Surgical Site Infection Prevention

Last updated 2017

Basics of Infection Prevention
Healthcare-Associated Infections Program
Center for Health Care Quality
California Department of Public Health
Objectives

• Review the epidemiology of surgical site infections (SSI)
• Explore causes and mechanisms of SSI
• Describe evidence-based practices for preventing SSI
• Discuss adherence monitoring and feedback
SSI Epidemiology

- SSI generally occur within 30 days following surgery
  - Some procedures are monitored up to 90 days
- 1.9% of hospitalized surgical patients acquire SSI
  - 3% die
  - 75% of deaths are attributable to the SSI
  - Many result in long term disability
- SSI increases hospital length of stay by 7-10 days
  - Cost estimates vary, ~$30,000 per SSI
  - Most estimates do not account for re-hospitalization, outpatient affected treatment, post-discharge expenses, quality of life for the patient, or any long term disability costs
SSI Pathogenesis

Endogenous
- Patient Flora
  - Skin
  - GI tract
  - Mucous membranes
- Seeding from pre-existing sites of infection

Exogenous
- Surgical personnel flora
- Inadequate skip prep
- Inadequate hand hygiene
- Contaminated equipment, surgical tools, devices within operative field or environment, including ventilation
- Breaks in aseptic techniques
SSI Pathogens

*Staphylococcus aureus* – 21%
*Escherichia coli* – 14%
Coagulase-negative Staphylococci – 8%
*Enterococcus faecalis* – 8%
*Pseudomonas aeruginosa* – 5%
Bacteroides - 5%
Enterobacter spp. – 4%
Enterococcus spp. - 4%
*Enterococcus faecium* – 3%
Proteus spp. 3%
*Streptococcus Viridans* – 2%

Appendix to Table 4 of the 2011-2014 NHSN Antimicrobial Resistance Report
SSI Severity Range
SSI Prevention Objectives

• National HAI Prevention Action Plan 2020 Target Goal
  • Reduce SSI by 30% from 2015 baseline

• CDPH HAI Advisory Committee recommended adoption by California hospitals
CDC Prevention Recommendations

**Core Care Practices**
- Higher levels of scientific evidence
- Demonstrated feasibility

**Supplemental Care Practices**
- Some scientific evidence
- Variable levels of feasibility

*Standard of practice*
Implement in addition to primary strategies when infections persist
SSI Core Prevention Strategies
New or revised, 2017

• Administer antimicrobial prophylaxis in accordance with evidence-based standards and guidelines
  • Administer such that bactericidal concentration is highest in tissues at time of incision
  • Administer before incision in all cesarean sections
  • In clean and clean/contaminated procedures, do not administer after the incision is closed (includes prosthetic joint arthroplasty) even in the presence of a drain
• Do not apply antimicrobial agents (i.e., ointments, solutions, or powders)) to surgical incision

CDC / HICPAC Guideline for Prevention of SSI, 2017
https://jamanetwork.com/journals/jamasurgery/fullarticle
SSI Core Prevention Strategies

New or revised, 2017

- Control blood glucose level in all patients during immediate post-operative period (<200mg/dl)
- Maintain perioperative normothermia
- Administer increased FiO₂ in the perioperative period
- Advise patients to shower/bathe with soap or an antiseptic agent at least the night before the operative day
- Perform intraoperative skin preparation with an alcohol-based antiseptic
- Do not withhold transfusion of necessary blood products as a means to prevent SSI

CDC / HICPAC Guideline for Prevention of SSI, 2017
https://jamanetwork.com/journals/jamasurgery/fullarticle
SSI Core Prevention Strategies

From 1999 CDC guideline; considered practice standards

- Identify and treat remote infections before elective operation
- Do not remove hair. If necessary, use clippers immediately prior to procedure
- Encourage tobacco cessation 30 days prior to surgery
- Ensure skin around incision site is free of gross contamination prior to antiseptic skin preparation
- Perform hand and forearm antisepsis (surgical team)

CDC / HICPAC Guideline for Prevention of SSI, 2017
https://jamanetwork.com/journals/jamasurgery/fullarticle
SSI Core Prevention Strategies

From 1999 CDC guideline; considered practice standards

• Maintain positive pressure ventilation in OR and adjoining spaces
• Do not perform special cleaning or closing of OR after contaminated or dirty operations
• Sterilize all surgical instruments according to published guidelines and manufacturer’s recommendations
• Use immediate-use steam sterilization only on items to be used immediately for emergency when no other option available

CDC/HICPAC Guideline for Prevention of SSI, 2017
https://jamanetwork.com/journals/jamasurgery/fullarticle

SSI Core Prevention Strategies

From 1999 CDC guideline; considered practice standards

- Wear a surgical mask fully covering nose and mouth during operation and when sterile instruments are exposed
- Wear new, disposable, or hospital laundered head covering for each case. Ensure it fully covers hair on head and facial hair not covered by mask
- Wear sterile gloves if a member of scrub team
- Use liquid penetration resistant surgical gowns and drapes
- Change scrub suits visibly soiled, contaminated, or penetrated by blood or other potentially infectious materials

CDC/HICPAC Guideline for Prevention of SSI, 2017
https://jamanetwork.com/journals/jamasurgery/fullarticle

SSI Core Prevention Strategies

From 1999 CDC guideline; considered practice standards

• Adhere to principles of sterile technique

• If drainage is necessary, use a closed suction drain. Place drain in a separate incision distant from the operative incision.

• Protect primarily closed incisions with a sterile dressing for 24-48 hours post-op

CDC / HICPAC Guideline for Prevention of SSI, 2017
https://jamanetwork.com/journals/jamasurgery/fullarticle
IP Role in SSI Prevention

- Ensure policies and practice reflect current evidence based practices
  - CDC guidelines
- Ensure staff competency upon hire and at least annually
  - Return demonstration to ensure competency
  - New hire orientation
  - Annual skills fair
- Perform SSI surveillance
- Develop an adherence monitoring program for SSI prevention practices
- Provide feedback to frontline staff and leaders
  - Present adherence results with SSI incidence to surgeons, perioperative services, and surgical units
Adherence Monitoring for SSI Prevention

• OR observations
• Hand hygiene
• Safe injection practices
• Environmental cleaning and disinfection
• Device reprocessing
• High level disinfection of reusable devices
• Sterilization of reusable devices

CDPH Adherence Monitoring Tools

www.cdph.ca.gov/hai
<table>
<thead>
<tr>
<th>Practice</th>
<th>Observe 1</th>
<th>Observe 2</th>
<th>Adherence by Task # Yes</th>
<th># Obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR clean, dust free, good repair, uncluttered.</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR door closed, only necessary personnel are in the room; traffic limited to necessary staff.</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate surgical attire is used (tied mask, all hair is covered, no long or artificial nails, no jewelry, no personal belongings, no personal clothing visible, shirts tucked, arms covered).</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe injection practices observed (e.g. ports/vial top scrubbed, needles and syringes are used one time).</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-op bathing is performed.</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate pre-op skin prep is performed (agent, application technique, hair removal).</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All hand hygiene opportunities are successful.</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sterility maintained (e.g. no breaches in field, instruments and implants are sterile, no immediate use sterilization, appropriate draping).</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

# Yes ________ # Observed ________ #Yes/#Observed = % Adherence ________%

CDPH Adherence Monitoring Tools: [www.cdph.ca.gov/hai](http://www.cdph.ca.gov/hai)
Are SSI Prevention Core Care Practices Used Routinely in YOUR facility?

- Preoperative antibiotics:
  - Right drug, right dose, right time (i.e. stopped at close)
- Blood glucose control
- Normothermia
- Increased FiO₂
- Alcohol-based skin prep
- Pre-night shower or bath
- Treat other infections
- Avoid hair removal; no razors

- Maintain positive pressure; keep OR doors closed
- Hand hygiene
- Surgical attire worn entire time including mask and head cover (over all head and facial hair)
- Clean/disinfect all surfaces between cases
- Avoid flash sterilization
- Sterile dressing for 24-48 hours

You won’t know if you don’t monitor!
Additional SSI Prevention References and Resources

- Institute for Healthcare Improvement (IHI), [http://www.ihi.org/Engage/Memberships/MentorHospitalRegistry/Pages/InfectionPreventionSSI.aspx](http://www.ihi.org/Engage/Memberships/MentorHospitalRegistry/Pages/InfectionPreventionSSI.aspx)
- Surgical Care Improvement Project (SCIP), [https://www.qualitynet.org/dcs/ContentServer?cid=1137346750659&pagename=Medqic/Content/ParentShellTemplate&parentName=TopicCat&c=MQParents](https://www.qualitynet.org/dcs/ContentServer?cid=1137346750659&pagename=Medqic/Content/ParentShellTemplate&parentName=TopicCat&c=MQParents)
- World Health Organization (WHO), [www.who.int/patientsafety/safesurgery/en/](http://www.who.int/patientsafety/safesurgery/en/)
Questions?

For more information, please contact any HAI Liaison IP Team member

Or email
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