Surgical Site Infections

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Objectives

- Understand NHSN Surgical Site Infection (SSI) case definitions for:
  - Superficial Incisional Surgical Site Infections
  - Deep Incisional Surgical Site Infections
  - Organ/Space Surgical Site Infections
Background

- In 2010, an estimated 16 million operative procedures were performed in acute care hospitals.

- NHSN data included 16,147 SSIs following 849,659 operative procedures in all groups reported, for an overall SSI rate of 1.9% between 2006-2008.

- SSIs are a substantial cause of morbidity, prolonged hospital stay, and death.
  - SSI is associated with a mortality rate of 3%, and 75% of SSI-associated deaths are directly attributable to the SSI.
SSI Surveillance Settings

• Current CMS data reporting rules require reporting of COLO and HYST procedures performed in any inpatient setting.

• Generally, surveillance of surgical patients will occur in any inpatient and/or outpatient setting where the selected NHSN operative procedure(s) are performed.
  • A procedure must meet the NHSN definition of an operative procedure in order to be included in the surveillance.
Surgical Site Infection Criteria
Superficial Incisional SSI

Date of event for infection occurs within 30 days after any NHSN operative procedure (where day 1 = the procedure date)

AND

Involves only skin and subcutaneous tissue of the incision

AND

Patient has at least one of the following:

a. Purulent drainage from the superficial incision.

b. Organisms identified from an aseptically-obtained specimen from the superficial incision or subcutaneous tissue by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnostic treatment.

c. Superficial incision that is deliberately opened by a surgeon, attending physician or other designee and culture or non-culture based testing is not performed.

AND

Patient has at least one of the following signs or symptoms: pain or tenderness; localized swelling; erythema; or heat.

d. Diagnosis of a superficial incisional SSI by the surgeon or attending physician or other designee.
Deep Incisional SSI

The date of event for infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 (handout).

AND

Involves deep soft tissues of the incision (e.g., fascial and muscle layers)

AND

Patient has at least one of the following:

a. Purulent drainage from the deep incision.

b. A deep incision that spontaneously dehisces, or is deliberately opened or aspirated by a surgeon, attending physician or other designee and organism is identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment or culture or non-culture based microbiologic testing method is not performed

AND

patient has at least one of the following signs or symptoms: fever (>38°C); localized pain or tenderness. A culture or non-culture based test that has a negative finding does not meet this criterion.

c. An abscess or other evidence of infection involving the deep incision that is detected on gross anatomical or histopathologic exam or imaging test
Organ/Space SSI

Date of event for infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 (handout)

AND

Infection involves any part of the body deeper than the fascial/muscle layers, that is opened or manipulated during the operative procedure

AND

Patient has at least one of the following:

a. Purulent drainage from a drain that is placed into the organ/space (e.g., closed suction drainage system, open drain, T-tube drain, CT guided drainage)

b. Organisms are identified from an aseptically-obtained fluid or tissue in the organ/space by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment

c. An abscess or other evidence of infection involving the organ/space that is detected on gross anatomical or histopathologic exam or imaging test

AND

Meets at least one criterion for a specific organ/space infection site listed in Table 3 (next slide).
### Table 3. Specific Sites of an Organ/Space SSI.

<table>
<thead>
<tr>
<th>Code</th>
<th>Site</th>
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<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>BONE</td>
<td>Osteomyelitis</td>
<td>MEN</td>
<td>Meningitis or ventriculitis</td>
</tr>
<tr>
<td>BRST</td>
<td>Breast abscess or mastitis</td>
<td>ORAL</td>
<td>Oral cavity (mouth, tongue, or gums)</td>
</tr>
<tr>
<td>CARD</td>
<td>Myocarditis or pericarditis</td>
<td>OREP</td>
<td>Other infections of the male or female reproductive tract</td>
</tr>
<tr>
<td>DISC</td>
<td>Disc space</td>
<td>PJI</td>
<td>Periprosthetic Joint Infection</td>
</tr>
<tr>
<td>EAR</td>
<td>Ear, mastoid</td>
<td>SA</td>
<td>Spinal abscess without meningitis</td>
</tr>
<tr>
<td>EMET</td>
<td>Endometritis</td>
<td>SINU</td>
<td>Sinusitis</td>
</tr>
<tr>
<td>ENDO</td>
<td>Endocarditis</td>
<td>UR</td>
<td>Upper respiratory tract</td>
</tr>
<tr>
<td>GIT</td>
<td>GI tract</td>
<td>USI</td>
<td>Urinary System Infection</td>
</tr>
<tr>
<td>IAB</td>
<td>Intraabdominal, not specified</td>
<td>VASC</td>
<td>Arterial or venous infection</td>
</tr>
<tr>
<td>IC</td>
<td>Intracranial, brain abscess or dura</td>
<td>VCUF</td>
<td>Vaginal cuff</td>
</tr>
</tbody>
</table>

- Criteria for these sites can be found in the Surveillance Definitions for Specific Types of Infections chapter of the 2017 Patient Safety Manual.
Reporting SSI
Infection Present At Time Of Surgery (PATOS)

- The Present on Admission (POA) definition does not apply to the SSI protocol
- Instead, Present At Time of Surgery (PATOS), denotes that there is evidence of an infection or abscess at the start of or during the index surgical procedure
  - PATOS is a YES/NO field on the SSI Event form
- The evidence of infection or abscess must be noted/documentated intraoperatively in an operative note or report of surgery
- Only select PATOS=YES if it applies to the depth of SSI that is being attributed to the procedures
  - If a patient has evidence of an intraabdominal infection at the time of surgery and then later returns with an organ/space SSI the PATOS field would be selected as YES
  - If the patient returned with a superficial or deep incisional SSI the PATOS field would be selected as a NO
• **Multiple tissue levels are involved in the infection:** The type of SSI reported should reflect the deepest tissue layer involved in the infection during the surveillance period. The date of event should be the date that the patient met criteria for the deepest level of infection:
  - A. Report infection that involves the organ/space as an organ/space SSI, whether or not it also involves the superficial or deep incision sites.
  - B. Report infection that involves the superficial and deep incisional sites as a deep incisional SSI.

• **Attributing SSI to NHSN procedures that involve multiple primary incision sites:** If multiple primary incision sites of the same NHSN operative procedure become infected, only report as a single SSI, and assign the type of SSI that represents the deepest tissue level involved at any of the infected sites.

• **Attributing SSI to NHSN procedures that have secondary incision sites:** Certain procedures can involve secondary incisions. The surveillance period for all secondary sites is 30 days, regardless of the required deep incisional or organ/space SSI surveillance period for the primary incision site(s). Procedures meeting this designations are reported as only one operative procedure.
SSI Attribution after Multiple types of NHSN procedures are performed during a single trip to the OR: If more than one NHSN operative procedure category was performed through a single incision/laparoscopic sites during a single trip to the operating room, attribute the SSI to the procedure that is thought to be associated with the infection. If it is not clear, as is often the case when the infection is an incisional SSI, use the NHSN Principal Operative Procedure Category Selection Lists to select the operative procedure to which the SSI should be attributed.

Table 4. NHSN Principal Operative Procedure Category Selection Lists
(The categories with the highest risk of SSI are listed before those with lower risks.)

<table>
<thead>
<tr>
<th>Priority</th>
<th>Code</th>
<th>Abdominal Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LTP</td>
<td>Liver transplant</td>
</tr>
<tr>
<td>2</td>
<td>COLO</td>
<td>Colon surgery</td>
</tr>
<tr>
<td>3</td>
<td>BILI</td>
<td>Bile duct, liver or pancreatic surgery</td>
</tr>
<tr>
<td>4</td>
<td>SB</td>
<td>Small bowel surgery</td>
</tr>
<tr>
<td>5</td>
<td>REC</td>
<td>Rectal surgery</td>
</tr>
<tr>
<td>6</td>
<td>KTP</td>
<td>Kidney transplant</td>
</tr>
<tr>
<td>7</td>
<td>GAST</td>
<td>Gastric surgery</td>
</tr>
<tr>
<td>8</td>
<td>AAA</td>
<td>Abdominal aortic aneurysm repair</td>
</tr>
<tr>
<td>9</td>
<td>HYST</td>
<td>Abdominal hysterectomy</td>
</tr>
<tr>
<td>10</td>
<td>CSEC</td>
<td>Cesarean section</td>
</tr>
<tr>
<td>11</td>
<td>XLAP</td>
<td>Laparotomy</td>
</tr>
<tr>
<td>12</td>
<td>APPY</td>
<td>Appendix surgery</td>
</tr>
<tr>
<td>13</td>
<td>HER</td>
<td>Herniorrhaphy</td>
</tr>
<tr>
<td>14</td>
<td>NEPH</td>
<td>Kidney surgery</td>
</tr>
<tr>
<td>15</td>
<td>VIYS</td>
<td>Vaginal Hysterectomy</td>
</tr>
<tr>
<td>16</td>
<td>SPLE</td>
<td>Spleen surgery</td>
</tr>
<tr>
<td>17</td>
<td>CHOL</td>
<td>Gall bladder surgery</td>
</tr>
<tr>
<td>18</td>
<td>OVRY</td>
<td>Ovarian surgery</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Priority</th>
<th>Code</th>
<th>Thoracic Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HTP</td>
<td>Heart transplant</td>
</tr>
<tr>
<td>2</td>
<td>CBGB</td>
<td>Coronary artery bypass graft with donor incision(s)</td>
</tr>
<tr>
<td>3</td>
<td>CBGC</td>
<td>Coronary artery bypass graft, chest incision only</td>
</tr>
</tbody>
</table>
Denominator Reporting
Closure Type

• **Primary Closure:** closure of the skin level during the original surgery, regardless of the presence of wires, wicks, drains, or other devices or objects extruding through the incision.
  * If any portion of the incision is closed at the skin level, by any manner, a designation of primary closure should be assigned to the surgery.
  * If a procedure has multiple incision/laparoscopic trocar sites and any of the incisions are closed primarily then the procedure technique is recorded as primary closed.

• **Non-primary Closure:** closure of the surgical wound in a way which leaves the skin level completely open following the surgery.
  * The deep tissue layers may be closed by some means or the deep and superficial layers may both be left completely open (with the skin level left open).
Wound Classes

1. **Clean**: an uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tracts are not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow nonpenetrating (blunt) trauma should be included in this category if they meet the criteria. The following procedures can never be classified as clean: APPY, BILI, CHOL, COLO, REC, SB, and VHYS.

2. **Clean-Contaminated**: Operative wounds in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination.

3. **Contaminated**: Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique or gross spillage from the gastrointestinal tract, and incisions in which acute, nonpurulent inflammation is encountered including necrotic tissue without evidence of purulent drainage (e.g., dry gangrene) are included in this category.

4. **Dirty or Infected**: Includes old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.
Denominator for Procedure

• **Same operative procedure category but different ICD-10-PCS or CPT codes during the same trip to the OR:** If procedures of different ICD-10-PCS or CPT codes from the same NHSN operative procedure category are performed through the same incision/laparoscopic sites, record only one procedure for that category.

• **Different operative procedure categories performed during the same trip to the OR:** If procedures in more than one NHSN operative procedure category are performed during the same trip to the operating room through the same or different incisions, a Denominator for Procedure form is reported for each NHSN operative procedure category being monitored.
  
  • Ex. If a CARD and CBGC are done through the same incision, a Denominator for Procedure form is reported for each.
  
  • Ex. If following a motor vehicle accident, a patient has an open reduction of fracture (FX) and splenectomy (SPLE) performed during the same trip to the operating room and both procedure categories are being monitored, complete a Denominator for Procedure form for each.
Duration of Operative Procedure

• If more than one category of NHSN operative procedure is performed through the same incision: record the combined duration of all procedures, which is the time from procedure/surgery start to procedure/surgery finish.
  • Ex. If a CBGC and a CARD are performed on a patient during the same trip to the OR, the time from start to finish is reported for both operative procedures.

• More than one operative procedure through same incision within 24 hours: If a patient goes to the operating room more than once during the same admission and another procedure is performed through the same incision and the start time of the second procedure is within 24 hours of the finish time of the original operative incision, report only one Denominator for Procedure form for the original procedure, combining the durations for both procedures based on the procedure start times and finish times for both procedures.
Duration of Operative Procedure

- **If patient has two different NHSN operative procedures performed via separate incisions on the same trip to the OR**: try to determine the correct duration for each separate procedure (if documented), otherwise, take the time for both procedures and split it evenly between the two.

- **Same NHSN operative procedure via separate incisions**: for operative procedures that can be performed via separate incisions during the same trip to the OR, separate *Denominator for Procedure* forms are completed. To document the duration of the procedures, indicate the procedure/surgery start time to procedure/surgery finish time for each procedure separately or, alternatively, take the total time for the procedures and split it evenly between procedures.
Questions?