

# SURGICAL SITE INFECTIONS

National Healthcare Safety  
Network (NHSN)



# 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

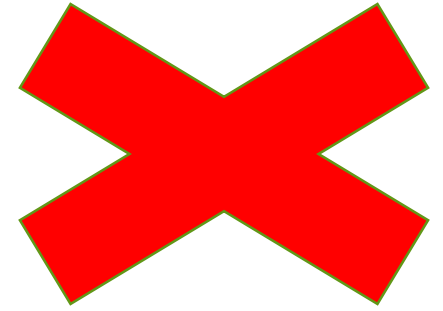


# POST-DISCHARGE SSI SURVEILLANCE METHODS

Criteria must  
be met  
regardless of  
where the SSI  
is detected!

- ▶ 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

# 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)

# 2017 SSI

## 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.



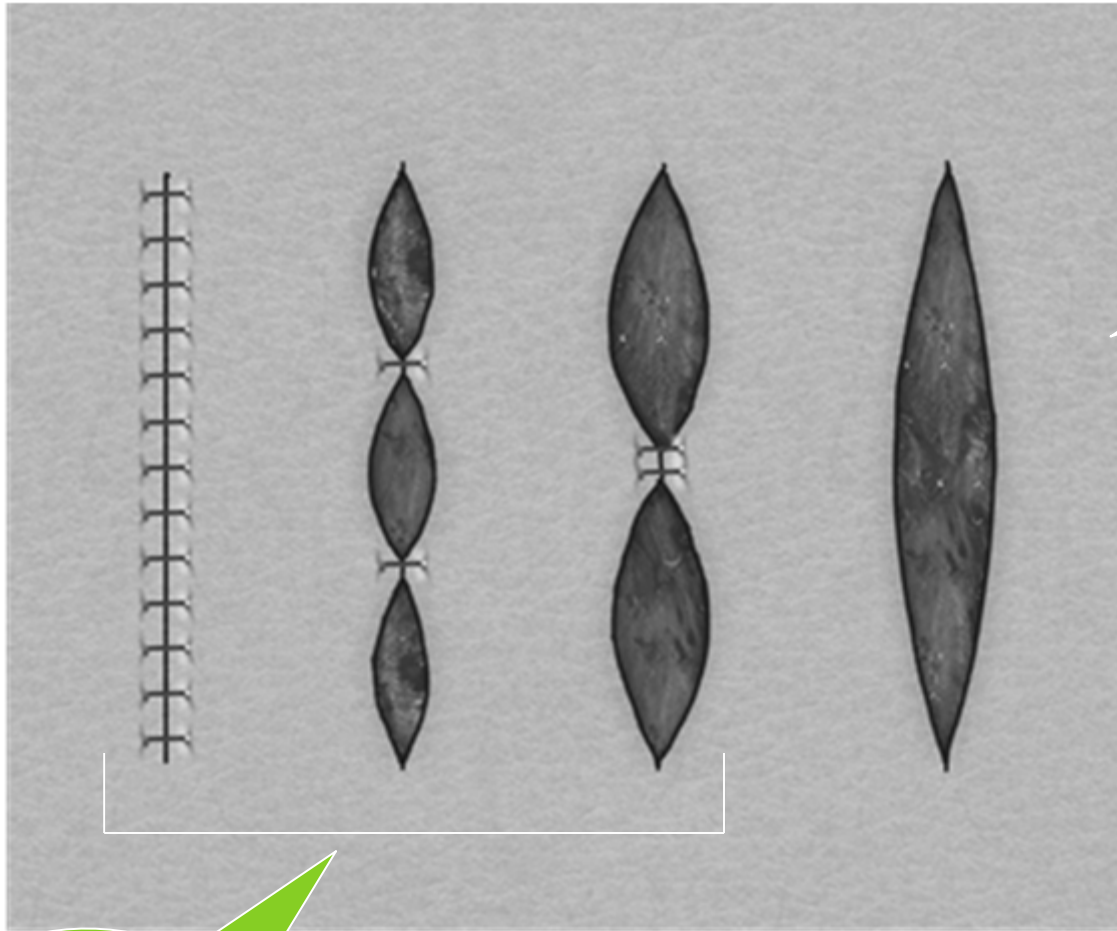
## KEY TERMS

- **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
- **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





Closure other than primary

Primary Closure

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

*Slide and drawing credit to Janet Brooks RN, BSN, CIC Nurse Consultant*

# 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 (present preoperatively). Must be noted/documentated preoperatively or found intraoperatively.
  - ▶ 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

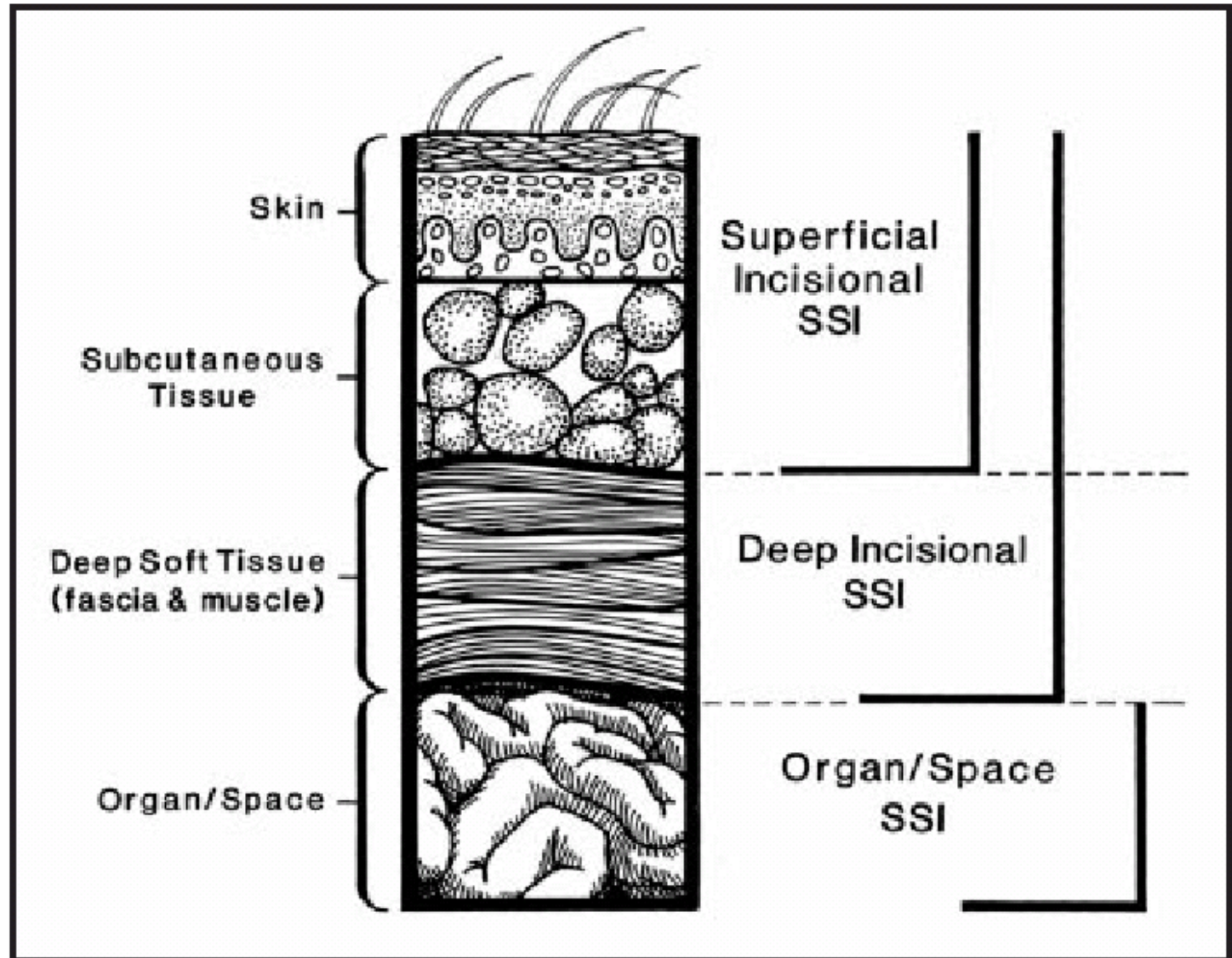
- ▶ The procedures that can never be entered as clean are:
  - ▶ APPY, BILI, CHOL, COLO, REC, SB and VHYS
- ▶ Based on that a CSEC, HST, or OVRV can be a clean wound class based on the particular events and findings of an individual case

# 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\*\*** and is culture-positive or not cultured.

### AND

- Patient has at least one of the following signs or symptoms: pain or tenderness, localized swelling, redness, or heat. A culture-negative finding does not meet this criterion.
- 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 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

# 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)

# 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
- 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

# 30-Day Surveillance

Code	Operative Procedure	Code	Operative Procedure
AAA	Abd aortic aneurysm	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/pancreatic	OVRY	Ovarian surgery
CEA	Carotid endarterectomy	PRST	Prostate surgery
CHOL	Gallbladder surgery	REC	Rectal surgery
COLO	Colon surgery	SB	Small bowel
CSEC	Cesarean section	SPLE	Spleen surgery
GAST	Gastric surgery	THOR	Thoracic surgery
HTP	Heart Transplant	THYR	Thyroid/parathyroid surgery
HYST	Abdominal hysterectomy	VHYS	Vaginal hysterectomy
KTP	Kidney transplant	XLAP	Exploratory Lap
		OTH	Other operative procedures not included in NHSN codes

# 90-day Surveillance

Code	Operative Procedure
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
PVBY	Peripheral vascular bypass surgery
RFUSN	Refusion of spine
VSHN	Ventricular shunt



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

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

# SSI FOLLOWING INVASIVE MANIPULATION/ACCESSION OF THE OPERATIVE SITE

- ▶ If during the post-operative period the surgical site has an invasive manipulation/accession for diagnostic or therapeutic purposes (e.g., needle aspiration, accession of ventricular shunts, accession of breast expanders) and there is no evidence of an infection at that time, if an SSI develops following this manipulation/accession, the infection is not attributed to the operation
  - ▶ Does not include wound packing, changing of wound packing materials or staple removal as part of postoperative care

▶	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*

# CASE STUDIES



- ARE YOU  
READY  
???



# CASE STUDY 1

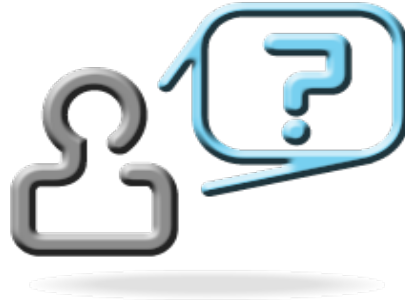
- ▶ A patient is admitted with a ruptured diverticulum and a COLO procedure is performed in the inpatient OR.
- ▶ Case is entered as a wound class 3
- ▶ Specimen is obtained in the OR which later returns (+) for *E. coli*
- ▶ Surgeon staples closed the skin at 4 locations with packing placed between the staples.

# IS THIS PROCEDURE PRIMARILY CLOSED ?

- Yes
- No

# CASE STUDY 2

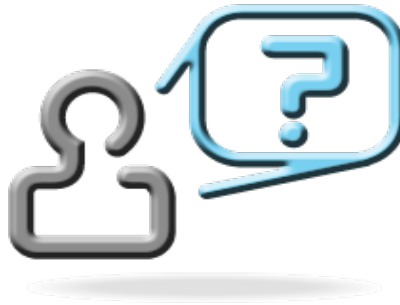
- ▶ Patient was admitted with an acute abdomen
- ▶ To OR for XLAP with findings of an abscess due to ruptured appendix and an APPY is performed.
- ▶ Patient returns 2 weeks later and meets criteria for an organ space IAB SSI.



- ▶ Does this patient meet the criteria for PATOS?
  - ▶ YES
  - ▶ NO
- ▶ Does this SSI have to be reported to NHSN
  - ▶ YES
  - ▶ NO

## CASE STUDY 3

- ▶ During an unplanned cesarean section (CSEC) the surgeon nicks the bowel and there is contamination of the intraabdominal cavity.
- ▶ One week later the patient returns and meets criteria for an organ space OREP (other reproductive) SSI.

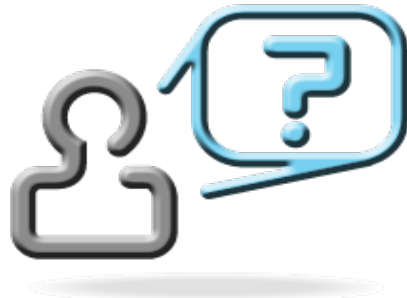


PATOS is checked as Yes

- TRUE
- FALSE

# CASE STUDY 4

- ▶ A patient had a COLO and a HYST through a single incision during a single trip to the OR
  - ▶ Incision at 0823 and PF time is 1133
  - ▶ The OR report also indicates that the HYST part of procedure began at 1000

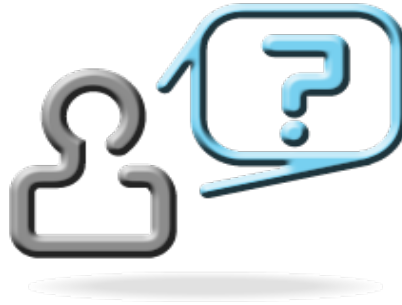


- Which statement is correct?
  1. Only the COLO should be reported since it is higher on the priority list
  2. Two separate procedures should be reported: COLO with a duration of 1hr 37 min and HYST with a duration of 1hr 33 min
  3. Two separate procedures should be reported one for COLO and one for HYST, each with a duration of 3hrs 10 min.



## CASE STUDY 5

- ▶ 2/18: 45 year old male admitted and had a laparoscopic left hemicolectomy
- ▶ 2/24: Purulent drainage noted at one of the trocar sites. Culture obtained and + for *Enterobacter* spp. and *E. coli*; patient started on antibiotics



- What should be reported to NHSH?
  1. Nothing. The surgeon did not open the wound, so the criteria are not met
  2. Nothing. It is an SSI, but not an HAI
  3. SSI-SIP
  4. SSI-DIP

# CASE STUDY 6

- 2/1/14: 18 year old female admitted for ruptured spleen secondary to motor vehicle accident and taken urgently to the OR for exploratory lap. Splenectomy, and Distal Pancreatectomy performed.
- 2/8/14: Post op course uneventful and patient discharged home
- 3/6/14: Patient seen in ED with a one day history of yellow, foul smelling drainage from incision and CT + for RUQ fluid collection
- 3/7/14: Patient taken to interventional radiology for abscess drainage and drain placement. 50 cc of “purulent” material obtained and culture + for E. coli



- Select the correct response
  1. Patient has an organ/space (IAB) SSI
  2. Patient has a deep (primary incisional SSI)
  3. Patient does not meet the criteria for SSI

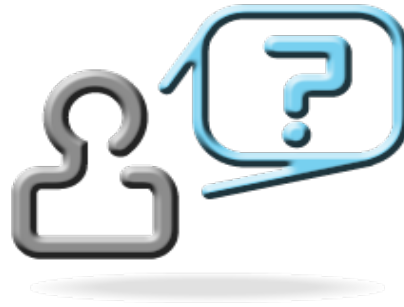
# CASE STUDY 7

- ▶ 3/10: Patient admitted and underwent a hemicolectomy due to colon cancer
- ▶ 3/14: Temp up to 38.7 C, abdominal pain. Ultrasonography shows intraabdominal abscess
- ▶ 3/15: To OR for I&D of the abscess. Abscess specimen collected for culture. Antibiotics begun. Abscess culture positive for E. coli
- ▶ 3/18: Discharged from hospital on oral antibiotics



- What criteria does this patient meet for SSI

1. SSI-SIP
2. SSI-DIP
3. SSI-IAB
4. SSI-GIT



- At the time of the I&D, it was discovered that the patient had suffered an anastomotic leak from which the abscess developed.
- Does this change your determination of an SSI-IAB?
  1. Yes
  2. No

# CASE STUDY 8

- ▶ A patient is admitted with an acute abdomen
- ▶ Taken to the OR for open appendectomy for suspected ruptured appendix (Wound class is 3)
- ▶ Patient readmitted 2 weeks later (POD 21) and has fever, abdominal pain and CT evidence of two intraabdominal abscesses. CT guided drainage of 100ccs of purulent drainage + for *E. coli* and *B. fragillis*





1. Patient meets criteria for an organ space IAB SSI but should not be reported because the case was contaminated at time of surgery
2. Patient meets criteria for deep SSI
3. Patient does not meet criteria because the surgeon did not diagnosis the SSI
4. This case meets criteria for O/S IAB and should be reported to NHSN as attributable to the APPY procedure

# CASE STUDY 9

- ▶ Mr. Jones had a hemi-colectomy performed on April 1<sup>st</sup>.
- ▶ Duration of the procedure was recorded as 3 hours and 10 minutes.
- ▶ In the ICU later that day, Mr. Jones was noted to be hypotensive and abdomen was rigid.
- ▶ Mr. Jones was taken back to the OR urgently and had repair of a bleeding vessel. This surgery time was recorded as 1 hour and 15 minutes.

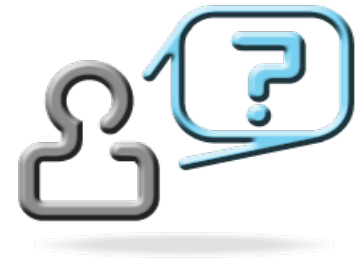


When reporting the colon procedure to NHSN you should:

1. Report the colon procedure with a duration of 3 hours and 10 minutes
2. Do not report the colon procedure since the patient had a complication
3. Report the colon procedure with a duration of 4 hours and 25 minutes
4. Report the colon and the “OTH” separately with the appropriate OR times

# CASE STUDY 10

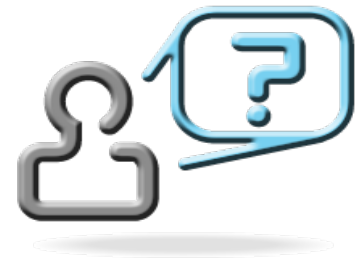
- ▶ A patient had bilateral knee prostheses (KPRO) implanted during a single trip to the OR
- ▶ Left KPRO PST at 8:30 a.m. with no recorded PF for this knee
- ▶ Right KPRO PF time was recorded as 11:30 a.m.



- Which statement is correct?
  1. One KPRO procedure should be reported with a combined duration of 3 hours 0 min
  2. Two separate KPRO procedures should be reported, each with a duration of 1hr. 30 min
  3. Two separate KPRO should be entered, each with a duration of 3 hrs. 0 min

# CASE STUDY 11

- 1/5/14 a 36 year old retired professional hockey player admitted and taken to OR for total knee replacement
- 1/8/14 the Post-op course is completely uneventful, incision is clean, dry and intact and patient discharged home with outpatient PT
- 2/16/14 patient is working out in the back yard, slips and falls. Incision opens and patient cleans area and places a bandage on it
- 2/19/14 patient notes redness, increased pain and tenderness with yellow/greenish drainage at incision. Patient goes to ED and admitted
- 2/20/14 patient taken to OR and purulent fluid noted tracking down to prosthesis. Fluid sent for bacterial and fungal cultures, knee irrigated. Culture from OR + for MRSA

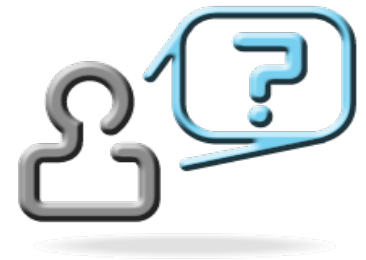


- Select the correct response
  1. Patient does not meet the criteria of SSI because incision was healed at time of discharge and patient fell at home
  2. Patient has a “deep” SSI
  3. Patient has an “organ/space” (PJI) SSI
  4. Patient has a “superficial” (primary incision) SSI

# CASE STUDY 12

- ▶ 70 y.o. male admitted on 3/10/14 and underwent a hemi-colectomy and repair of an abdominal wall hernia via the same incision on day of admission. The incision was closed and a JP drain was placed via a stab wound in LLQ.
- ▶ Patient discharged 3/14/14
- ▶ 3/17/14 patient arrives to ED with a red, painful incision and the incision is draining yellow foul smelling discharge. Physician removes 2 staples and probes wound. The fascia is intact and only the subcutaneous tissue is involved. No cultures were obtained. Antibiotics started, wound packed and patient discharged.



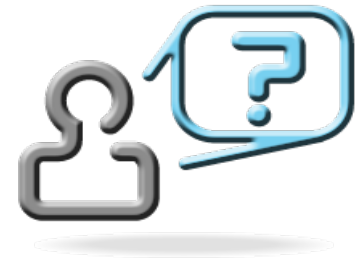


## What should be reported to NHSN

1. Nothing, the wound was not cultured so it could not have been infected
2. Nothing, he had 2 procedures so you don't know which one caused the infection
3. SSI---SIP attributable to the COLO
4. SSI---DIP attributable to the HERN

# CASE STUDY 13

- ▶ Patient is admitted to the hospital on 3/12 for elective surgery and active MRSA screening test is positive
- ▶ On the same day as admission, patient undergoes total abdominal hysterectomy, postoperative course is unremarkable and patient is discharged home on 3/15
- ▶ On 3/18, patient is readmitted with complaints of acute incisional pain since day before. Surgeon opened the wound and clear serous drainage is found and notes that the fascia was not intact and sent a specimen from the deep wound.
- ▶ On 3/20 culture results are final and no growth

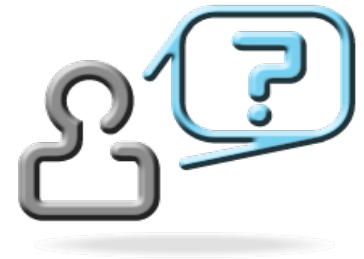


# What infection should be reported to NHSN?

1. SSI-SIP
2. SSI-DIP
3. SSI-Organ/Space
4. Nothing, criteria not met

# CASE STUDY 14

- ▶ On 8/1 patient presents to the ED with an acute abdomen and is admitted to the OR on the same day for colon resection. Peritoneal abscess noted at time of surgery.
- ▶ Abdominal abscesses drained and thorough abdominal washout and incision loosely closed with some packing between staples and a JP drain in an adjacent stab wound
- ▶ 8/4 Patient doing well and discharged home
- ▶ 8/8 Patient presents to the ED with fever, abdominal pain, and sent to CT for CT guided drainage of an abscess.



Which of the following is correct

1. This is not an SSI because patient was already infected at time of surgery
2. Does not meet criteria because packing was left between staples
3. Not an SSI but a SST due to stab wound
4. Report as SSI-IAB

# Hang On and Enjoy The Ride

