CDC and HICPAC DRAFT Guideline for Prevention of Surgical Site Infection

Healthcare Infection Control Practices Advisory Committee Meeting
March 14, 2013

Disclaimer: The findings and conclusions are draft and have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.
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
- Immunosuppressive 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

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category IA</td>
<td>A strong recommendation supported by high to moderate quality evidence suggesting net clinical benefits or harms.</td>
</tr>
<tr>
<td>Category IB</td>
<td>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.</td>
</tr>
<tr>
<td>Category IC</td>
<td>A strong recommendation required by state or federal regulation</td>
</tr>
<tr>
<td>Category II</td>
<td>A weak recommendation supported by any quality evidence suggesting a tradeoff between clinical benefits and harms.</td>
</tr>
<tr>
<td>No recommendation</td>
<td>An unresolved issue for which there is low to very low-quality evidence with uncertain tradeoffs between benefits and harms.</td>
</tr>
</tbody>
</table>

DRAFT RECOMMENDATIONS
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.

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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?

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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)

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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)

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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**
  - 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

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**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

- **2011 American 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.

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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)

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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

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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

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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

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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)

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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?

<table>
<thead>
<tr>
<th>Specialty</th>
<th>RCTs</th>
<th>Publication Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic</td>
<td>1</td>
<td>1994</td>
</tr>
<tr>
<td>Ear, Nose, Throat</td>
<td>2</td>
<td>2008, 2003</td>
</tr>
<tr>
<td>Orthopaedics-Arthroplasty</td>
<td>2</td>
<td>1992, 1989</td>
</tr>
<tr>
<td>General Surgery-Other</td>
<td>3</td>
<td>2007(2), 2005</td>
</tr>
<tr>
<td>Mixed general, urologic, GYN</td>
<td>1</td>
<td>1992</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>38</td>
<td>71% published before 1999</td>
</tr>
</tbody>
</table>

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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*

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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

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

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

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

**Evidence Summary**

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<tr>
<th>Specialty</th>
<th>Study Level</th>
<th>Comparator</th>
<th>SSI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENT</td>
<td>2 RCT</td>
<td>≤24h vs. 3-5d</td>
<td>Meta-analysis: No difference</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GYN</td>
<td>1 RCT</td>
<td>None vs. ≤24h</td>
<td>No difference</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 RCT</td>
<td>None vs. &lt;2.5d</td>
<td>No difference</td>
</tr>
<tr>
<td>Ortho-Fracture</td>
<td>4 RCT</td>
<td>None vs. ≤24h</td>
<td>Meta-analysis: No difference</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ortho-Arthroplasty</td>
<td>2 RCT</td>
<td>None vs. ≤24h</td>
<td>Meta-analysis: No difference</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Evidence Summary**

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Study Level</th>
<th>Comparator</th>
<th>SSI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal Bowel preparation and Oral antibiotics preop</td>
<td>1 RCT Moderate</td>
<td>None vs. 2d</td>
<td>No difference</td>
</tr>
<tr>
<td></td>
<td>1 RCT Moderate</td>
<td>≤24h vs. 5d</td>
<td>No difference</td>
</tr>
</tbody>
</table>
| 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 |

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

**Evidence Summary**

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<tr>
<th>Specialty</th>
<th>Study Level</th>
<th>Comparator</th>
<th>SSI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendectomy</td>
<td>1 RCT</td>
<td>None vs. ≤24h</td>
<td>No difference</td>
</tr>
<tr>
<td>Gastric surgery</td>
<td>1 RCT</td>
<td>None vs. 4 days</td>
<td>No difference</td>
</tr>
<tr>
<td>Hepatectomy</td>
<td>1 RCT</td>
<td>2 days vs. 5 days</td>
<td>No difference</td>
</tr>
</tbody>
</table>

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**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

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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)

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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.

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**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.”

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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?

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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.

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**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)

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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)


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**KQ2A.2. How safe and effective is antiseptic irrigation?**

**Evidence Summary**

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<tr>
<th></th>
<th>ECAS vs. Normal Saline</th>
<th>ECAS vs. PI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N=982</strong></td>
<td><strong>ECAS vs. Normal Saline</strong></td>
<td><strong>N=178</strong></td>
</tr>
<tr>
<td>meta: 2 RCTs: Takesue 2011 Japan, Tijerina 2010 Mexico F/U 30d</td>
<td></td>
<td>1 RCT: Ramzisham 2010 Malaysia; F/U 6w</td>
</tr>
<tr>
<td><strong>Superficial SSI</strong></td>
<td>OR: 0.56; 95% CI: 0.37 – 0.86; p=0.008</td>
<td>5/88 (6%) vs. 10/90 (11%); p=0.20</td>
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<tr>
<td></td>
<td>Elective open appendectomy N=529 13% vs. 20%; p=0.03</td>
<td>Coronary artery bypass graft</td>
</tr>
<tr>
<td></td>
<td>Elective colorectal N=363 3.3% vs. 7.1% p=NS</td>
<td></td>
</tr>
<tr>
<td><strong>Deep SSI</strong></td>
<td>OR: 0.91; 95% CI: 0.47 – 1.77; p=0.79</td>
<td>0/88(0%) vs. 4/90(4%); p=0.14</td>
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<tr>
<td><strong>Organ/Space SSI</strong></td>
<td>OR: 0.99; 95% CI: 0.43 – 2.27; p=0.97</td>
<td>None</td>
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KQ2A.2. How safe and effective is antiseptic irrigation? Evidence Summary

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<tr>
<td><em>Clean Surgical Procedures in Combination with Parenteral AMP</em></td>
<td>meta: 2 RCTs: Takesue 2011 Japan, Tijerina 2010 Mexico F/U 30d</td>
<td>1 RCT: Ramzisham 2010 Malaysia; F/U 6w</td>
</tr>
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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)

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**KQ2A.2. How safe and effective is antiseptic irrigation?**

**Evidence Summary**

<table>
<thead>
<tr>
<th>SSI</th>
<th>CLEAN</th>
<th>CONTAMINATED</th>
<th>DIRTY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI vs. Normal saline</strong></td>
<td><strong>N=658</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>meta 2RCTs Cheng 2005, Chang 2006 Taiwan; F/U 15-19m</td>
<td>1) N=200 1 RCT Galland 1983-England 2) n=90 1 RCT Sindelar 1979 USA</td>
<td>1) N=78 Sindelar 1979 USA</td>
</tr>
<tr>
<td><strong>Superficial</strong></td>
<td>1) 0/280 vs. 1/206; p=0.50</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>2) No superficial infections</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spine surgery:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1) decompression, pedicle screw fixation, discectomy, tumor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) lumbosacral posterolateral fusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Deep</strong></td>
<td>OR: 0.07; 95% CI: 0.01 – 0.58; p=0.01</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>1) 0/208 vs. 6/206; p=0.015</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) 0/120 vs. 6/124; p=0.029</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>35% PI irrigation, 3min soak, 2L normal saline</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Postop AMP IV+PO: 11/13 SSI MRSA+</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Organ/Space</strong></td>
<td>None</td>
<td>2) 1/44 vs. 3/46: p=NS</td>
<td>0/36 vs. 6/42; P&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Peritoneal cavity irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SSI</strong></td>
<td>NR</td>
<td>1) 13/95 vs. 14/105; p=NS</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>Open appy (perforated or gangrenous) PI dry aerosol spray</td>
<td></td>
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### KQ2A.2. How safe and effective is antiseptic irrigation?

#### Evidence Summary

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**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

**Deep**

1) OR: 0.07; 95% CI: 0.01 – 0.58; p=0.01  
2) 0/208 vs. 6/206; p=0.015  
3) 0/120 vs. 6/124; p=0.029  
35% PI irrigation, 3min soak, 2L normal saline  
Postop AMP IV+PO; 11/13 SSIs MRSA+

**Organ/Space**

None

**SSI**

NR

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

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**Superficial**
- 1) 0/280 vs. 1/206; p=0.50
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- Spine surgery:
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**Organ/Space**
- None

**SSI**
- NR

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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

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**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

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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)**
  - Modified 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

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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)*

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

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)

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**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)
    
    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%)

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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)

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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

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**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

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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)

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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)*

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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)

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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.

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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)

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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?

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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)

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

**Evidence Summary - Iodophors**

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<thead>
<tr>
<th>Aqueous Iodophor (1 step) vs. Aqueous Iodophor (2 step)</th>
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<tbody>
<tr>
<td><strong>SSI</strong></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Aqueous Iodophor (1 or 2 step) vs. Iodophor in alcohol (1 or 2 step, ± adhesive drape)</th>
</tr>
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## KQ8A. How safe and effective are topical antiseptic products individually and in combination? Evidence Summary - Iodophors

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

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**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 (1 or 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)

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

**Evidence Summary – Chlorhexidine gluconate in alcohol**

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<tr>
<th>SSI</th>
<th>CHG-alcohol (1 or 2 step) vs. Aqueous Iodophor (1 or 2 step)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meta-analysis 5 RCTs (N=1976) (High)</strong></td>
<td>CHG-alcohol (1or 2 step) associated with reduced risk for SSI</td>
</tr>
<tr>
<td><strong>(High)</strong></td>
<td>OR: 0.59 (95% CI: 0.42 – 0.83); p=0.003</td>
</tr>
<tr>
<td>(Sistla 2010)</td>
<td>1)(n=849) mixed:RR: 0.59 (95% CI: 0.41-0.85); p=0.004 (30d) (Darouiche 2010)</td>
</tr>
<tr>
<td>(Darouiche 2010)</td>
<td>2)(n=400) hernia repairs:14(7%) vs. 19(9.5%); p=0.364 (30d f/u) (Sistla 2010)</td>
</tr>
<tr>
<td>(Saltzman 2009)</td>
<td>3)(n=500) mixed; RR: 0.62 (95% CI: 0.20 – 1.91); p=0.40 (Paocharoen 2009)</td>
</tr>
<tr>
<td>(Paocharoen 2009)</td>
<td>4)(n=127) Foot and ankle: No infections (f/u NR) (Bibbo 2005)*</td>
</tr>
<tr>
<td>(Bibbo 2005)</td>
<td>5)(n=100) Shoulder: No infections (10m f/u) (Saltzman 2009)*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SSI</th>
<th>CHG-alcohol (1 or 2 step) vs. Iodophor in alcohol (1 or 2 step)</th>
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</thead>
<tbody>
<tr>
<td><strong>Meta-analysis 5 RCTs (N=1346) (High)</strong></td>
<td>No difference</td>
</tr>
<tr>
<td><strong>(High)</strong></td>
<td>OR: 0.64 (95% CI: 0.24 – 1.71); p=0.38</td>
</tr>
<tr>
<td>(Berry 1982)</td>
<td>(n=743) mixed- 27/389(6.9%) vs. 35/354(9.9%); p=NS</td>
</tr>
<tr>
<td>(Cheng 2009)*</td>
<td>(n=250) plastic breast surgery; 4 SSI in iodophor group (30d f/u)</td>
</tr>
<tr>
<td>(Saltzman 2009)*</td>
<td>(n=50) Foot and ankle- no infections (f/u NR) (Cheng 2009)*</td>
</tr>
<tr>
<td>(Veiga 2008)</td>
<td>(n=100) shoulder- No infections (10m f/u) (Saltzman 2009)*</td>
</tr>
<tr>
<td>(Ostrander 2005)</td>
<td>(n=80) Foot and ankle- No infections (f/u NR) (Ostrander 2005)*</td>
</tr>
</tbody>
</table>

*Designed to evaluate efficacy in decreasing skin contamination not SSI

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

**Evidence Summary – Chlorhexidine gluconate in alcohol**

<table>
<thead>
<tr>
<th>CHG-alcohol (1 or 2 step) vs. Aqueous Iodophor (1 or 2 step)</th>
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<tbody>
<tr>
<td><strong>SSI</strong></td>
</tr>
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**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)

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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
  
  \[ \text{RR: 0.57 (95\% CI: 0.38 – 0.87); p=0.009} \]
  
  • 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

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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)

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**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

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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

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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)

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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

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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

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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)

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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)

Disclaimer: The findings and conclusions are draft and have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.
**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

Disclaimer: The findings and conclusions are draft and have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.
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 A1C and the risk of surgical site infection in diabetic and non-diabetic patients. (No recommendation/unresolved issue)

UPDATE: NONE

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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)

Disclaimer: The findings and conclusions are draft and have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.
KQ5. What are the most effective strategies for achieving and maintaining normothermia?

**Draft Recommendations**

5. **Normothermia- strategies**

**Clinical Practice Guidelines**

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**


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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 (FiO₂) 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)*

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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 (FiO₂) 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)

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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 (FiO₂), 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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