**Surgical Site Infection Prevention Guidelines: the US CDC 2014 Update**

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**Guidelines in Modern Healthcare**

- Clinical practice guidelines are systematically developed, generated by evidence, not expert opinion
- Over the past 10-15 years, the use of guidelines has significantly improved outcomes when applied to common and appropriately narrow health care issues
- In the US, government now are requiring guideline compliance

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**The Arthroplasty Module: What’s the Big Deal?**

- Approximately 1.2 million arthroplasties are performed annually in the United States
- By 2030, primary arthroplasties are projected to exceed 5.2 million procedures
- Anticipated increased infection burden from 1.4% to 6.5% and 6.8% in hip and knee arthroplasties, respectively

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How Diabetes Causes Infection: Advanced Glycosylation Endproducts

- accumulation of AGEs in the extracellular matrix causing aberrant cross-linking
- the binding of circulating AGEs to the receptor of AGEs (RAGE) on different cell types and activation of key cell signalling pathways with subsequent modulation of gene expression and chronic inflammation
- intracellular AGE formation leading to quenching of nitric oxide and impaired function of growth factors

National Nosocomial Infection Surveillance System Risk Index

- One point given for each of the following:
  1. patient having an American Society of Anesthesiologists (ASA) preoperative assessment score of 3, 4, or 5
  2. an operation classified as either contaminated or dirty-infected
  3. an operation with duration of >T hours, where T is the 75th percentile for the operative procedure being done

“Complex Infections”

- Collectively, deep incisional and organ space infections are considered “complex” SSIs
- Complex SSIs represent about one-third to one-half of SSIs,
- Complex SSIs typically require re-hospitalization, drainage or debridement, and systemic antimicrobial therapy.
- These infections generate considerable morbidity, cost, and even mortality. In contrast, superficial incisional SSIs often do not require hospitalization and are inconsistently diagnosed by post-discharge surveillance

Surgical Site Infection Rates in the US: NNIS 1992-2004

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Risk 0</th>
<th>Risk 1</th>
<th>Risk 2</th>
<th>Risk 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABG</td>
<td>1.25</td>
<td>1.5</td>
<td>5.4</td>
<td>9.8</td>
</tr>
<tr>
<td>Small bowel</td>
<td>4.97</td>
<td>7.1</td>
<td>8.63</td>
<td>11.6</td>
</tr>
<tr>
<td>Abd hyster</td>
<td>1.36</td>
<td>2.3</td>
<td>5.17</td>
<td>----</td>
</tr>
<tr>
<td>Hip prosthesis</td>
<td>0.86</td>
<td>1.65</td>
<td>2.52</td>
<td>----</td>
</tr>
<tr>
<td>Laminectomy</td>
<td>0.88</td>
<td>1.35</td>
<td>2.46</td>
<td>----</td>
</tr>
<tr>
<td>Colorectal</td>
<td>3.98</td>
<td>5.66</td>
<td>8.54</td>
<td>11.25</td>
</tr>
</tbody>
</table>


Surgical Site Infection Rates: Deep Incision and Organ Space Infections NHSN 2011

<table>
<thead>
<tr>
<th>Procedure</th>
<th># Procedures</th>
<th># Infected</th>
<th>Infection Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CABG</td>
<td>87,934</td>
<td>926</td>
<td>1.05</td>
</tr>
<tr>
<td>Small bowel surgery</td>
<td>11,262</td>
<td>259</td>
<td>2.11</td>
</tr>
<tr>
<td>Colon surgery</td>
<td>68,702</td>
<td>1663</td>
<td>2.42</td>
</tr>
<tr>
<td>Abdominal hysterectomy</td>
<td>82,082</td>
<td>524</td>
<td>0.64</td>
</tr>
<tr>
<td>Hip prosthesis</td>
<td>180,996</td>
<td>1,422</td>
<td>0.79</td>
</tr>
</tbody>
</table>

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Draft Guideline for the Prevention of Surgical Site Infection

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GRADE

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/unsolved issue An unresolved issue for which there is either low to very low-quality evidence with uncertain tradeoffs between benefits and harms or no published evidence on outcomes deemed critical to weighing the risks and benefits of a given intervention

Preoperative Care

8A. Advise patients to shower or bathe (full body) with either soap (antimicrobial or non-antimicrobial) at least the night before the operative day (Category IB)

8B. Perform intraoperative skin preparation with an alcohol-based antiseptic agent, unless contraindicated. (Category IA)

8D. Use of plastic adhesive drapes with or without antimicrobial properties, is not necessary for the prevention of surgical site infection. (Category II)

What to Put In or On the Wound

• 9A. Consider intraoperative irrigation of deep or subcutaneous tissues with aqueous iodophor solution for the prevention of surgical site infection. Intra-peritoneal lavage with aqueous iodophor solution in contaminated or dirty abdominal procedures is not necessary. (Category II)

• 9B. Use of antimicrobial coated sutures is not necessary for the prevention of surgical site infection. (Category II)

• 9C. Do not apply antimicrobial agents (i.e., ointments, solutions, powders) to the surgical incision for the prevention of surgical site infection (Category IB)

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Other Recommendations

- use blood glucose target levels <200mg/dL in diabetic and non-diabetic patients. (Category IA)
- Maintain perioperative normothermia (Category IA)
- For patients with normal pulmonary function undergoing general anesthesia with endotracheal intubation, administer increased fraction of inspired oxygen (FiO2) both intraoperatively and post-extubation in the immediate postoperative period. To optimize tissue oxygen delivery, maintain perioperative normothermia and adequate volume replacement. (Category IA)

Surgical Care Improvement Project

The Institute for Healthcare Improvement (IHI) has launched the Surgical Care Improvement Project (SCIP). The goal of this initiative is to prevent surgical site infections by implementing the four components of care:
1. Appropriate use of prophylactic antibiotics
2. Appropriate hair removal
3. Controlled 0600 postoperative serum glucose in cardiac surgery patients
4. Immediate postoperative normothermia
5. for colorectal patients

How SCIP Works

- For each patient undergoing operation, hospitals report to the government (CMS/CDC) if SCIP measures were met
- If hospitals have <90% compliance, payment from CMS is reduced by 1-3%
- Compliance rates are reported to the public through the internet

SSI Prevention Guidelines – WHO Perspectives

- Need for updated, evidence-based guidelines
- Valid for any country, but including specific issues depending on regional differences and/or peculiar to low-/middle-income countries
- Strong component on implementation strategies and surveillance
- Associated implementation tools

Risk Models are Needed to Monitor Performance

- Different patients, different diseases, and different operations create different risks of infection
- risk adjustment that accounts for these differences is critical to allow for meaningful comparisons between surgeons or between hospitals

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Conclusions

- Absence of data makes planning hierarchy of recommendations difficult
- Not obvious there is easy extrapolation of high income data (clean elective background) to low/middle income settings
- Implementation strategies will likely require surgical champions