The Devil is in the Details: Applying Surgical Site Infection Criteria Accurately

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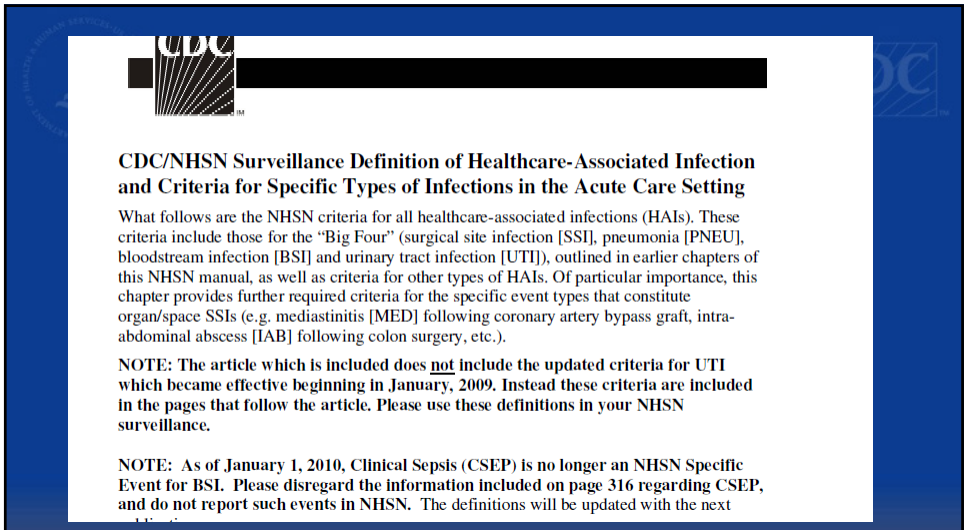
Objectives

1. State the incidence of Surgical Site Infections in the U.S.
2. Define terms necessary to correctly participate in the NHSN SSI module.
3. Identify NHSN criteria for the major event type SSI and specific event types.
4. Apply event criteria for SSI to case studies.

NHSN Website

- NHSN Manual
  - Criteria
  - Key Definitions
  - Tables of Instructions
- Data and Statistics
  - NHSN published reports
- Trainings
- NHSN forms
- Lots more!!!

http://www.cdc.gov/nhsn/index.html



CDC/NHSN Surveillance Definition of Healthcare-Associated Infection and Criteria for Specific Types of Infections in the Acute Care Setting

What follows are the NHSN criteria for all healthcare-associated infections (HAIs). These criteria include those for the "Big Four" (surgical site infection [SSI], pneumonia [PNEU], bloodstream infection [BSI] and urinary tract infection [UTI]), outlined in earlier chapters of this NHSN manual, as well as criteria for other types of HAIs. Of particular importance, this chapter provides further required criteria for the specific event types that constitute organ/space SSIs (e.g. mediastinitis [MED] following coronary artery bypass graft, intra-abdominal abscess [IAB] following colon surgery, etc.).

NOTE: The article which is included does not include the updated criteria for UTI which became effective beginning in January, 2009. Instead these criteria are included in the pages that follow the article. Please use these definitions in your NHSN surveillance.

NOTE: As of January 1, 2010, Clinical Sepsis (CSEP) is no longer an NHSN Specific Event for BSI. Please disregard the information included on page 316 regarding CSEP, and do not report such events in NHSN. The definitions will be updated with the next

Horan TC, Andrus ML, Dudeck MA. CDC/NHSN surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control* 2008;36:309-32.

http://www.cdc.gov/ncidod/dhqp/pdf/NNIS/NosInfDefinitions.pdf

Healthcare-associated Infection (HAI)

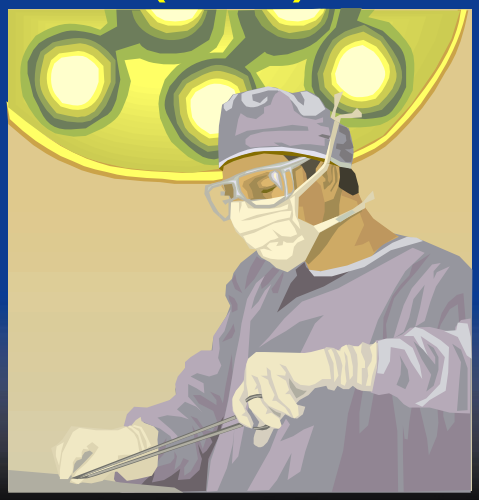
- A localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that
  - Occurs in a patient in a healthcare setting and
  - Was not present or incubating at the time of admission, unless the infection was related to a previous admission
- When the setting is a hospital, meets the criteria for a specific infection (body) site as defined by CDC
- When the setting is a hospital, may also be called a nosocomial infection

HAI

- The following conditions are <u>not</u> infections:
  - Colonization (presence of microorganisms on skin, mucous membranes, in open wounds, or in excretions or secretions but are not causing adverse clinical signs or symptoms
  - Inflammation that results from tissue response to injury or stimulation by noninfectious agents, such as chemicals

Horan TC, Andrus ML, Dudeck MA. CDC/NHSN surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control* 2008;36:309-32.

Surgical Site Infections (SSIs)



Epidemiology

- SSIs are the third most frequently reported HAI
- Account for 14-16% of all HAIs among hospitalized patients
- Remains a substantial cause of morbidity and mortality even with recent advances in prevention

Centers for Medicare and Medicaid Services (CMS)

Hospital Inpatient Quality Reporting Program (Prev. RHQDAPU: Reporting Hospital Quality Data for Annual Payment Update)

"… program is intended to equip consumers with quality of care information to make more informed decisions about their health care. It is also intended to encourage hospitals and clinicians to improve the quality of inpatient care provided to all patients. The hospital quality of care information gathered through the program is available to consumers on the Hospital Compare website"

http://www.qualitynet.org/dcs/ContentServer?cid=1138115987129&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page

Hospital Inpatient Quality Reporting Program

*Hospitals that do not participate will receive a reduction of **2.0 percent** in their Medicare Annual Payment Update for fiscal year 2011*

Hospital Inpatient Quality Reporting Program

- Tentative requirements for SSI reporting:
- Procedures occuring afterJanuary 1, 2012??
- The Joint Commission's SCIP (Surgical Care Improvement Project) core measurement set

AAA
CBGB & CBGC
CARD
COLO
HPRO
HYST
KPRO
PVBY
REC
VASC
VHYST

NHSN Operative Procedure Includes:

- Surgery completed in a single trip to the OR
- Incision closed before leaving OR
- Surgery conducted in defined operating room suite
- May be an in- or out-patient procedure
- Laparoscopic & traditional approaches included

Definition of an Operating Room

- A patient care area that meets the American Institute of Architects (AIA) criteria for an operating room. This may include an operating room, C-Section room, interventional radiology room, or a cardiac catheterization lab.

NHSN Operative Procedures*

- Each NHSN Operative Procedure category consists of a group of ICD-9-CM codes

  Example: CBGB (CABG with chest and donor site incisions) = ICD-9 codes 36.10 – 36.14, 36.19

- When monitoring a specific NHSN Operative Procedure category, all the ICD-9 codes within that category that are done in your facility must be followed

*Table 11 in the *NHSN Patient Safety Component Protocol* document

Implant

- A nonhuman-derived implantable foreign body (e.g., prosthetic heart valve, hip prosthesis) that is permanently placed in a patient during an NHSN operative procedure and is not routinely manipulated for diagnostic or therapeutic purposes
- Screws, wires, and mesh that are left in place are considered implants (currently staples are also considered implants). This list is not all inclusive.

Transplant

- REPORTI[illegible] INSTRUCTIONS:
- Some p[illegible]e a combi[illegible]human- and nonhu[illegible]at[illegible] demineral[illegible]with porcine gel carrier. W[illegible]atient during an operative pr[illegible]es" for both the Implant a[illegible]lant fields.
- Some [illegible]cedur[illegible]acement of both aut[illegible] and non-aut[illegible] products. For these procedures, indicate "[illegible]s" for Non-autologous Transplant field.

Non-AutologousTransplant

- Tansplant: Human cells, tissues, organs, or cellular- or tissue-based products that are placed into a human recipient by grafting, infusion, or implantation. Examples include: heart valves, bone, blood vessels, skin, bone marrow cells.
- *Autologous* transplants are products derived from the patient's own body.
- *Non-autologous* or "allograft" transplants are tissues or other products derived from another human body, either a donor cadaver or a live donor.

Superficial Incisional SSI

A **superficial incisional SSI** must meet one of the following criteria:

Infection occurs within 30 days after the operative procedure
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 isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
c. at least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat, and superficial incision is deliberately opened by surgeon, and is culture-positive or not cultured. A culture-negative finding does not meet this criterion.
d. diagnosis of superficial incisional SSI by the surgeon or attending physician.

Superficial Incisional SSI

NOTE: There are two specific types of superficial incisional SSIs:

1. Superficial Incisional Primary (SIP) – a superficial incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB)
2. Superficial Incisional Secondary (SIS) – a superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site [leg] incision for CBGB)

REPORTING INSTRUCTIONS:

- Do not report a stitch abscess (minimal inflammation and discharge confined to the points of suture penetration) as an infection.
- Do not report a localized stab wound infection as SSI. While it would be considered either a skin (SKIN) or soft tissue (ST) infection, depending on its depth, it is not reportable under this module.
- "Cellulitis", by itself, does not meet the criteria for Superficial Incisional SSI.
- If the incisional site infection involves or extends into the fascial and muscle layers, report as a deep-incisional SSI.
- Classify infection that involves both superficial and deep incision sites as deep incisional SSI.
- An infected circumcision site in newborns is classified as CIRC. Circumcision is not an NHSN operative procedure. CIRC is not reportable under this module.
- An infected burn wound is classified as BURN and is not reportable under this module

Deep Incisional SSI

A **deep incisional SSI** must meet on of the following criteria:
Infection occurs within 30 days after the operative procedure if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operative procedure
and
involves deep soft tissues (e.g., fascial and muscle layers) of the incision
and
patient has at least one of the following:

a. purulent drainage from the deep incision but not from the organ/space component of the surgical site
b. a deep incision spontaneously dehisces or is deliberately opened by a surgeon and is culture-positive or not cultured when the patient has at least one of the following signs or symptoms: fever (>38°C), or localized pain or tenderness. A culture-negative finding does not meet this criterion.
c. an abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination
d. diagnosis of a deep incisional SSI by a surgeon or attending physician.

Organ/Space SSI

An organ/space SSI must meet the following criterion:

Infection occurs within 30 days after the operative procedure if no implant[1] is left in place or within 1 year if implant is in place and the infection appears to be related to the operative procedure

and

infection involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure

and

patient has at least *1* of the following:

a. purulent drainage from a drain that is placed through a stab wound into the organ/space
b. organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space
c. an abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination
d. diagnosis of an organ/space SSI by a surgeon or attending physician.

Specific Sites of Organ/Space SSI

Table 2. Specific sites of an organ/space SSI. Criteria for these sites can be found in the NHSN Help Messages (must be logged in to NHSN) orChapter 17.[8]

Code	Site	Code	Site
BONE	Osteomyelitis	LUNG	Other infections of the respiratory tract
BRST	Breast abscess or mastitis	MED	Mediastinitis
CARD	Myocarditis or pericarditis	MEN	Meningitis or ventriculitis
DISC	Disc space	ORAL	Oral cavity (mouth, tongue, or gums)
EAR	Ear, mastoid	OREP	Other infections of the male or female reproductive tract
EMET	Endometritis	OUTI	Other infections of the urinary tract
ENDO	Endocarditis	SA	Spinal abscess without meningitis
EYE	Eye, other than conjunctivitis	SINU	Sinusitis
GIT	GI tract	UR	Upper respiratory tract
IAB	Intraabdominal, not specified else-where	VASC	Arterial or venous infection
IC	Intracranial, brain abscess or dura	VCUF	Vaginal cuff
JNT	Joint or bursa		

Organ/Space SSI

- Occasionally an organ/space infection drains through the incision. Such infection generally does not involve reoperation and is considered a complication of the incision. Therefore, classify it as a deep incisional SSI.
- Report mediastinitis following cardiac surgery that is accompanied by osteomyelitis as SSI-MED rather than SSI-BONE.
- Report CSF shunt infection as SSI-MEN if it occurs ≤ 1 year of placement; if later or after manipulation/access, it is considered CNS-MEN and is not reportable under this manual.
- Report spinal abscess with meningitis as SSI-MEN following spinal surgery.

Organ/Space SSI

- If a patient has several NHSN operative procedures prior to an infection, report the operative procedure code of the operation that was performed most closely in time prior to the infection date, unless there is evidence that the infection is associated with a different operation.
- 2. If more than one NHSN operative procedure was done through a single incision, attempt to determine 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 a superficial incisional SSI), use the NHSN Principal Operative Procedure Selection Lists (Table 3) to select which operative procedure to report.

Table 3. NHSN Principal Operative Procedure Selection Lists

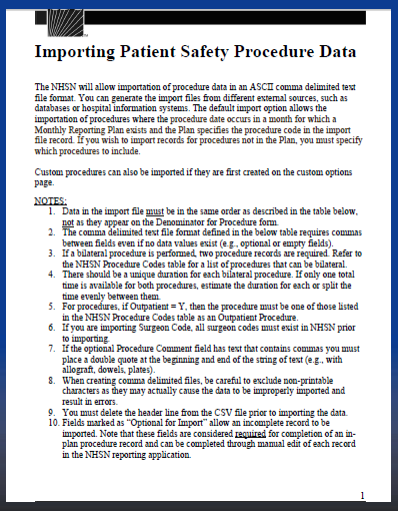
The following lists are derived from Table 1, NHSN Operative Procedure Categories. The operative procedures with the highest risk of surgical site infection are listed before those with a lower risk.

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

Priority	Code	Thoracic Operations
1	HTP	Heart transplant
2	CBGB	Coronary artery bypass graft with donor incision(s)
3	CBGC	Coronary artery bypass graft, chest incision only
4	CARD	Cardiac surgery
	THOR	Th[illegible]c surgery

Entering Procedure Data (1)

1. *Manual*
2. *Electronic Import*



Importing Patient Safety Procedure Data

The NHSN will allow importation of procedure data in an ASCII comma delimited text file format. You can generate the import files from different external sources, such as databases or hospital information systems. The default import option allows the importation of procedures where the procedure date occurs in a month for which a Monthly Reporting Plan exists and the Plan specifies the procedure code in the import file record. If you wish to import records for procedures not in the Plan, you must specify which procedures to include.

Custom procedures can also be imported if they are first created on the custom options page.

NOTES:

1. Data in the import file must be in the same order as described in the table below, not as they appear on the Denominator for Procedure form.
2. The comma delimited text file format defined in the below table requires commas between fields even if no data values exist (e.g., optional or empty fields).
3. If a bilateral procedure is performed, two procedure records are required. Refer to the NHSN Procedure Codes table for a list of procedures that can be bilateral.
4. There should be a unique duration for each bilateral procedure. If only one total time is available for both procedures, estimate the duration for each or split the time evenly between them.
5. For procedures, if Outpatient = Y, then the procedure must be one of those listed in the NHSN Procedure Codes table as an Outpatient Procedure.
6. If you are importing Surgeon Code, all surgeon codes must exist in NHSN prior to importing.
7. If the optional Procedure Comment field has text that contains commas you must place a double quote at the beginning and end of the string of text (e.g., with allograft, dowels, plates).
8. When creating comma delimited files, be careful to exclude non-printable characters as they may actually cause the data to be improperly imported and result in errors.
9. You must delete the header line from the CSV file prior to importing the data.
10. Fields marked as "Optional for Import" allow an incomplete record to be imported. Note that these fields are considered required for completion of an in-plan procedure record and can be completed through manual edit of each record in the NHSN reporting application.

1

http://www.cdc.gov/nhsn/PDFs/ImportingProcedureData_current.pdf

Entering Procedure Data (2)

- 1. If more than one NHSN operative procedure (category) is performed during the same trip to the OR, a Denominator for Procedure (CDC 57.121) record is reported for each operative procedure being monitored. Even if more than one NHSN operative procedure (category) is done through the same incision (e.g., CARD and CBGC), a *Denominator for Procedure record is reported for each.*
- EXCEPTIONS:
  - If a patient has both a CBGC and CBGB during the same trip to the OR, report only as a CBGB.
  - If patient has a LAM as an approach to FUSN, record only FUSN

Entering Procedure Data (3)

- If more than one NHSN operative procedure category is performed through the same incision, record the combined duration of all procedures, which is the time from skin incision to primary closure
- For bilateral operative procedures (e.g., KPRO), two separate Denominator for Procedure (CDC 57.121) are completed. To document the duration of the procedure, indicate the incision time to closure time for each procedure separately or, alternatively, take the total time for both procedures and split it evenly between the two

Entering Procedure Data (4)

- If a patient goes to the OR more than once during the same admission and another procedure is performed through the same incision within 24 hours of the original operative incision, report only one procedure on the Denominator for Procedure (CDC 57.121) combining the durations for both procedures

Analysis of SSI data

(and improved)

~~NNIS Risk~~ Index

NHSN Risk Modeling

USING THE STANDARDIZED INFECTION RATIO FOR HAI ANALYSIS

- Based on Standardized Mortality Ratio (SMR)
  - Used extensively in public health research
- Compares the experience in one facility to that in a standard population (referent population)

Number observed/number expected

Quick and Dirty:

If the expected # of infections = # observed, the ratio will

=1

>1 = more infections than expected

< 1= fewer infections than expected

Limitations of the Risk Index: Moving to Risk Modeling Methods

- *Risk index relies on three risk factors only*
- *These same risk factors must differentiate risk for all types of procedures*
- *The relative contribution of these factors are constrained to be equal*
- *What can be done to improve risk adjustment?*

Improved Risk Adjustment

- *Risk index relies on three risk factors only*
  - *Allow all available factors to be considered*
- *These same risk factors must differentiate risk for all types of procedures*
  - *Allow the set of risk factors to be procedure-specific*
- *The relative contribution of these factors are constrained to be equal*
  - *Allow each factor's contribution to vary according to it's significant association with risk*
- *What can be done to improve risk adjustment?*
  - *Build logistic regression models*

Available NHSN Risk Factors

For All Procedures	General anesthesia	Age
Wound class	Emergency	Gender
ASA score	Trauma	Endoscope
Duration of procedure	Bed size$^{\Delta}$	Med School Affiliation$^{\Delta}$
For C-section	Duration of labor	
Weight Height	Estimated blood loss	
For Spinal Fusion	Diabetes Mellitus	
Spinal level	Approach/Technique	
For Hip/Knee prosthesis		
Total/Partial	Primary/Revision	

$^{\Delta}$*Hospital-level factor*

Available NHSN Data

2006-2008	
Number of procedure types:	40
Number of hospitals:	823
Total SSI:	16,152
Total procedure volume:	823,770
Lowest (spleen surgery):	257
Highest (knee prosthesis):	171,659

Example Comparison- NNIS Risk vs. Modeling
SSI after VHYS

Patient	Age	Duration	ASA Score	Med School Affiliation	SSI	Prob of SSI ($\hat{p}$) Risk Index	Prob of SSI ($\hat{p}$) Model
1	40	117	4	Y	0	**0.012**	**0.050**
2	53	95	2	N	0	**0.007**	**0.004**
3	30	107	2	Y	1	**0.007**	**0.033**
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
100	37	128	4	Y	1	**0.012**	**0.050**
		Total			**O = 3**	**E = 0.85**	**E = 2.91**

Standardized Infection Ratio (SIR) = *3 / 0.85 =* *3.5* *3 / 2.91=* *1.0*

NHSN Version 6.3 SSI Analysis Options

- SSI
  - CDC Defined Output
    - Line Listing - All SSI Events — Run | Modify
    - Frequency Table - All SSI Events — Run | Modify
    - Bar Chart - All SSI Events — Run | Modify
    - Pie Chart - All SSI Events — Run | Modify
    - SIR - Complex AR SSI Data by Procedure — Run | Modify
    - SIR - Complex AR SSI Data by Surgeon — Run | Modify
    - SIR - In-plan Complex AR SSI data by Procedure — Run | Modify
    - SIR - In-plan Complex AR SSI data by Surgeon — Run | Modify
    - SIR - All SSI Data by Procedure — Run | Modify
    - SIR - All SSI Data by Surgeon — Run | Modify
    - SIR - In-plan All SSI Data by Procedure — Run | Modify
    - SIR - In-plan All SSI data by Surgeon — Run | Modify
    - Line Listing - Incomplete Procedures for SSI SIR — Run | Modify
  - Post-Procedure PNEU
- MDRO/CDAD Module - Infection Surveillance
- MDRO/CDAD Module - LABID Event Reporting

National Healthcare Safety Network

SIR for All SSI Data by Procedure - By OrgID

SSI Sample Analysis

As of: October 4, 2010 at 1:22 PM

Date Range: All SIR_ALLSSIPROC

orgid=10018

orgid	summaryYH	procCount	infCountAll	numExpAll	SIRAll	SIRAll_pval	SIRAll95CI
10018	2009H1	157	11	2.709	4.06	0.0001	2.277, 6.721
10018	2009H2	370	3	4.119	0.73	0.4105	0.198, 1.882
10018	2010H1	38	0	3.367	0.00	.	

As of: October 4, 2010 at 1:22 PM

Date Range: All SIR_ALLSSIPROC

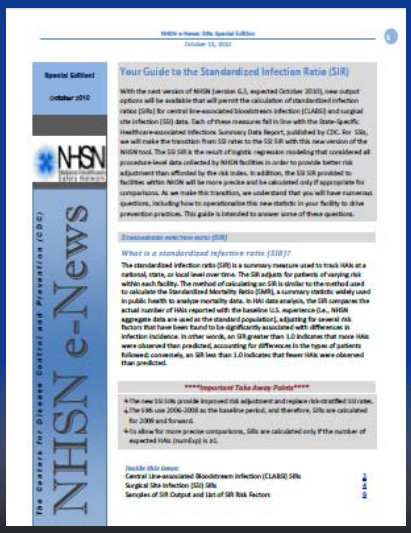
orgid=10018

orgid	proccode	summaryYH	procCount	infCountAll	numExpAll	SIRAll	SIRAll_pval	SIRAll95CI
10018	AAA	2009H1	1	0	0.104	.	.	
10018	AAA	2010H1	1	0	0.104	.	.	
10018	AMP	2009H1	1	0	0.069	.	.	
10018	AMP	2010H1	5	0	0.345	.	.	
10018	APPY	2009H1	2	1	0.020	.	0.0193	2.630, 243.275
10018	CARD	2009H2	3	0	0.039	.	.	
10018	CARD	2010H1	1	0	0.026	.	.	

SSI Analysis Options

- SSI rates will still be available using the legacy NNIS risk index
- Advanced output section
- No NHSN pooled means available

October SIR Newsletter



http://www.cdc.gov/nhsn/PDFs/Newsletters/NHSN_NL_OCT_2010_final.pdf

SSI Risk Models

Special Edition: NHSN e-News: SIRs

October 15, 2010

Appendix D: SSI SIR Risk Factors

NHSN Operative Procedure	Risk Factor(s) – ALL SSIs
AAA	duration
AMP	duration, number of beds*
APPY	emergency, gender, number of beds*, wound class
AVSD	age
BILI	asa, duration, number of beds*
BRST	asa, duration, number of beds*
CBGB/C	age, asa, duration, gender, number of beds*
CARD	age, asa, duration
CHOL	age, asa, duration, endoscope, wound class
COLO	age, anesthesia, asa, duration, endoscope, medical school affiliation*, number of beds*, wound class
CRAN	age, asa, duration, number of beds* ,trauma
CSEC	age, anesthesia, asa, BMI, duration, emergency, duration of labor, wound class
FUSN	approach, asa, diabetes, duration, medical school affiliation*, spinal level, trauma, wound class
FX	age, asa, duration, number of beds*, outpatient
GAST	asa, duration, emergency
HER	age, asa, duration, gender, outpatient
HPRO	[illegible] duration, HPR[illegible]

** These risk factors originate from the Patient Safety Annual Facility Survey*

Case 1

- 45 year-old male patient had colon resection (COLO) performed on 6/18
- 6/22:
  - The upper aspect of the patient's abdominal wound has purulent drainage with some redness and induration
  - Wound swabs sent to lab for culture
  - Patient started on antibiotics
- 6/24:
  - Wound culture grew *Enterobacter* spp. and *E. coli*

Case 1

Is this an SSI?

Yes

What type?

Superficial Incisional Primary

Purulent drainage from superficial incision (positive culture and redness supportive, but unnecessary)

Case 2

- Patient is admitted to the hospital on 04/12 for elective surgery and active MRSA screening test is positive.
- On the same day, patient undergoes small bowel resection (SB).
- Postoperative course is unremarkable patient discharged on 4/16.
- On 4/29, patient is readmitted with a red, angry wound that is opened to the fascial level by the surgeon and is cultured.
- 4/30 culture positive for MRSA.

Case 2

Is this possible infection considered healthcare-associated?

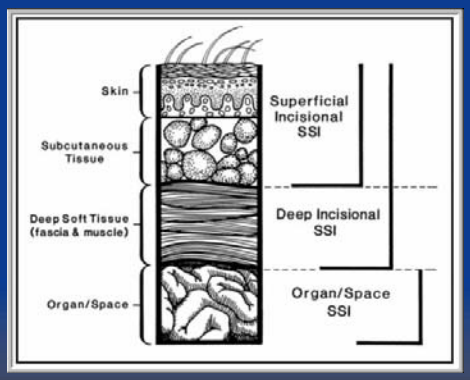
Yes. Preoperative colonization does not prevent an infection from being healthcare associated.

Case 2

If so, what type?

Superficial

Incisional Primary



If so, what is the date of onset? *4/29 or first symptom*

Case 3

- Which of the following does not meet the criteria for superficial incisional SSI if identified within 30 days after the procedure?
  - A. Physician documents “superficial wound infection”
  - B. Purulent drainage noted from upper aspect of incision
  - C. Physician documents “cellulitis”
  - D. MRSA grows from an aseptically obtained swab of the superficial incision

Case 3

C. Physician documents “cellulitis”

Avoid using terms such as “cellulitis” to determine whether criteria of an SSI are met. Use only those terms that are part of the criteria… redness, heat, etc.

Case 4

- Jane Doe had a spinal fusion (FUSN) on 1/22 performed
- 2/1-Increased back pain; Temp 38°C
- 2/2 MRI reveals abscess in the spinal epidural space
- Surgeon opened wound in the OR & drained abscess; specimen to lab for culture; notes 'infected hematoma"; antibiotics begun for epidural abscess
- Culture positive for *Pseudomonas aeruginosa*

Case 4

- Is this an SSI?

Yes

- If so, what type?

Organ/Space SSI

Specific Type:

SA Spinal abscess without meningitis

SA-Spinal abscess without meningitis

An abscess of the spinal epidural or subdural space, without involvement of the cerebrospinal fluid or adjacent bone structures, must meet at least *1* of the following criteria:

1. Patient has organisms cultured from abscess in the spinal epidural or subdural space.
2. Patient has an abscess in the spinal epidural or subdural space seen during a surgical operation or at autopsy or evidence of an abscess seen during a histopathologic examination.
3. Patient has at least *1* of the following signs or symptoms with no other recognized cause: fever (>38°C), back pain, focal tenderness, radiculitis, paraparesis, or paraplegia

and

at least 1 of the following:

   a. organisms cultured from blood
   b. radiographic evidence of a spinal abscess (eg, abnormal findings on myelography, ultrasound, CT scan, MRI, or other scans [gallium, technetium, etc]).

and

if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

Reporting instruction

- Report spinal abscess *with* meningitis as MEN.

Case 4 (Cont).

- If this patient also had a positive cerebrospinal fluid culture, this would instead be an SSI-MEN

Reporting Instructions

...tion as SSI-MENI if ≤1 year of placement; if later or after manipulation/access of the shunt, report as CNS-MEN.
- Report meningoencephalitis as MEN.
- Report spinal abscess *with* meningitis as MEN.

MEN-Meningitis or ventriculitis

Meningitis or ventriculitis must meet at least *1* of the following criteria:

1. Patient has organisms cultured from cerebrospinal fluid (CSF).
2. Patient has at least *1* of the following signs or symptoms with no other recognized cause: fever (>38°C), headache, stiff neck, meningeal signs, cranial nerve signs, or irritability
   and
   at least *1* of the following:
   a. increased white cells, elevated protein, and/or decreased glucose in CSF
   b. organisms seen on Gram's stain of CSF
   c. organisms cultured from blood
   d. positive antigen test of CSF, blood, or urine
   e. diagnostic single antibody titer (IgM) or 4-fold increase in paired sera (IgG) for pathogen
   and
   if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.
3. Patient ≤1 year of age has at least *1* of the following signs or symptoms with no other rec-...ized caus... fever ...°C ...al), hy...

Case 5

- 4/8 John Smith had a tunneled central line placed in the OR, due to failure of a hemodialysis fistula during an inpatient hospitalization. He was discharged and continued on outpatient hemodialysis using the line.
- 8/22 JS readmitted with redness and purulent discharge at the insertion site. Blood cultures are negative.

Case 5

- Would this be an SSI?
- Why or why not?

No. Because the device has been manipulated for therapeutic purposes, it is no longer an implant. Therefore any SSI must develop within 30 days of the surgery.

Implant	A nonhuman-derived object, material, or tissue that is permanently placed in a patient during an operative procedure and is not routinely manipulated for diagnostic or therapeutic purposes. Examples include: porcine or synthetic heart valves, mechanical heart, metal rods, mesh, sternal wires, screws, cements, and other devices.

Case 5

- If in addition to the signs/ symptoms listed, the blood culture was positive for MSSA, would this be called a BSI attributed to your facility?

Case 5

- No. CDC/NHSN device-associated criteria (except Dialysis Events) are for inpatients only. It cannot be called a CLABSI within NHSN because all NHSN CLABSIs are healthcare-associated, not community-associated.
- The event may be reported through the NHSN DE module if your facility is participating in that module and the patient was receiving hemodialyis in one of your facility's outpatient dialysis units.

Case 5

- What if instead of a dialysis catheter, a ventricular shunt was placed? Let's say the shunt had not been manipulated/accessed and had been functioning fine.
- However, on 6/22 the patient is admitted with redness overlying the incision and it is opened subcutaneously by the surgeon and drained of milky fluid. (Surgery performed 4/08).

Case 5

- Is this an SSI?
- If so what type?
- If not, why not?

No, because this infection lies within the subcutaneous layer of tissue, it must appear within 30 days to be meet criteria of a superficial SSI.

A **superficial incisional SSI** must meet one of the following criteria:

Infection occurs within 30 days after the operative procedure
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 isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
c. at least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat, and superficial incision is deliberately opened by surgeon, and is culture-positive or not cultured. A culture-negative finding does not meet this criterion.
d. diagnosis of superficial incisional SSI by the surgeon or attending physician.

Case 6

- A 66-year-old woman is admitted on Sept 10th as an inpatient, having recently noticed blood in her stools. Diagnostic investigation reveals a colon carcinoma.
- 9/11 – Admitted; hemicolectomy performed.
- 9/13 - Temperature up to 38.7°C, abdominal pain. Abscess of the abdominal wall per U/S.

Case 6

- 9/14 - I&D of the abdominal wall abscess. Abscess culture collected. Antibiotics begun.
- 9/16 - Abscess culture positive for *E.coli*.
- 9/18-Discharge from hospital on oral antibiotics.

Case 6

- Is this an HAI?
- If so what type?

Yes

Organ/Space SSI

Specific Type:
IAB Criteria 2:

An **organ/space SSI** involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure. Specific sites are assigned to organ/space SSI to further identify the location of the infection. The table below lists the specific sites that must be used to differentiate organ/space SSI. An example is appendectomy with subsequent subdiaphragmatic abscess, which would be reported as an organ/space SSI at the intraabdominal specific site (SSI-IAB). Specific sites of organ/space (Table 2) have specific criteria which must be met in order to qualify as an NHSN event. These criteria are in addition to the general criteria for and can be found in Chapter 17.[8]

An **organ/space SSI** must meet one of the following criteria:
Infection occurs within 30 days after the operative procedure if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operative procedure
and
infection involves any part of the body, excluding the skin incision, fascia, or 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 through a stab wound into the organ/space
b. organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space
c. an abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination
d. diagnosis of an organ/space SSI by a surgeon or attending physician.

2. Patient has abscess or other evidence of intraabdominal infection seen during a surgical operation or histopathologic examination

Case 6

- Let's change the scenario and say that at the time of the I & D, it was discovered that the patient had suffered an anastamotic leak from which the abscess developed.
- Does this change your determination of an SSI- IAB?

Case 6

- Does this change your determination of an SSI- type organ/space?

No. Although an anastomotic leak can be a complication of surgery, the fact remains that this patient meets the criterion for an SSI. If the surgery had not been performed there would not have been an anastomotic leak and no SSI.

Case 7

- A 79-year-old male patient is brought from a nursing home after a fall and is admitted to hospital with a fractured neck of femur. On admission the nursing home indicates that the patient has MRSA colonization. Consequently, while the patient is still in the emergency room cultures are taken from the nose, pharynx, perineum and groin.

Case 7

- Day 1 – HPRO completed. Antibiotic prophylaxis is administered peri-operatively.
- Day 2 - The patient is very confused. Temperature normal. Wound condition good.
- Day 3 -The results of the admission cultures of the nose and groin are positive for MRSA. The following entry is found in the patient's notes: "Patient removed the dressing several times. Recurrent confused condition. Wound edges very red and taut."

Case 7

- Day 5 - Entry in the patient's notes: "Abscess lanced by the attending surgeon". A wound culture sent to lab. Antibiotics begun.
- Day 6- Wound culture: MRSA
- Day 9 -Improvement in wound condition. Sent to Rehab.

Case 7

- Does this patient have an SSI?
- If so, what Type?
- If so, what is the date of the infection?

Yes. Postoperative treatment or mistreatment of the wound does not negate the development of an SSI.

Superficial
Incisional
Primary

Day 3; date of first signs of infection

Case Study 8

- 7/7 Mrs. Jones has a saphenous endoscopic harvest and an internal mammary vein used for her CAB. The ICD codes as entered are 36.12 and 36.15, both CBGB and CBGC.
  If the saphenous vein was harvested endoscopically, what NHSN operative procedure code(s) should be entered into NHSN?

Case Study 8

When a CBGB and a CBGC are done together on a patient on the same trip to the OR, report it as a CBGB only. That way, if the donor site incisions should get infected, you can report it as SIS or DIS. (Use of the endoscope is irrelevant for these purposes).

Case 8

- If Mrs. Jones develops both a leg donor site infection and a chest incision infection, do you count both as infections or only one?
- If only one, which one?

Count both

Chest as a primary site SIP, DIP or Organ/Space

Leg as a secondary site SIS, or DIS

Case 9

- 75 year old patient admitted for small bowel obstruction. 5/15 taken to OR and SB resection and appendectomy performed.
- What surgeries are recorded in NHSN?

Both SB and APPY procedures are recorded

Case 9

- How are the durations for the individual surgeries determined?

If more than one NHSN operative procedure is performed through the same incision, record the combined duration of all procedures, which is the time from skin incision to primary closure.

Case 9

- What if bilateral surgeries are recorded in NHSN? (ex bilat KPROs)
- How are the durations for the individual surgeries determined?

Both procedures are recorded

For bilateral operative procedures (e.g., KPRO), two separate Denominator for Procedure (CDC 57.121) are completed. To document the duration of the procedure, indicate the incision time to closure time for each procedure separately or, alternatively, take the total time for both procedures and split it evenly between the two if individual times are not known.

Case 9

- 5/19 patient spikes temp to 38°C, has abdominal pain and emesis. Ultrasound shows fluid collection in abdominal cavity. Needle aspiration of fluid collection. Fluid sent for culture.
- 5/20 culture positive for *E. faecium,* many neutrophils seen.

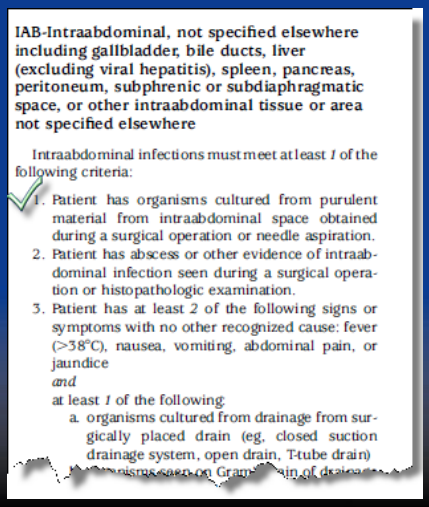
Case 9

- Is this an HAI?
- If so, what type?

Yes

Intraabdominal abscess (IAB)

Criteria 1



IAB-Intraabdominal, not specified elsewhere including gallbladder, bile ducts, liver (excluding viral hepatitis), spleen, pancreas, peritoneum, subphrenic or subdiaphragmatic space, or other intraabdominal tissue or area not specified elsewhere

Intraabdominal infections must meet at least *1* of the following criteria:

1. Patient has organisms cultured from purulent material from intraabdominal space obtained during a surgical operation or needle aspiration.
2. Patient has abscess or other evidence of intraabdominal infection seen during a surgical operation or histopathologic examination.
3. Patient has at least 2 of the following signs or symptoms with no other recognized cause: fever (>38°C), nausea, vomiting, abdominal pain, or jaundice

and

at least *1* of the following:

a. organisms cultured from drainage from surgically placed drain (eg, closed suction drainage system, open drain, T-tube drain)

b. organisms seen on Gram stain of drainage

Case 9

- To what surgery is an SSI attributed if applicable?
- If more than one NHSN operative procedure was done through a single incision, attempt to determine 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 a superficial incisional SSI), or if the infection site being reported is not an SSI, use the NHSN Principal Operative Procedure Selection Lists (Table 3) to select which operative procedure to report.

Case 9

Table 3. NHSN Principal Operative Procedure Selection Lists

The following lists are derived from Table 1, NHSN Operative Procedure Categories. The operative procedures with the highest risk of surgical site infection are listed before those with a lower risk.

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

WELL DONE!!

References

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