

# **SURGICAL SITE INFECTIONS**

**National Healthcare Safety  
Network (NHSN)**



# INTRODUCTION

- ▶ In 2014 a total of 14.2 million operative procedures were performed in the inpatient setting in United States Hospitals
- ▶ CDC prevalence survey found estimated 157,500 SSIs associated with inpatient surgeries in 2011
- ▶ NHSN data included 16,147 SSIs following 849,659 operative procedures in all groups reported (SSI rate of 1.9%) between 2006-2008
- ▶ 17% decrease in SSI related to 10 select procedures reported between 2008-2014
- ▶ Mortality rate of 3% and cost \$3.3 billion

# KEY TERMS

- ▶ “In-plan” surveillance means that you have committed to following the NHSN surveillance protocol, in its entirety, for that particular event, as shown in your NHSN monthly reporting plan (*including any additional data elements e.g., C section KPRO, HPRO, FUSN, RFUSN*)
- ▶ “Off-plan” surveillance is surveillance that is done because you/your facility have decide to track a particular event for internal use. Will not be included in NHSN reports.

# SSI- ACTIVE SURVEILLANCE METHODS

- ▶ Review of medical records or surgery clinic patient records
  - ▶ Admission, readmission, ED, and OR logs
  - ▶ Patient charts for signs and symptoms of SSI
  - ▶ Lab, X-ray, other diagnostic test reports
  - ▶ Nurses and physician notes
  - ▶ Visit the ICU and wards- talk to primary care staff



# POST-DISCHARGE SSI SURVEILLANCE METHODS

- ▶ Surgeon and/or patient surveys by mail or phone
- ▶ Review of postoperative clinic records
- ▶ Line list of all readmission with diagnosis
- ▶ Line list of ED admissions with diagnosis
- ▶ ICD-10-PCS Discharge/Procedure codes
- ▶ Notification between facilities



Criteria must be met, regardless of surveillance methodology

# DEFINITIONS

- An NHSN operative procedure is a procedure that:
  - Is included in the ICD-10-PCS or CPT NHSN operative procedure code mapping.

**And**

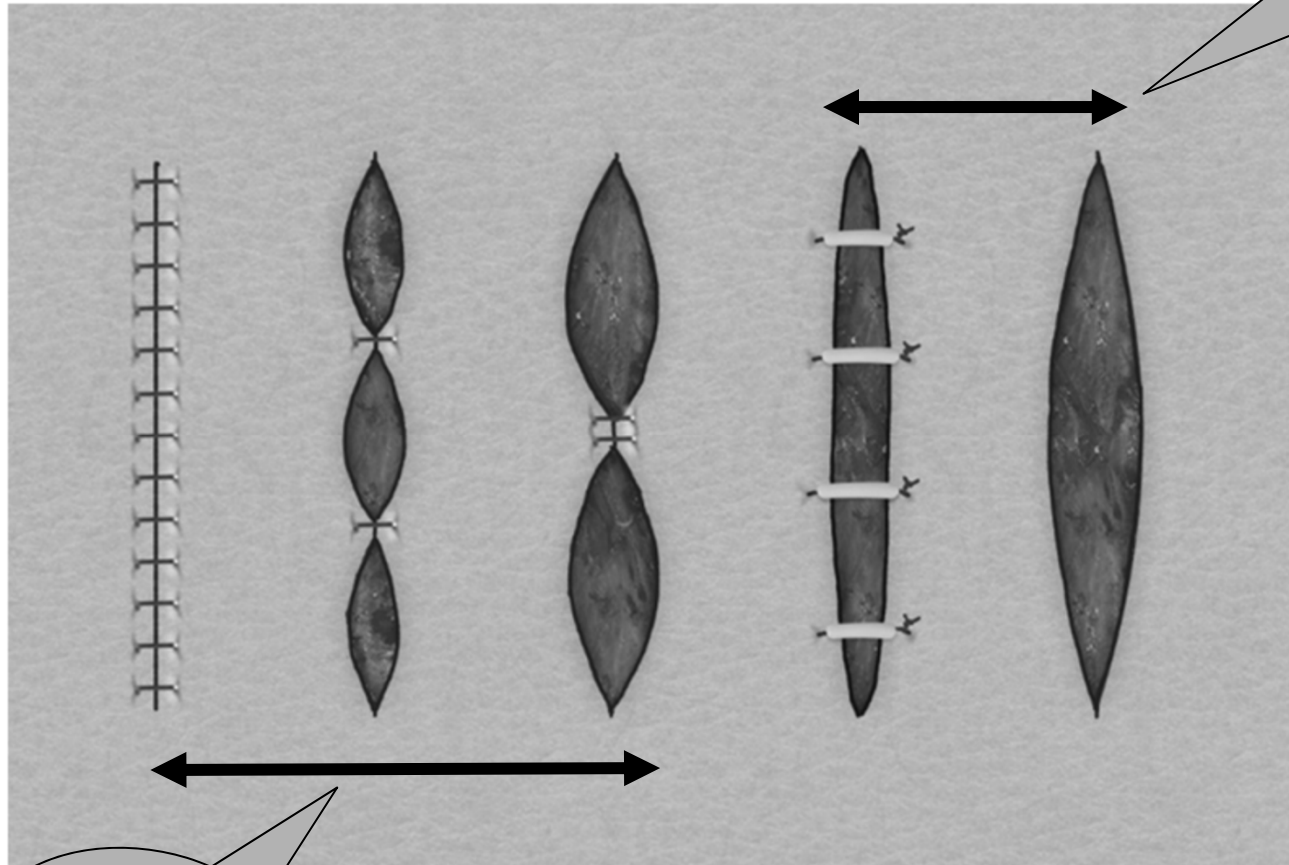
- Takes place during an operation where at least one incision (including laparoscopic approach and cranial Burr hole) is made through the skin or mucous membrane, or reoperation via an incision that was left open during a prior operative procedure

**And**

- Takes place in an operating room (OR), defined as a patient care area that met the Facilities Guidelines Institute's (FGI) or American Institute of Architects' (AIA) criteria for an operating room when it was constructed or renovated. This may include an operating room, C-section room, interventional radiology room, or a cardiac catheterization lab.

***Exclusion: Otherwise eligible procedures that are assigned an ASA score of 6 are not eligible for surveillance***

# CLOSURE TECHNIQUE

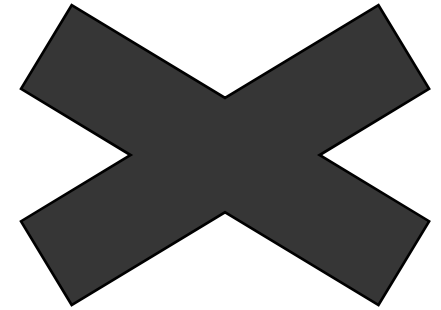


Closure  
other  
than  
primary

Primary  
Closure

***Incisional closure method is NOT a part of the NHSN operative procedure definition; all otherwise eligible procedures are included, regardless of closure type.***

DOES NOT APPLY TO SSI



- ▶ Present on Admission (POA)
- ▶ 7 Day Infection Window Period (IWP)
- ▶ Healthcare Associated Infection (HAI)
- ▶ 14 day Repeat Infection Timeframe (RIT)





## KEY TERMS

- **Date of Event:**
  - For an SSI the date of event is the date when the first element used to meet the SSI infection criterion occurs for the first time during the surveillance period
  - All symptoms usually occur within a 7-10 day timeframe and no more than 2-3 days between elements (relational to each other)
- **Secondary BSI Attribution Period:**
  - The secondary BSI attribution period for SSI is a 17-day period that includes the date of event, 3 days prior and 13 days after
    - Different because the IWP and RIT do not apply to SSI

# KEY TERMS

- **NHSN Inpatient:**
  - A patient whose date of admission to the healthcare facility and the date of discharge are different calendar days
- **Aseptically obtained**
  - Obtained in a manner to prevent introduction of organisms from the surrounding tissues into the specimen being collected
- **Trauma:**
  - Blunt or penetrating injury
- **Scope:**
  - An instrument used to visualize the interior of a body cavity or organ. Creation of several small incisions to perform or assist in the performance of an operation. Robotic assistance is considered equivalent to use of a scope for NHSN SSI surveillance

# PROCEDURE DETAILS: SCOPE

- ▶ ICD-10-PCS codes (5<sup>th</sup> character) can be helpful in answering this scope question. The fifth character indicates the approach to reach the procedure site:
  - ▶ Value of zero (0) = an open approach
  - ▶ Value of four (4) = percutaneous endoscopic approach.
  - ▶ Value of F = via natural or artificial opening with endoscopic assistance approach.
- ▶ If the fifth character of the ICD-10-PCS code is a four (4) or F then the field for scope should be YES.
- ▶ Note: If a procedure is coded as open and scope then the procedure should be entered into NHSN as Scope = NO. The open designation is considered a higher risk procedure.

# KEY TERMS

- Duration of operative procedure:
  - Procedure/Surgery Start Time (PST); Time when the procedure is begun (e.g., incision)
  - Procedure/Surgery finish (PF): time when all instrument and sponge counts are completed and verified as correct, all postoperative radiologic studies to be done in the OR are completed, all dressings and drains are secured, and the physicians/surgeons have completed all procedure-related activities on the patient

# KEY TERMS

- **Diabetes:**
  - The NHSN SSI surveillance definition of diabetes indicates that the patient has a diagnosis of diabetes requiring management with insulin or a non-insulin anti-diabetic agent. The ICD-10-CM diagnosis codes that reflect the diagnosis of diabetes are also acceptable for use to answer YES to the diabetes field question on the denominator for procedure entry. These codes are found on the NHSN website in the SSI section under Supporting Materials”. The NHSN definition excludes patients with no diagnosis of diabetes. The definition also excludes patients who receive insulin for perioperative control of hyperglycemia but have no diagnosis of diabetes.
- **Height and Weight:**
  - The patient’s most recent height and weight documented in the medical record prior to otherwise closest to the procedure

# KEY TERMS

## ▶ 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. Must be noted/documentated found intraoperatively (intraoperative or immediate post operative note).
- ▶ Only select PATOS YES if it applies to the depth of SSI that is being attributed to the procedures
  - ▶ Example: If a patient had evidence of an intraabdominal infection at the time of surgery and then later return with O/S 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.

# PATOS

- The following verbiage alone without specific mention of infection does not meet the PATOS definition:
  - colon perforation, necrosis, gangrene, fecal spillage, nicked bowel during procedure, or a note of inflammation.
- Fresh traumas
  - Fresh traumas that are contaminated cases do not necessarily meet PATOS. For example, a gunshot wound to the abdomen will be a trauma case with a high wound class but there would not have been time for infection to develop.
- PATOS can be met when an abscess is noted, there is mention of infection in the OR note, purulence or pus is noted, septic/feculent peritonitis is noted.

## PROCEDURES THAT CAN NOT BE CODED AS CLEAN

- ▶ The procedures that can never be entered as clean are:
  - ▶ APPY, BILI, CHOL, COLO, REC, SB and VHYS
- ▶ Based on that a CSEC, HST, or OVRV can be a clean wound class based on the particular events and findings of an individual case

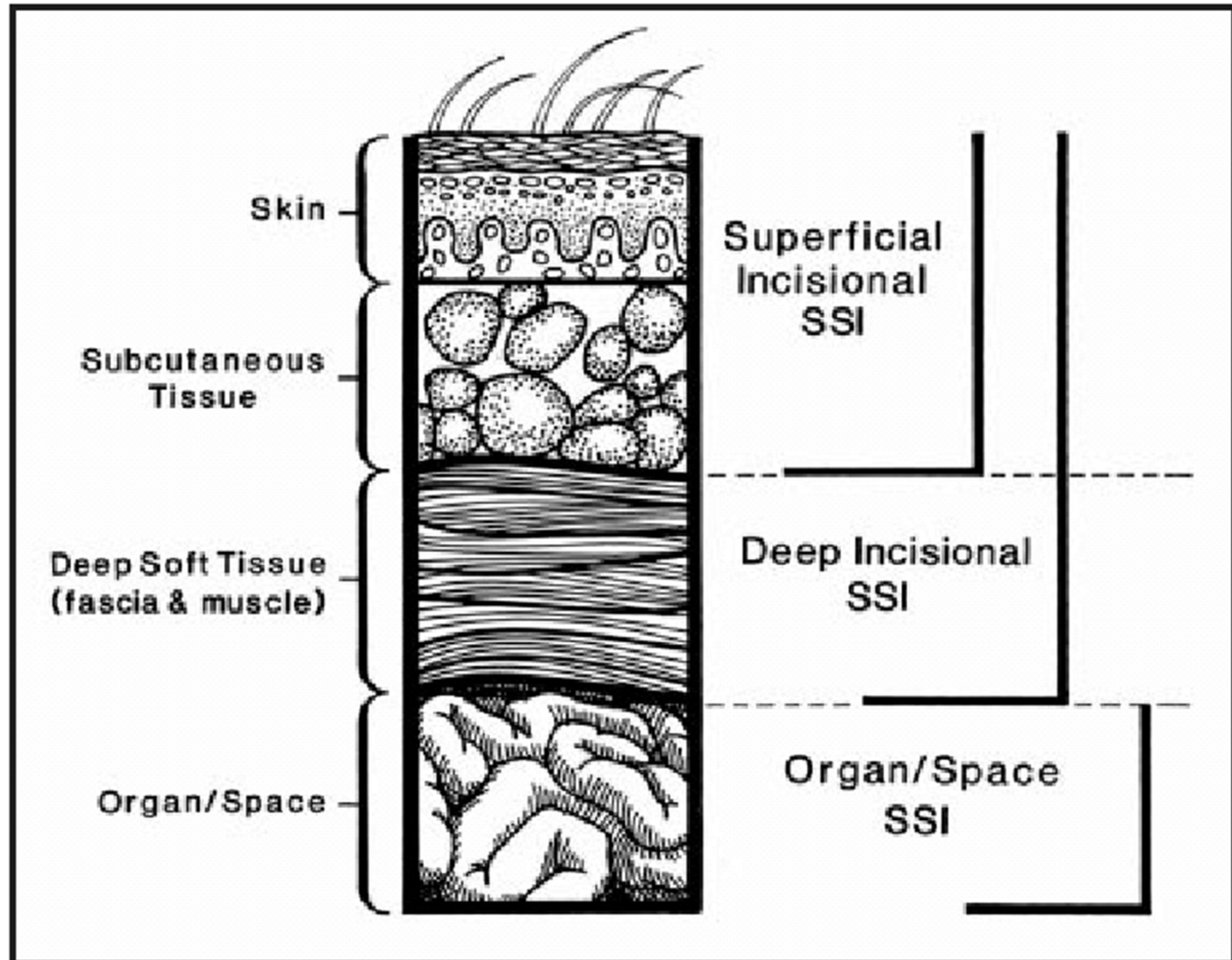


# DENOMINATOR REPORTING

## INSTRUCTIONS:

- More than one NHSN Procedure done thru the same incision use the same start and finish time for each procedure
- Patient has two different NHSN operative procedures performed via separate incisions on the same trip to 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)
- Patient has the same NHSN operative procedure via separate incisions indicate the procedure/surgery start time to procedure/finish time for each procedure separately or take the total time for the procedures and split it evenly between procedures.
- Patient taken back to OR during first 24 hours and primary incision is opened, combine the time of the first and second procedure and assign to primary procedure

# SSI CLASSIFICATIONS:

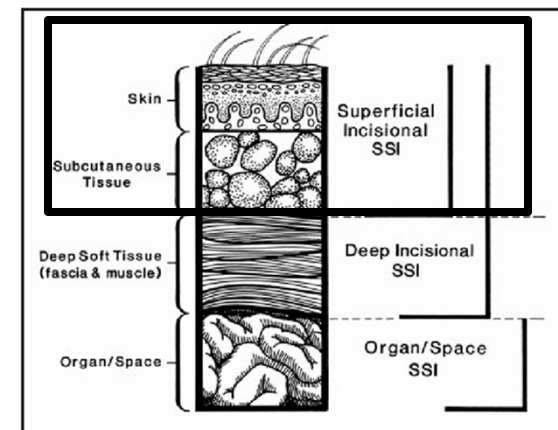


# SUPERFICIAL INCISIONAL SSI

Infection occurs within 30 days after any NHSN operative procedure (*Day one = procedure day*)  
and

Involves only skin and subcutaneous tissue of the incision

and



## Patient has at least one of the following:

- Purulent drainage from the superficial incision.
- Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision
- 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: localized pain or tenderness, localized swelling, erythema, or heat.
- Diagnosis of superficial incisional SSI by the surgeon or attending physician\*\* or other designee

**\*\* The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon, ID,ED, other physician on case or nurse practitioner or PA**

# SUPERFICIAL SSI: TWO TYPES

- ▶ 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 (chest incision for CBGB)
- ▶ Secondary (SIS)
  - ▶ A superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with one or more incisions (e.g., donor site for CBGB)

# SUPERFICIAL INCISIONAL SSI REPORTING INSTRUCTIONS

- ▶ A stitch abscess (minimal inflammation and discharge contained to the points of suture penetration) is not considered an SSI
- ▶ A localized stab wound or pin site infection is not considered an SSI (may be SKIN/ST infection)
- ▶ Cellulitis, by itself, does not meet the criteria for superficial incisional SSI

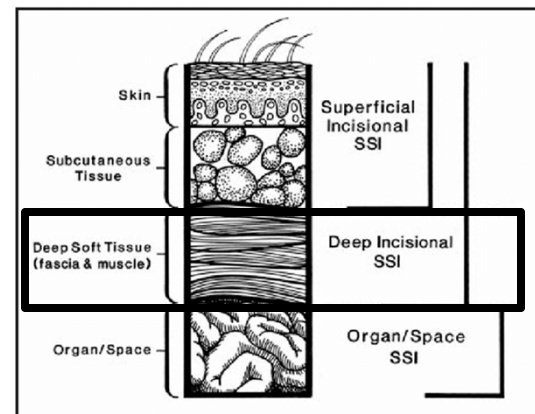
# DEEP INCISIONAL SSI

Infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to Table 2

and

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

and



# DEEP SSI

Patient has at least one of the following:

- Purulent drainage from the deep incision
  - Deep incision spontaneously dehisces or is deliberately opened or aspirated by a surgeon, attending physician\*\* or other designee and is culture-positive or not cultured
- AND
- The patient has at least one of the following signs or symptoms: fever ( $>38^{\circ}\text{C}$ ), or localized pain or tenderness.

*A culture-negative finding does not meet this criterion.*

- An abscess or other evidence of infection involving the deep incision is detected on gross anatomical or histopathologic exam, or imaging test

***\*\* The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon, ID, ED, other physician on case or nurse practitioner or PA***



# DEEP SSI: TWO TYPES

- ▶ Deep incisional primary (DIP)
  - ▶ A deep incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (chest incision for CBGB)
- ▶ Deep (DIS)
  - ▶ A deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with one or more incisions (e.g., donor site for CBGB)

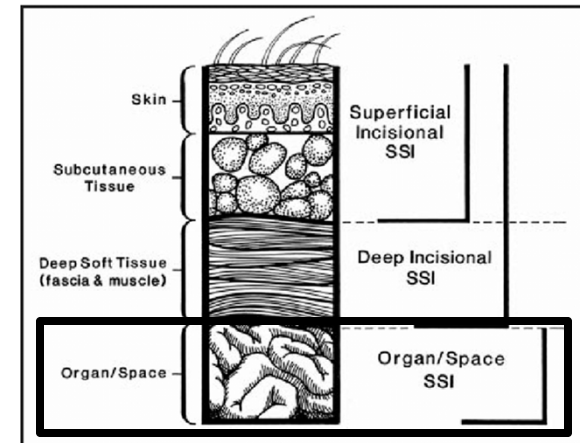
# ORGAN/SPACE SSI

Infection occurs within 30 or 90 days after the **NHSN operative procedure according to Table 2**

and

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

and



# ORGAN/SPACE SSI

Patient has at least one of the following:

- Purulent drainage from a drain that is placed into the organ/space (*closed suction drainage system, open drain, T-tube drain, CT-guided drainage*)
- Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space
- An abscess or other evidence of infection involving the organ/space that is detected on gross anatomical or histopathologic exam, or imaging test evidence of suggestive infection.

AND

- Meets at least one criterion for a specific organ/space infection site listed in Table 3. Criteria are in the Surveillance Definitions for Specific Types of Infections Chapter 17

# KEY TERMS

## ▶ Gross anatomical Exam

- ▶ Evidence of infection elicited or visualized on physical examination or observed during an invasive procedure. Includes physical examination of a patient during admission or subsequent assessments of the patient, may include findings noted during a medical/invasive procedure dependent upon the location of the infection as well as the NHSN infection criterion

## ▶ Purulence

- ▶ NHSN does not define purulent drainage. Generally, thick/viscous, creamy/opaque fluid discharge with or without blood seen at the site or documentation of pus/purulence by a medical professional would be accepted evidence of purulent drainage

Table 3

## ***30-Day Surveillance***

***Day 1 = the date of procedure***

<b>30-day Surveillance</b>			
<b>Category</b>	<b>Operative Procedure</b>	<b>Category</b>	<b>Operative Procedure</b>
AAA	Abdominal aortic aneurysm repair	LAM	Laminectomy
AMP	Limb amputation	LTP	Liver transplant
APPY	Appendix surgery	NECK	Neck surgery
AVSD	Shunt for dialysis	NEPH	Kidney surgery
BILI	Bile duct, liver or pancreatic surgery	OVRY	Ovarian surgery
CEA	Carotid endarterectomy	PRST	Prostate surgery
CHOL	Gallbladder surgery	REC	Rectal surgery
COLO	Colon surgery	SB	Small bowel surgery
CSEC	Cesarean section	SPLE	Spleen surgery
GAST	Gastric surgery	THOR	Thoracic surgery
HTP	Heart transplant	THYR	Thyroid and/or parathyroid surgery
HYST	Abdominal hysterectomy	VHYS	Vaginal hysterectomy
KTP	Kidney transplant	XLAP	Exploratory laparotomy

# ***90-day Surveillance***

Table 3

<b>90-day Surveillance</b>	
<b>Category</b>	<b>Operative Procedure</b>
BRST	Breast surgery
CARD	Cardiac surgery
CBGB	Coronary artery bypass graft with both chest and donor site incisions
CBGC	Coronary artery bypass graft with chest incision only
CRAN	Craniotomy
FUSN	Spinal fusion
FX	Open reduction of fracture
HER	Herniorrhaphy
HPRO	Hip prosthesis
KPRO	Knee prosthesis
PACE	Pacemaker surgery
PVBY	Peripheral vascular bypass surgery
VSHN	Ventricular shunt

- ***Superficial SSIs followed for 30 day period for all procedure types***
- ***Secondary incisional SSIs followed for 30 day period regardless of the surveillance period for the primary site***

Table 4

***Specific Sites of an Organ/Space SSI***

<b>Category</b>	<b>Specific Site</b>	<b>Category</b>	<b>Specific Site</b>
BONE	Osteomyelitis	MED	Mediastinitis
BRST	Breast abscess or mastitis	MEN	Meningitis or ventriculitis
CARD	Myocarditis or pericarditis	ORAL	Oral cavity infection (mouth, tongue, or gums)
DISC	Disc space infection	OREP	Deep pelvic tissue infection or other infection of the male or female reproductive tract
EAR	Ear, mastoid infection	PJI	Periprosthetic joint infection
EMET	Endometritis	SA	Spinal abscess/infection
ENDO	Endocarditis	SINU	Sinusitis
GIT	Gastrointestinal (GI) tract infection	UR	Upper respiratory tract, pharyngitis, laryngitis, epiglottitis
IAB	Intraabdominal infection, not specified elsewhere	USI	Urinary System Infection
IC	Intracranial infection	VASC	Arterial or venous infection
JNT	Joint or bursa infection	VCUF	Vaginal cuff infection
LUNG	Other infection of the lower respiratory tract		

***Criteria for these sites can be found in chapter 17***

# SSI FOLLOWING INVASIVE MANIPULATION/ACCESSION OF THE OPERATIVE SITE

An SSI will not be attributed if the following 3 criteria are ALL met:

- ▶ During the post-operative period the surgical site is without evidence of infection
- ▶ An invasive manipulation/accession of the site is performed for diagnostic or therapeutic purposes (for example, needle aspiration, accession of ventricular shunts, accession of breast expanders)
- ▶ An infection subsequently develops in a tissue level which was entered during the manipulation/accession





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

*When there are different operative procedures/same incision/same trip to OR and SSI occurs use the NHSN Principal Operative Procedure Category Selection List. Ascending order with highest risk first*

Priority	Category	Neurosurgical (Brain/Spine) Operative Procedures
1	VSHN	Ventricular shunt
2	CRAN	Craniotomy
3	FUSN	Spinal fusion
4	LAM	Laminectomy
Priority	Category	Neck Operative Procedures
1	NECK	Neck surgery
2	THYR	Thyroid and or parathyroid surgery

# **Case Studies & Discussion**

**Hang On and Enjoy  
The Ride**

