional; No difference
Vascular	1 RCT Moderate	None vs. <24h	No difference
	1 RCT Moderate	None vs. 3-5d	No difference
	2 RCT High	16h vs. 3-5d	Meta-analysis: No difference

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration? Evidence Summary

Specialty	Study Level	Comparator	SSI*
ENT	2 RCT Moderate	≤24h vs. 3-5d	Meta-analysis: No difference
GYN	1 RCT Low	None vs. ≤24h	No difference
	1 RCT Low	None vs. <2.5d	No difference
Ortho-Fracture	4 RCT Low	None vs. ≤24h	Meta-analysis: No difference
Ortho-Arthroplasty	2 RCT Low	None vs. ≤24h	Meta-analysis: No difference

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration? Evidence Summary

Specialty	Study Level	Comparator	SSI*
Colorectal Bowel preparation and Oral antibiotics preop	1 RCT Moderate	None vs. 2d	No difference
	1 RCT Moderate	≤24h vs. 5d	No difference
Colorectal Bowel preparation only	5 RCT Moderate	None vs. ≤24h	Meta-analysis 5 RCTs: No difference Organ/space meta 3 RCTs: No difference
	3 RCT Moderate	None vs. <2-3d	Meta-analysis: No difference
Colorectal Bowel preparation Not reported	2 RCT High	None vs. ≤24h	Meta-analysis: No difference
	2 RCT Moderate	≤24h vs. 3d	Meta-analysis: No difference

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration? Evidence Summary

Specialty	Study Level	Comparator	SSI*
Appendectomy	1 RCT Moderate	None vs. ≤24h	No difference
Gastric surgery	1 RCT Moderate	None vs. 4 days	No difference
Hepatectomy	1 RCT Moderate	2 days vs. 5 days	No difference

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration?

Existing Guidance

2006 Society for Thoracic Surgeons

AMP duration for cardiac procedures should be ≤48h

2012 Treatment Guidelines from The Medical Letter – Surgical Prophylaxis

AMP duration should be <24h for most procedures

2013 American Society of Health-System Pharmacists (ASHP) Guidelines

AMP duration should be <24h for all patients

KQ1C. How safe and effective is postoperative AMP, when is it indicated and what is the optimal duration?

Draft Recommendations

1999 Guideline Administer….until, at most, a few hours after the incision is closed in the operating room. Category IA

Draft Update In clean and clean-contaminated procedures, do not administer additional prophylactic antimicrobial agent doses after the surgical incision is closed in the operating room.**(Category IA)**

KQ1D. HOW SAFE AND EFFECTIVE IS WEIGHT-ADJUSTED DOSING AND RE-DOSING OF ANTIMICROBIAL PROPHYLAXIS IN NON-OBESE, AND MORBIDLY OBESE PATIENTS?

KQ1D. How safe and effective is weight-based dosing and re-dosing of AMP in non-obese, obese, and morbidly obese patients?

Evidence Summary

Our search did not identify studies that evaluated weight- based dosing and re-dosing of antimicrobial prophylaxis in non-obese, obese, and morbidly obese patients, and its impact on the risk of surgical site infection.

KQ1D. How safe and effective is weight-based dosing and re-dosing of AMP in non-obese, obese, and morbidly obese patients?

Evidence Summary

2012 Treatment Guidelines from The Medical Letter – Surgical Prophylaxis

"The recommended dose of cefazolin is 1 g for patients who weigh <80 kg and 2 g for those >80 kg. Morbidly obese patients may need higher doses."

2013 American Society of Health-System Pharmacists (ASHP) Guidelines

"The pharmacokinetics of drugs may be altered in obese patients, so dosage adjustments based on body weight may be warranted in these patients."

KQ1D. How safe and effective is weight-based dosing and re-dosing of AMP in non-obese, obese, and morbidly obese patients?

Draft recommendations

1D. Weight-based dosing and re-dosing

1999 Guideline: No specific mention

DRAFT UPDATE

1D Adjust the prophylactic antimicrobial agent dose, based on the patient's weight, in obese and morbidly obese patients. **(Category 1B)**

KQ2. WHAT ARE THE MOST EFFECTIVE STRATEGIES FOR LOCAL, NON-PARENTERAL (TOPICAL) AMP?

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

- **KQ2A.** How safe and effective is antimicrobial or antiseptic irrigation?
- **KQ2B.** How safe and effective are antimicrobial coated sutures, when and how should they be used?
- **KQ2C.** How safe and effective are topical antimicrobial or antiseptic agents?
- **KQ2D.** How safe and effective are antimicrobial sealants?
- **KQ2E**. How safe and effective are antimicrobial dressings?

KQ2A.1. How safe and effective is antimicrobial irrigation?
Evidence Summary

Our search did not identify studies that evaluated the safety and effectiveness of antimicrobial irrigation in combination with parenteral antimicrobial prophylaxis and its impact on the risk of surgical site infection.

Also:

Our search did not identify studies that evaluated the safety and effectiveness of soaking surgical implants (i.e., meshes, neurosurgical ventricular shunts, etc.) in antimicrobial or antiseptic solutions prior to insertion, in combination with antimicrobial prophylaxis, and its impact on surgical site infection.

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

2A.1 Antimicrobial irrigation

Further research is needed to evaluate the safety and effectiveness of antimicrobial irrigation and of soaking prosthetic devices in antimicrobial or antiseptic solutions prior to surgical implantation. **(No recommendation/unresolved issue)**

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

- Effectiveness and safety – in combination with parenteral AMP
  - **Agents**
    - Electrochemically activated solutions (ECAS) or Povidone iodine (PI)
  - **Critical Outcome***
    - **SSI*** (superficial, deep, organ/space)
  - **Quantity and Type of Evidence**
    - ECAS or PI vs. Normal saline meta-analyses: 2 RCTs each (High quality)
    - ECAS vs. PI 1 RCT (Low quality)

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

- **Electrochemically activated solutions (ECAS)**

- Direct current applied to a low- mineral salt solution (like normal saline) transforms the electrolyte (sodium chloride) into an oxidative solution of hypochlorous acid, free chlorine, and free radicals with antimicrobial properties (Thorn 2012)

- Deactivated by contact with organic matter (Kiura 2002)

- Commonly used for wound irrigation or are incorporated into wound dressings in the treatment of wound infections (diabetic and venous ulcers, burns), treatment and prevention of periodontal disease, medical device disinfection, and environmental decontamination. (Thorn 2012)

Thorn RM, et al. Eur J Clin Microbiol Infect Dis. 2012 May;31(5):641-53. and Kiura H, et al. J Microbiol Methods. 2002;49:285–293.

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

ECAS Clean Surgical Procedures in Combination with Parenteral AMP		
	ECAS vs. Normal Saline **N=982** meta: 2 RCTs: Takesue 2011 Japan, Tijerina 2010 Mexico F/U 30d	ECAS vs. PI N=178 1 RCT: Ramzisham 2010 Malaysia; F/U 6w
Superficial SSI	**OR: 0.56; 95% CI: 0.37 – 0.86; p=0.008** Elective open appendectomy N=529 13% vs. 20%; p=0.03 Elective colorectal N=363 3.3% vs. 7.1% p=NS	5/88 (6%) vs. 10/90 (11%); p=0.20 Coronary artery bypass graft
Deep SSI	**OR: 0.91; 95% CI: 0.47 – 1.77; p=0.79**	0/88(0%) vs. 4/90(4%); p=0.14
Organ/ Space SSI	**OR: 0.99; 95% CI: 0.43 – 2.27; p=0.97**	None

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

ECAS Clean Surgical Procedures in Combination with Parenteral AMP		
	ECAS vs. Normal Saline **N=982** meta: 2 RCTs: Takesue 2011 Japan, Tijerina 2010 Mexico F/U 30d	**ECAS vs. PI** **N=178** 1 RCT: Ramzisham 2010 Malaysia; F/U 6w
Superficial SSI	**OR: 0.56; 95% CI: 0.37 – 0.86; p=0.008** Elective open appendectomy N=529 13% vs. 20%; p=0.03 Elective colorectal N=363 3.3% vs. 7.1% p=NS	**5/88 (6%) vs. 10/90 (11%); p=0.20** Coronary artery bypass graft
Deep SSI	**OR: 0.91; 95% CI: 0.47 – 1.77; p=0.79**	**0/88(0%) vs. 4/90(4%); p=0.14**
Organ/ Space SSI	**OR: 0.99; 95% CI: 0.43 – 2.27; p=0.97**	None

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

- **Product related adverse outcomes**

ECAS

- 1 RCT (Takesue 2011) in 363 elective colorectal procedures on logistic regression analysis identified ECAS as a significant independent risk factor associated with wound healing disturbances including wound breakdown, dehiscence, (superficial or deep to the fascia) or hernia: **OR 2.28 (95% CI: 1.03 – 5.04); p=0.043** (Moderate quality evidence)
- 1 RCT (Ramzisham 2010) reported no product-related adverse events (Low quality evidence)

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

Povidone Iodine Irrigation in Combination with Parenteral AMP			
SSI	**CLEAN** **PI vs. Normal saline** **N=658** meta 2RCTs Cheng 2005,Chang 2006 Taiwan; F/U 15-19m	CONTAMINATED PI vs. Normal saline 1)N=200 1 RCT Galland 1983-England 2) n=90 1 RCT Sindelar 1979 USA	DIRTY PI vs. Normal saline (N=78) Sindelar 1979 USA
Superficial	1) 0/280 vs. 1/206; p=0.50 2) No superficial infections Spine surgery: 1) decompression, pedicle screw fixation, discectomy, tumor 2)lumbosacral posterolateral fusion	NR	NR
Deep	**OR: 0.07; 95% CI: 0.01 – 0.58; p=0.01** 1) 0/208 vs. 6/206; p=0.015 2) 0/120 vs.6/124;p=0.029 35% PI irrigation, 3min soak, 2L normal saline Postop AMP IV+PO: 11/13 SSIs MRSA+	NR	NR
Organ/ Space	None	2) 1/44 vs. 3/46: p=NS Peritoneal cavity irrigation	0/36 vs. 6/42; P<0.05
SSI	NR	1)13/95 vs. 14/105; p=NS Open appy (perforated or gangrenous) PI dry aerosol spray	NR

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

Povidone Iodine Irrigation in Combination with Parenteral AMP			
SSI	**CLEAN** **PI vs. Normal saline** **N=658** meta 2RCTs Cheng 2005,Chang 2006 Taiwan; F/U 15-19m	**CONTAMINATED** **PI vs. Normal saline** **1)N=200** 1 RCT Galland 1983-England **2) n=90** 1 RCT Sindelar 1979 USA	DIRTY PI vs. Normal saline (N=78) Sindelar 1979 USA
Superficial	1) 0/280 vs. 1/206; p=0.50 2) No superficial infections Spine surgery: 1) decompression, pedicle screw fixation, discectomy, tumor 2)lumbosacral posterolateral fusion	NR	NR
Deep	**OR: 0.07; 95% CI: 0.01 – 0.58; p=0.01** 1) 0/208 vs. 6/206; p=0.015 2) 0/120 vs.6/124;p=0.029 35% PI irrigation, 3min soak, 2L normal saline Postop AMP IV+PO;11/13 SSIs MRSA+	NR	NR
Organ/ Space	None	2) 1/44 vs. 3/46: p=NS Peritoneal cavity irrigation	0/36 vs. 6/42; P<0.05
SSI	NR	1)13/95 vs. 14/105; p=NS Open appy (perforated or gangrenous) PI dry aerosol spray	NR

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

Povidone Iodine Irrigation in Combination with Parenteral AMP			
SSI	**CLEAN** **PI vs. Normal saline** **N=658** meta 2RCTs Cheng 2005,Chang 2006 Taiwan; F/U 15-19m	**CONTAMINATED** **PI vs. Normal saline** **1)N=200** 1 RCT Galland 1983-England **2) n=90** 1 RCT Sindelar 1979 USA	**DIRTY** **PI vs. Normal saline** **(N=78)** Sindelar 1979 USA
Superficial	1) 0/280 vs. 1/206; p=0.50 2) No superficial infections Spine surgery: 1) decompression, pedicle screw fixation, discectomy, tumor 2)lumbosacral posterolateral fusion	NR	NR
Deep	**OR: 0.07; 95% CI: 0.01 – 0.58; p=0.01** 1) 0/208 vs. 6/206; p=0.015 2) 0/120 vs.6/124;p=0.029 35% PI irrigation, 3min soak, 2L normal saline Postop AMP IV+PO; 11/13 SSIs MRSA+	NR	NR
Organ/ Space	None	2) 1/44 vs. 3/46: p=NS Peritoneal cavity irrigation	**0/36 vs. 6/42; P<0.05**
SSI	NR	1)13/95 vs. 14/105; p=NS Open appy (perforated or gangrenous) PI dry aerosol spray	NR

KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

- **Product related adverse outcomes**

Povidine Iodine

- 3 RCTs-1 RCT (Chang 2006) reported 1 incidence of wound dehiscence in the povidone iodine group; RCT (Sindelar-1979, Cheng 2005) reported no product related adverse events

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

2A.2 Antiseptic irrigation

- ECAS- discuss
- Povidone Iodine- discuss

KQ2B. How safe and effective are antimicrobial coated sutures and when and how should they be used? Evidence Summary

- ***Triclosan-coated suture (absorbable) vs. non-antimicrobial coated suture (absorbable and non-absorbable)***
  - Meta-analysis (N=424) 4 RCTs (Zhang 2011, Mingmalairak 2009, Rozelle 2008, Ford 2005) (High)
  - Modifed radical mastectomy, appendectomy, pediatric ventricular shunt and pediatric general surgery
  - No benefit of triclosan-coated sutures as compared to non-antimicrobial coated sutures (High quality evidence)
  - **SSI*** (High quality evidence)

    OR: 0.58; 95% CI: 0.18 – 1.90; p=0.37
  - **Adverse events** – (High quality evidence)
    - 4 RCTs – suggest no risk of product related adverse events

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

2B. Antimicrobial coated sutures

- Do not use antimicrobial coated sutures for the prevention of surgical site infection. **(Category 1A)**

KQ2C. How safe and effective are topical antimicrobial or antiseptic agents? Evidence Summary

- Effectiveness and safety – in combination with parenteral AMP
  - **Agents**
    - **Antimicrobials:** ampicillin, chloramphenicol, or rifampin
    - **Antiseptics:** povidone iodine
    - **Autologous platelet rich plasma- APRP** (gel or spray)

KQ2C. How safe and effective are topical antimicrobial or antiseptic agents? Evidence Summary

- **Topical Antimicrobial Agents- SSI***
  - No benefit of topical antimicrobial agents as compared to no topical antimicrobial agents
    - ***Ampicillin vs. No topical agent*** (High quality evidence)

      Meta-analysis 4 RCTs (N=699) 2 in colorectal (Juul 1985, Raahave 1989)
      2 in appendectomy (Seco 1990, Al-Sheri 1994)

      OR: 0.927; 95% CI: 0.27 – 1.72; p=0.90
    - ***Chloramphenicol vs. No topical agent*** (Moderate quality evidence)

      1 RCT (N= 92) hemiarthroplasty/hip fracture surgery (Kamath 2008 UK)

      12 (13.0%), 4/47 (8.5%) vs. 8/45 (17.8%); p=0.20
    - ***Rifampin vs. No topical agent*** (Low quality evidence)

      1 RCT (N=48) laparoscopic cholecystectomy (Neri 2008 Italy)

      reduced risk of "purulent" wound leakage (P<0.005)

      Histogram 12h postoperatively: 34/48 (70.8%); 10/24 (41.7%) vs. 24/24 (100%)

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

KQ2C.1 Topical antimicrobials

- Do not use topical antimicrobial agents (i.e., ointments, solutions) prior to or following wound closure for the prevention of surgical site infection. **(Category 1A)**

KQ2C. How safe and effective are topical antimicrobial or antiseptic agents? Evidence Summary

- **Topical Antiseptic Agents**
- ***Povidone iodine to skin prior to wound closure vs. No topical agent*** (Low)

  1 RCTs (N=107): gastric and colorectal procedures (Harihara 2006 Japan)

  Povidone iodine skin preparation; normal saline irrigation followed by repeat povidone iodine swab to skin around the incision (twice) prior to wound closure

  No benefit of topical antiseptic agents as compared to no topical antiseptic agents

  - **SSI* - 13/54 (24.1%) vs. 12/53 (22.6%)**

    All procedures- No difference between groups: superficial or organ/space SSI

    Gastric (N=47): No difference

    Colorectal (n=60):No difference

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

KQ2C.2 Topical antiseptics

- Use of a topical skin antiseptic agents after performing skin preparation prior to wound closure is not recommended for the prevention of surgical site infection. **(Category II)**

KQ2C. How safe and effective are topical antimicrobial or antiseptic agents?
Evidence Summary

- **Autologous Platelet Rich Plasma (APRP)**
- ***APRP (spray or gel) vs. No APRP*** (High quality evidence)

  Meta-analysis (N=257) 3 RCTs: 2 cardiac (Almdahl 2011- Norway, Litmathe 2009 Germany)
  1 total knee arthroplasty-TKA (Peerbooms 2009 Netherlands)

  - No benefit of topical APRP as compared to no topical APRP
  - **SSI*** **OR: 0.94 (95% CI: 0.42 – 2.13); p=0.89**
  - **Adverse events** (Moderate quality) – At 2w postop use of an APRP spray was associated with decreased likelihood of total wound closure: **1% vs. 35%; p=0.02**

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

2C.3 Autologous platelet rich plasma

- Do not use autologous platelet rich plasma for the prevention of surgical site infection. **(Category IA)**

KQ2D. How safe and effective are topical antimicrobial sealants?
Evidence Summary

- **Cyanoacrylate –based skin sealant**
- ***Cyanoacrylate based skin sealant vs. No sealant*** *(High level evidence)*

  Meta-analysis (N=553) 3 RCTs: 2 in cardiac surgery (Silva von Eckardstein 2011, Iyer 2011 Australia) and 1 in hernia repair (Towfigh 2011)

  No benefit of topical cyanoacrylate-based skin sealant as compared to no sealant

  SSI* OR: 0.23 (95% CI: 0.04 – 1.22); p=0.08

  Adverse events (High quality) No significant product related sensitivity or other adverse events (3 RCTs). Four episodes of some difficulty incising through the film and visible flaking of the product in one patient.

  Other- The two large multicenter studies were funded by the manufacturer of the cyanoacrylate-based skin sealant. (von Eckardstein, Towfigh)

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

2D. Antimicrobial sealants

- Do not use antimicrobial skin sealant following skin preparation and prior to skin incision for the prevention of surgical site infection. **(Category IA)**

KQ2E. How safe and effective are topical antimicrobial dressings?
Evidence Summary

- Our search did not identify studies that evaluated the safety and effectiveness of antimicrobial dressings and their impact on the risk of surgical site infection.

KQ2. What are the most effective strategies for local, non-parenteral AMP to reduce the risk of SSI?

Draft Recommendations

2E. Antimicrobial dressings

- Further research is needed to evaluate the safety and effectiveness of antimicrobial dressings. **(No recommendation/unresolved issue)**

KQ8. WHAT ARE THE MOST EFFECTIVE STRATEGIES FOR PREPARING THE PATIENT'S SKIN PRIOR TO SURGERY?

KQ8. What are the most effective strategies for preparing the patient's skin prior to surgery?

- **KQ8A.** How safe and effective are topical antiseptic products individually and in combination?

- **KQ8A.1**. How safe and effective is vaginal preparation with topical antiseptics, in combination with standard abdominal skin preparation, in obstetric and gynecological procedures?

- **KQ8B.** How safe and effective are plastic adhesive drapes?

KQ8A. How safe and effective are topical antiseptic products individually and in combination? Evidence Summary

Iodophors

- **Aqueous 1 or 2 step: 2 RCTs** (Moderate quality evidence)

  No benefit of 2 step aqueous iodophor as compared to 1 step aqueous iodophor

- **Iodophor in alcohol (1 or 2 step): 5 RCTs** (Moderate quality evidence)

  No benefit of iodophor in alcohol (1 or 2 step) as compared to aqueous iodophor (1 or 2 step)

KQ8A. How safe and effective are topical antiseptic products individually and in combination? Evidence Summary - Iodophors

Aqueous Iodophor (1 step) vs. Aqueous Iodophor (2 step)		
SSI	**2 RCTs (Moderate)** (Ellenhorn 2005) (Segal 2002)	**No difference** **1)** (N=234) abdominal oncology surgeries (30 day f/u) (Elllenhorn 2005) Incisional (10% in each group); intra-abdominal (2% vs.3%; p=0.14) **2)** (N=108) CABG patients (6w f/u) + antimicrobial shower (Segal 2002) Sternal SSI: 12% vs. 13%
Aqueous Iodophor (1 or 2 step) vs. Iodophor in alcohol (1 or 2 step, ± adhesive drape)		
SSI	**Meta-analysis** **5 RCTs (N=626)** **(High)** (Saltzman 2009) (Segal 2002) (Hort 2002) (Roberts 1995) (Gilliam 1990)	**No difference** **OR: 1.80 (95% CI: 0.50 – 6.52); p=0.37** (Segal 2002)- (n=209) CABG: 4/101(4%) vs. 14/108(13%); p=0.028 (6w f/u) (Roberts 1995)- (n=200) CABG: 9/96 (9.4%) versus 10/104 (9.6%); (30d f/u) (Saltzman 2009)* (n=100) Shoulder- No infections (10m f/u) (Hort 2002)* Foot and Ankle- No infections (f/u NR) (Gilliam 1990)* Hip and Knee Arthroplasty- No infections (f/u NR) * Designed to evaluate efficacy in decreasing skin contamination not SSI

KQ8A. How safe and effective are topical antiseptic products individually and in combination? Evidence Summary - Iodophors

Aqueous Iodophor (1 step) vs. Aqueous Iodophor (2 step)		
SSI	**2 RCTs (Moderate)** (Ellenhorn 2005) (Segal 2002)	**No difference** **1)** (N=234) abdominal oncology surgeries (30 day f/u) (Ellenhorn 2005) Incisional (10% in each group); intra-abdominal (2% vs.3%; p=0.14) **2)** (N=108) CABG patients (6w f/u) + antimicrobial shower (Segal 2002) Sternal SSI: 12% vs. 13%
Aqueous Iodophor (1 or 2 step) vs. Iodophor in alcohol (1 or 2 step, ± adhesive drape)		
SSI	**Meta-analysis** **5 RCTs (N=626) (High)** (Saltzman 2009) (Segal 2002) (Hort 2002) (Roberts 1995) (Gilliam 1990)	**No difference** **OR: 1.80 (95% CI: 0.50 – 6.52); p=0.37** **1)** (n=209) CABG: 4/101(4%) vs. 14/108(13%); p=0.028 (6w f/u) (Segal 2002) **2)** (n=200) CABG: 9/96 (9.4%) versus 10/104 (9.6%); (30d f/u) (Roberts 1995) **3)** (n=100) Shoulder- No infections (10m f/u) (Saltzman 2009)* **4)** (n=60) Hip and Knee Arthroplasty- No infections (f/u NR) (Gilliam 1990)* **5)** (n=49) Foot and Ankle- No infections (f/u NR) (Hort 2002)* * Designed to evaluate efficacy in decreasing skin contamination not SSI

KQ8A. How safe and effective are topical antiseptic products individually and in combination? Evidence Summary

- **Chlorhexidine gluconate (CHG) alcohol**
- **7 RCTs** (High quality evidence)

- Benefit of CHG-alcohol (1or 2 step) as compared to aqueous iodophor (1 or 2 step) - (High level evidence)

- No benefit of CHG-alcohol (1 or 2 step) as compared to aqueous iodophor in alcohol (1 or 2 step)- (High level evidence)

KQ8A. How safe and effective are topical antiseptic products individually and in combination?
Evidence Summary – Chlorhexidine gluconate in alcohol

CHG-alcohol (1 or 2 step) vs. Aqueous Iodophor (1 or 2 step)		
SSI	**Meta-analysis** **5 RCTs (N=1976)** **(High)** (Sistla 2010) (Darouiche 2010) (Saltzman 2009) (Paocharoen 2009) (Bibbo 2005)	CHG-alcohol (1or 2 step) associated with reduced risk for SSI **OR: 0.59 (95% CI: 0.42 – 0.83); p=0.003** 1)(n=849) mixed:RR: 0.59 (95% CI: 0.41-0.85); p=0.004 (30d)(Darouiche 2010) 2)(n=400) hernia repairs:14(7%) vs. 19(9.5%); p=0.364 (30d f/u) (Sistla 2010) 3)(n=500) mixed; RR: 0.62 (95% CI: 0.20 – 1.91); p=0.40(Paocharoen 2009) 4)(n=127) Foot and ankle: No infections (f/u NR) (Bibbo 2005)* 5)(n=100) Shoulder: No infections (10m f/u) (Saltzman 2009)*
CHG-alcohol (1 or 2 step) vs. Iodophor in alcohol (1 or 2 step)		
SSI	Meta-analysis 5 RCTs (N=1346) (High) (Cheng 2009) (Saltzman 2009) (Veiga 2008) (Ostrander 2005) (Berry 1982)	No difference OR: 0.64 (95% CI: 0.24 – 1.71); p=0.38 (Berry 1982) (n=743) mixed- 27/389(6.9%) vs. 35/354(9.9%); p=NS (Veiga 2008)- (n=250) plastic breast surgery; 4 SSI in iodophor group (30d f/u) (Cheng 2009)*- (n=50) Foot and ankle- no infections (f/u NR) (Saltzman 2009)* (n=100) shoulder- No infections (10m f/u) (Ostrander 2005)* (N=80) Foot and ankle- No infections (f/u NR) * Designed to evaluate efficacy in decreasing skin contamination not SSI

KQ8A. How safe and effective are topical antiseptic products individually and in combination?
Evidence Summary – Chlorhexidine gluconate in alcohol

CHG-alcohol (1 or 2 step) vs. Aqueous Iodophor (1 or 2 step)		
SSI	**Meta-analysis** **5 RCTs (N=1976)** **(High)** (Sistla 2010) (Darouiche 2010) (Saltzman 2009) (Paocharoen 2009) (Bibbo 2005)	CHG-alcohol (1or 2 step) associated with reduced risk for SSI **OR: 0.59 (95% CI: 0.42 – 0.83); p=0.003** 1)(n=849) mixed:RR: 0.59 (95% CI: 0.41-0.85); p=0.004 (30d)(Darouiche 2010) 2)(n=400) hernia repairs:14(7%) vs. 19(9.5%); p=0.364 (30d f/u) (Sistla 2010) 3)(n=500) mixed; RR: 0.62 (95% CI: 0.20 – 1.91); p=0.40(Paocharoen 2009) 4)(n=127) Foot and ankle: No infections (f/u NR) (Bibbo 2005)* 5)(n=100) Shoulder: No infections (10m f/u) (Saltzman 2009)*
CHG-alcohol (1 or 2 step) vs. Iodophor in alcohol (1 or 2 step)		
SSI	**Meta-analysis** **5 RCTs (N=1346)** **(High)** (Cheng 2009) (Saltzman 2009) (Veiga 2008) (Ostrander 2005) (Berry 1982)	**No difference** **OR: 0.64 (95% CI: 0.24 – 1.71); p=0.38** 1)(n=743) mixed- 27/389(6.9%) vs. 35/354(9.9%); p=NS (Berry 1982) 2)(n=250) plastic breast surgery; 4 SSI in iodophor group (30d f/u)(Veiga '08) 3)(n=50) Foot and ankle- No infections (f/u NR) (Cheng 2009)* 4)(n=100) Shoulder- No infections (10m f/u) (Saltzman 2009)* 5)(n=80) Foot and ankle- No infections (f/u NR) (Ostrander 2005)* ** Designed to evaluate efficacy in decreasing skin contamination not SSI*

KQ8. What are the most effective strategies for preparing the patient's skin prior to surgery.

Draft Recommendations

8A. Antiseptic Agent- Skin Preparation

1999 Guideline

Use an appropriate antiseptic agent for skin preparation Category IB

DRAFT UPDATE

8A.1 Perform intraoperative skin preparation with an appropriate antiseptic agent. **(Category IA)**

8A.1.a Use an antiseptic agent with alcohol, unless contraindicated**. (Category IA)**

KQ8BA.1. How safe and effective is vaginal preparation with topical antiseptics, in combination with standard abdominal skin preparation, in OBGYN procedures? Evidence Summary

- ***Aqueous iodophor vaginal prep vs. control (normal saline or none) in cesarean section*** (Moderate quality evidence)
  - 1 SR (Haas 2010) meta-analysis (N=1198) 4 RCTs in cesarean sections
  - Benefit of aqueous iodophor vaginal preparation as compared to no vaginal preparation in cesarean section (Moderate quality evidence)
- **Post-cesarean endometritis***

  Vaginal prep associated with reduced risk of post-cesarean endometritis

  RR: 0.57 (95% CI: 0.38 – 0.87); p=0.009

  •Subgroup analysis (n=148) from 2 RCTs showed reduction most pronounced in women with ruptured membranes:

  1.4% vs. 15.4%; RR 0.13 (95%CI, 0.02-0.66)

  •Substantial heterogeneity between the studies

  Abdominal incisional SSI- meta-analysis 3 RCTs no difference p=0.81

KQ8A.1. How safe and effective is vaginal preparation with topical antiseptics, in combination with standard abdominal skin preparation, in OBGYN procedures?

KQ8A. Antiseptic Agent- Vaginal Preparation Cesarean Section

1999 Guideline

No mention

DRAFT RECOMMENDATION UPDATE

8A.2.a In cesarean sections, perform vaginal preparation with aqueous iodophor in addition to standard abdominal skin preparation. **(Category 1A)**

KQ8A.1. How safe and effective is vaginal preparation with topical antiseptics, in combination with standard abdominal skin preparation, in OBGYN procedures? Evidence Summary

- ***Aqueous iodophor vaginal prep + iodophor gel at vaginal apex vs. Aqueous iodophor vaginal prep in total abdominal hysterectomy***
  (Moderate quality evidence)

  - 1 RCT (N=1570) in total abdominal hysterectomy (Eason 2004)
  - Benefit of iodophor gel in addition to aqueous iodophor vaginal preparation in total abdominal hysterectomy (Moderate evidence)

- **Pelvic abscess***

  0/780 vs. 7/790; p<0.01

  3/505 received AMP vs. 4/576 did not receive AMP; p=0.26

KQ8A.1. How safe and effective is vaginal preparation with topical antiseptics, in combination with standard abdominal skin preparation, in OBGYN procedures?

KQ8A. Antiseptic Agent- Vaginal Prep- Total Abdominal Hysterectomy

1999 Guideline

No mention

DRAFT RECOMMENDATION UPDATE:

8A.2.b. In total abdominal hysterectomy- discuss

KQ8B. How safe and effective are plastic adhesive drapes?
Evidence Summary

- Effectiveness and safety
  - **Agents**
    - Non-antimicrobial plastic adhesive drape
    - Iodophor-impregnated plastic adhesive drape
  - **Critical Outcome***
    - **SSI***
  - **Quantity and Type of Evidence**
    - **Non-antimicrobial plastic adhesive drape**
      - 1 SR (Webster 2007) meta-analysis 4 RCTs (High quality)
    - **Iodophor-impregnated plastic adhesive drape**
      - 1 SR (Webster 2007) meta-analysis 2 RCTs (High quality)

KQ8B. How safe and effective are plastic adhesive drapes?
Evidence Summary

Non-Antimicrobial Adhesive Drapes

- ***Adhesive drape vs. No drape*** (High quality evidence)

  1 SR meta-analysis (N=1742) 4 RCTs (Webster 2007)

  Studies cover 30 year clinical period (1971-2001)

  General surgery, cesarean section, and hipfracture surgery

  2 recent studies used polyurethane adhesive drape (Chiu 1993, Ward 2001)

  2 older studies did not report drape information (Jackson 1971, Psaila 1977)

  - No benefit of non-antimicrobial plastic adhesive drape as compared to no drape (High quality evidence)

    SSI* **RR: 1.05 (95% CI: 0.81 – 1.35); p=0.71**

    Skin preparation (product and application) may have impacted drape adhesion

KQ8B. How safe and effective are plastic adhesive drapes?
Evidence Summary

- **Iodophor-impregnated adhesive drape**
- ***Iodophor impregnated adhesive drape vs. No drape*** (High quality evidence)

  1 SR meta-analysis 2 RCTs (N=1113) (Webster 2007)

  Studies cover 15 year clinical period (1987-2002)

  Follow up was 3 weeks in the abdominal surgery study (Dewan 1987) and 6 weeks in the CABG study (Segal 2002)

  - No benefit of iodophor-impregnated plastic adhesive drape as compared to no drape (High evidence)
  - **SSI*** **RR 1.03 (95% CI: 0.66 – 1.60); p=0.89**

KQ8. What are the most effective strategies for preparing the patient's skin prior to surgery.

Draft Recommendations

8B. Plastic adhesive drapes

1999 Guideline

No recommendation

DRAFT UPDATE

8B. Do no use plastic adhesive drapes (with or without antimicrobial properties) for the sole purpose of preventing surgical site infection. **(Category IA)**

OCTOBER 2012 TOPICS
UPDATED
RECOMMENDATIONS

KQ3. GLYCEMIC CONTROL

KQ3A. In diabetics and non-diabetics, how is the risk of SSI impacted by blood glucose levels and what are the optimal targets?

Draft Recommendations

3A Glycemic Control- Glucose levels

1999 Guideline: Adequately control serum blood glucose levels in all diabetic patients and particularly avoid hyperglycemia perioperatively. Category IB

October 2012

3A.1 For diabetic, cardiac surgery patients with short surgical intensive care unit stays, standard practice of blood glucose targets <200mg/dL is recommended (Category IB)

DRAFT UPDATE: *Implement perioperative glycemic control and use blood glucose target levels <180mg/dL in diabetic and non-diabetic surgical patients*. **(Category IB)**

KQ3A. In diabetics and non-diabetics, how is the risk of SSI impacted by blood glucose levels and what are the optimal targets?

Draft Recommendations

3A Glycemic Control- Glucose levels

3A.1. *Further research to define optimal blood glucose target levels in diabetic, non-diabetic, and critically-ill surgical patients should evaluate the benefits and harms associated with glycemic control in different surgical populations, and postoperative settings which may impact choice of optimal target levels, delivery methods, timing of instituting, and duration of the protocol.*
(No recommendation/unresolved issue) UPDATE: NONE

3A.2. Perioperative glycemic control using strict blood glucose target levels, solely for the prevention of surgical site infections, in predominantly non-diabetic, cardiac surgery patients with expected short surgical intensive care unit stays is not recommended (Category IA) **UPDATE: REMOVED**

KQ3B. In diabetics and non-diabetics, how is the risk of SSI impacted by hemoglobin A1C levels?

Draft Recommendations

3B. Glycemic control- Hemoglobin A1C

1999 Guideline- No recommendation

KQ3B. *Further research is needed to understand the association between hemoglobin AIC and the risk of surgical site infection in diabetic and non-diabetic patients.* **(No recommendation/unresolved issue)**

UPDATE: NONE

KQ4-5. NORMOTHERMIA

KQ4 How effective is maintenance of normothermia in reducing the risk of SSI?

Draft Recommendations

4 Normothermia

1999 Guideline- No recommendation

October 2012

4. Maintenance of perioperative normothermia is recommended **(Category IA)**

DRAFT UPDATE

4. *Maintain perioperative normothermia* **(Category 1A)**

KQ5. What are the most effective strategies for achieving and maintaining normothermia?

Draft Recommendations

5. Normothermia- strategies

Clinical Practice Guidelines

2009: Forbes S et.al. Evidence-based guidelines for prevention of perioperative hypothermia.

2010: Hooper VD et al. ASPAN's evidence-based clinical practice guideline for the promotion of perioperative normothermia

October 2012

5. *Further research is needed on the most effective strategies for achieving and maintaining normothermia, particularly with respect to determining the lower limit, optimal timing, and duration. These studies should all include SSI as an outcome*.

(No recommendation/unresolved issue)

UPDATE: **NONE**

Forbes S et.al. J Am Coll Surg. 2009 Oct;209(4):492-503.e1.
Hooper VD et al. J Perianesth Nurs. 2010 Dec;25(6):346-65

KQ6-7. OXYGENATION

KQ6. In patients with normal pulmonary function, how safe and effective is the perioperative use of increased FiO2/inspired oxygen in reducing the risk of SSI, and when is it indicated?

Draft Recommendations

1999 Guideline: No recommendation to provide measures that enhance wound space oxygenation to prevent SSI**.** Unresolved issue

October 2012

6. Increased perioperative oxygenation alone, in the absence of strategies to optimize oxygen tissue delivery including maintenance of perioperative normothermia and liberal fluid/volume replacement is not recommended for the prevention of surgical site infection. **(Category IA)**

DRAFT UPDATE

6A.1 *In patients undergoing surgery with general anesthesia using mechanical ventilation, administer increased fraction of inspired oxygen (FiO_2) intraoperatively and post-extubation in the immediate postoperative period, in combination with strategies to optimize tissue oxygen delivery through maintenance of perioperative normothermia and adequate volume replacement.* **(Category 1A)**

KQ6. In patients with normal pulmonary function, how safe and effective is the perioperative use of increased FiO2/inspired oxygen in reducing the risk of SSI, and when is it indicated?

DRAFT RECOMMENDATION UPDATE

6A.2 *Further research is needed to understand the association between perioperative increased fraction of inspired oxygen (FiO_2) delivery and the risk of surgical site infection in patients undergoing surgery with general anesthesia without mechanical ventilation. or neuraxial anesthesia (e.g., spinal, epidural or local nerve blocks).*
(No recommendation/unresolved issue)

KQ7.What is the optimal concentration of FiO2/inspired oxygen, how and when should it be administered?

Draft Recommendation

October 2012

7 Further research addressing the optimal fraction of inspired oxygen (FiO_2), timing, duration, and delivery method in surgical site infection prevention should also evaluate potential benefits and harms. **(No recommendation/ unresolved issue)**

UPDATE: NONE

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