

Case-Scenarios

For optimal use: Cover the answers. Try to answer each question BEFORE you look!

1. Mr. Jones, a 52 year old male smoker, had been in the hospital with pneumonia for 5 days. He was discharged on levofloxacin.

Twenty-four hours after discharge, he was seen in the emergency department complaining of voluminous watery diarrhea every 1-2 hours. His stool specimen from the ED was *C difficile* toxin assay positive. He was treated with IV fluids and metronidazole and sent home to follow up with his primary physician.

He returns to the hospital one week later. Admission *C difficile* tests are positive.

Q: Per California requirements, what is the correct way to report this to NHSN?

A: Report to NHSN the re-admission CDI.

Rationale: California reporting requirements include only inpatient LabID reporting. Positive *C. difficile* tests must be reported from inpatients and from ED patients if admitted to the hospital the same calendar day. The CDI positive lab obtained in the ED 24-hours after the first hospital discharge is not reported because the patient was not admitted. The CDI-positive lab obtained on re-admission must be reported. The LabID algorithm will categorize this case as HCFA and it will be included in the hospital's CDI incidence rates.

2. The infection preventionist (IP) was reviewing the medical record of an ICU patient suspected of having a CLABSI. She notes a blood culture, drawn on the day of admission, is positive for VRE. The IP returns to her office and finds the case has not been entered into NHSN. She reviews the online culture reports produced and provided by the lab for the affected time period, but this blood culture cannot be found.

Q. What are some possible reasons the positive blood culture finding is missing from the report used by the IP?

A: A number of systems errors have been identified related to how laboratory data are exchanged. In this case, the IP had requested a daily line listing of all positive VRE and MRSA blood cultures. However, this blood specimen had been drawn in the ED on the day the patient was admitted. The IP thought the laboratory had been providing culture results from **any** patient who **became** an inpatient. However, it was discovered the laboratory was excluding cultures sent from the ED.

Rationale: You need to assure the reports being reviewed by the IP program for identifying HAI are complete and reliable. This requires periodic internal validation. Request directly from the Laboratory information system (LIS) a list of final results for the previous month (or quarter). Compare it to the lists routinely reviewed for surveillance purposes. If lab data are filtered (put through an algorithm) by a 3rd party surveillance software system, review lists to ensure all relevant lab results are not being excluded from your IP reports. If you review positive cultures monthly, be sure the culture date is used to derive your surveillance review report and not the date the culture is final.

3. Mrs. Bevis, a 65 year old female diabetic was admitted through the emergency department to the medical/surgical unit. ED notes indicate a peripheral IV was inserted (not a central line). Her blood culture drawn in the ED was positive for MRSA.

The very astute infection preventionist reports the positive MRSA as a LabID event and a CLABSI.

Q: What possible surveillance criteria could lead the IP to report this as a CLABSI?

A: During surveillance case finding, the very capable IP reviewed the medical record and discovered the patient was recently discharged from the hospital (28 hrs prior), right after her PICC line was removed.

Rationale: Consistent with the NHSN 48-hour rule.

4. A 41 year-old man presented to the emergency department on August 14 in a diabetic coma and with severe anemia. He had a right external jugular catheter inserted in the ED.

The next day in the medical ICU, he had a midline catheter inserted in the right upper extremity.

On August 21, shortly after he was transferred to the telemetry unit, he developed a fever to 39 C and shaking chills. Two sets of blood cultures were submitted.

On August 24, blood cultures were positive for *Staphylococcus aureus* (resistant to methicillin). Neither of the central line insertion sites showed inflammation and there was no other documented infection.

Q: How should this case be reported to submitted to NHSN? If so, which module and to what location should it be attributed?

A: Yes, in California, it must be entered as an Event twice: as a CLABSI (Device-Associated Module) and MRSA BSI LabID (MDRO/CDI Module) BSI

Rationale: The infections would have different location attributions per NHSN protocol.

- o The CLABSI Event location would be entered as the medical ICU because symptoms began within 48 hours of transfer to another unit.
- o The MRSA BSI Lab ID Event location would be entered as the telemetry unit because that is where the patient was when culture blood culture was ordered.

5. An 84 year-old woman with mild Alzheimer's disease was hospitalized on the telemetry unit with upper GI bleeding.

On hospital day 3, her records indicate that she was hemodynamically stable, had a central venous catheter in the right internal jugular vein and an indwelling catheter was in the urinary bladder.

On day 6, she became unresponsive and hypotensive. She was nasally intubated placed on a ventilator, and transferred to the ICU. WBCs were 15K. Temp was 37.6. Two sets of blood cultures were drawn (10 minutes apart) and urine collected for culture.

49 hours later, both sets of blood cultures and the urine (>10⁵CFU/ml) were reported to be positive for Gram-positive cocci in chains (viridans streptococci on final report).

Q: Is this a CLABSI, and if so, what location would it be attributed to in the NHSN?

A: No this is not a CLABSI.

Rationale: Although both sets of blood cultures are positive from specimens drawn while a central line was in place, there was another infection present. The surveillance criteria are met for Asymptomatic Bacteremic urinary tract infection (ABUTI). The bacteremia (BSI) is considered a secondary blood stream infection to the primary infection, UTI.

6. While reviewing a medical record to follow-up on a positive culture line list provided by the lab, the IP notices a discrepancy. The patient's location noted in the medical record at the time the specimen was collected does not match the location noted on the lab line listing. The IP uses the lab line list provided when reporting Events to NHSN.

Q: What are some reasons for this discrepancy?

A: There are at least four different locations available from a hospital's information system that a laboratory information system might use for "Location" when reporting lab results:

The patient's location recorded by the phlebotomist/clinician when the specimen was collected (correct for NHSN entry).

- The patient's location when the test was ordered (location in an order-entry system may differ from the patient's location when specimen collected).
- The patient's location at the time the lab finding was delivered ("Reported To" location).
- The patient's most current bed assignment in the patient admission, discharge and transfer (ADT) system. (Retrospective reviews of locations are highly inaccurate).

Rationale: To be sure to attribute to the correct location, perform a periodic validation by comparing location accuracy derived from the source being used for surveillance with the findings in the medical record.

7. On December 5, a 35 year old man involved in a motor vehicle accident sustains multiple internal and external traumatic injuries. On arrival at the emergency department, a triple-lumen subclavian line and Foley catheter are placed. Once stabilized, the patient is transferred to the intensive care unit.

On December 8, the patient spikes a temperature to 101°F and is pan-cultured, including two blood cultures.

On December 10, the subclavian line is discontinued, and the catheter tip is sent for culture. Later that afternoon, the blood culture results from December 8 are reported as *Staphylococcus hominis* in both sets, with different susceptibility profiles. The physician notes: "Positive blood culture contaminant; no antibiotics required." All other specimens cultured are negative.

On December 12, catheter tip results are reported as *Staphylococcus epidermidis*.

Q: Is this a CLABSI per NHSN surveillance criteria?

- a. No, because the blood cultures grew only common skin contaminant organisms.
- b. Yes, a central line-associated bloodstream infection (CLABSI) because both the blood and catheter tip cultures grew coagulase-negative staphylococci.
- c. No, because the ID consulting physician stated that the blood culture results were contaminants and did not treat the patient with antibiotics.
- d. Yes, a CLABSI because the patient had a central line in place, had a fever, and there were 2 positive blood cultures with a common skin contaminant organisms, collected within two days of each other.

A: d. Yes, CLABSI because the patient had a central line in place, had a fever, and there were 2 positive blood cultures with a common skin contaminant organisms, collected within two days of each other.

Rationale: *S. hominis*, a skin-colonizing organism, grew in both sets of blood cultures, which were drawn within 2 days of each other. and the patient is symptomatic (fever), without evidence of infection at another site. This meets criterion 2 for a laboratory-confirmed bloodstream infection (LCBI).

Even though the isolates from the 2 positive blood cultures did not have matching antibiotic susceptibilities, NHSN states

- "Only genus and species identification should be utilized to determine the sameness of organisms. No additional comparative methods should be used (e.g., morphology or antibiograms)"
- "Report the organism to the genus/species level only once, and if antibiogram data are available, report the results from the most resistant panel."

The fact that the line tip grows another skin colonizing organism may aid in the clinical diagnosis, it is irrelevant for surveillance purposes, as is the physician's note. This BSI is associated with the use of the subclavian line, which is a central line because it terminates at or near the heart or in one of the great vessels.

8. Same as scenario 7 above, except the subclavian line tip culture instead grows *Staphylococcus hominis*.

Q: Does this finding change your HAI assessment?

A: No.

Rationale: Catheter tip cultures are not part of NHSN CLABSI surveillance criteria.

9. A 56 year-old man with no significant past medical history admitted via the ED goes to the OR for trauma to both legs following a motor vehicle accident.

On post-op day 3, the orthopedic surgeon discharged him to home with a 10-day prescription for amoxicillin since he developed a cough and is producing thin yellow sputum. He had no fever or dyspnea.

The patient returned to the ED after being home for six days complaining of weakness, dizziness and diarrhea for over 24 hours. A stool specimen was collected in the ED and an hour later the patient was admitted to the surgical floor at 12:15 AM for severe dehydration. The PCR for *Clostridium difficile* is positive.

Q: Per California reporting requirements, should this positive stool specimen be reported as a CDI LabID event?

A: No.

Rationale: Regardless of the history presented in this scenario, the specimen date was prior to the date of admission and would not be included in CDI inpatient LabID reporting.

10. Same scenario as 9, above, however, the stool specimen had been taken one hour later.

Q. Should this positive stool specimen be reported as a CDI LabID event?

A: Yes.

Rationale: The ED specimen would have then been taken on the same calendar date as the date of admission to the hospital.

11. On April 8, while an inpatient on the renal ward, a patient had a tunneled central line placed in the OR due to the failure of a hemodialysis fistula. He was discharged, and was continued on outpatient dialysis using the new line.

On May 9, the patient was readmitted to the medical telemetry unit with redness, pain and purulent drainage at the placement catheter site. Blood cultures were drawn. Fluid cultures were obtained aseptically.

On May 10, one of the blood cultures was reported to have grown *Enterococcus faecalis*. One of the three organisms cultured from the catheter wound site was reported as *Enterococcus faecalis*. Both are resistant to vancomycin.

Q: Is this a CLABSI? Should this infection be reported to NHSN? To what location would the infection be attributed?

A: Yes, it is a CLABSI. Although there is a localized infection at the vascular access site, it is considered a CLABSI when there is a positive blood culture. Since the patient has not been recently discharged, the CLABSI would not be reported or attributed to your hospital. The outpatient dialysis facility should be notified to report this to NHSN.

In California, it must however be reported by your hospitals as a VRE BSI LabID event. It would be attributed to the medical telemetry ward.

Rationale: To “rule out” CLABSI when a central line is present and another site of infection is suspected as being the cause for the bacteremia (and not the central line), the NHSN infection surveillance definitions **must** be consulted. The NHSN surveillance definition for skin/sort tissue infection (SST) state that with the presence of a positive blood culture: “Even if there are clinical signs or symptoms of localized infection at a vascular access site, but no other infection can be found, the infection is considered a primary BSI.”

For the blood culture positive for VRE or MRSA, a LabID event must be reported whether it’s a primary or secondary BSI are reported if the pathogens are VRE or MRSA.

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12. When reviewing a medical medical record, the IP notes a blood culture was ordered on March 11 and the date of specimen collection was recorded as March 11. On the lab-produced line list used by the IP to identify CLABSI, MRSA BSI, and VRE BSI, the specimen date is listed as March 12. The IP is concerned about this discrepancy

Q: What is the most likely reason for this discrepancy?

A: It is possible the specimen date recorded corresponds to the date the specimen was received by the lab not the date the specimen was collected.

Accurate date of collection is necessary to determine if surveillance criteria are met. Lab dates should be validated periodically, especially if specimens are sent to off-site or reference laboratories.

13. A 1 day-old neonate, with clinical signs and symptoms of sepsis status post prolonged delivery, meconium staining, and an APGAR of 6, was transferred to a level III nursery. An umbilical line had been placed by the transferring facility 5 hours before the arrival of the patient.

At the receiving hospital, blood cultures were drawn and the sepsis protocol was initiated. The cultures revealed *Enterococcus faecalis*, vancomycin resistant. The patient’s antibiotic regimen was adjusted.

Q: Which, if any, of these two California hospitals need to report this event?

A: The receiving hospital, **and** perhaps the transferring hospital.

Rationale: The receiving hospital must report the positive blood culture in the MDRO/CDI Module as a Lab ID Event because specimen was drawn on or after the date of admission. Since the patient had the signs and symptoms present upon admission consistent with sepsis, the receiving facility would not report this as a CLABSI.

The transferring hospital placed the central line. The receiving hospital should communicate these findings to the transferring hospital. The transferring hospital should review to determine if CLABSI criteria are met and therefore must be reported.

14. A 37 year-old male with a known history of drug and alcohol abuse was re-admitted 35 days following an appendectomy performed at the same hospital. He was complaining of nausea, poor appetite, cachexia, abdominal tenderness and continued drainage from the surgical wound margin that began 2 weeks prior to presentation at the hospital. An abdominal CT revealed an intra-abdominal abscess with fistula near the caecum. The patient was taken for an exploratory laparotomy.

Cultures on the day of admission from the abscess grew *Escherichia coli*, *Enterococcus faecalis*, vancomycin resistant and *Staphylococcus aureus*, methicillin resistant.

Blood cultures grew *Staphylococcus aureus*, methicillin resistant.

Q: What, if anything, needs to be reported to NHSN?

A: Two infections must be reported: MRSA BSI LabID and SSI-IAB.

Rationale: The MRSA BSI from the blood culture drawn on the date of admission must be reported as MDRO/CDI Module LabID event.

Appendectomy is a reportable procedure in California. The criteria are also met for deep/organ space intrabdominal surgical site infection, and must be reported as SSI-IAB. Note that even though the patient returned to the hospital >30 days after his procedure, the onset date of infection is clearly within the 30 day required post-operative surveillance period for procedures without an implant.

15. On December 19 a premature infant of 590 grams was delivered by Caesarian section and transferred to the NICU on ampicillin and cefotaxime. Blood cultures drawn were negative.

On December 27, an intestinal perforation was suspected and a peritoneal drain was inserted. A PICC was inserted and blood cultures drawn were again negative. However, the patient was started on 14-day treatment with vancomycin, cefotaxime and metronidazole.

Over the ensuing weeks, the following micro labs results showed

- o Jan 2 - Respiratory culture, negative
- o Jan 6 - Urine culture, negative
- o Jan 6 - Blood cultures, negative
- o Jan 8 - Respiratory culture, negative
- o Jan 14 - Blood cultures, negative

By mid-January, it was felt the presumed intestinal perforation had resolved.

On February 1, a blood culture was positive for *Citrobacter freundii* and *Enterococcus faecalis* (both non-resistant antibiograms) and the patient was started on vancomycin, gentamicin and metronidazole.

Eventually the patient was transferred to another hospital with clinical note indicating "presumed necrotizing enterocolitis".

Q: Is this CLABSI or NEC with secondary BSI?

A: CLABSI

Rationale: For this to be considered a secondary BSI, the patient would have to meet the NHSN criteria for an infection at another site. The surveillance definition for necrotizing enterocolitis (NEC) includes at least one culture matching the blood culture, or a logical pathogen if primary site cultures were not obtained.

The *Citrobacter freundii* isolated from the blood would not be considered "logical" because it is not a typical GI-pathogen. In hospitalized patients, *Citrobacter* species are known to cause a wide variety of HAI of the respiratory tract, urinary tract, and the blood.

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16. A patient with a PICC line inserted 5 days previously spikes a fever to 39.5C. No other signs of infection are evident. Blood cultures are ordered. The lab reports 1 bottle growing *Staphylococcus epidermidis*.

The patients's condition continues to worsen over the next 24 hours. Again blood cultures are ordered. The lab reports 1 bottle growing *coagulase-negative staphylococci*

Q: Is this a CLABSI? If so, what is the causative pathogen reported to NHSN?

A: Yes, it meets CLABSI criterion 2. The pathogen should be reported as *Staphylococcus epidermidis*

Rationale: Common commensals were isolated from 2 blood cultures within 2 days. If a common commensal is identified to the species level from one culture, and a companion culture is identified with only a descriptive name (e.g., to the genus level), then it is assumed that the organisms are the same. The organism identified to the species level should be reported as the infecting pathogen along with its antibiogram if available (see Table 1).

Table 1. Examples of how to report speciated and unspeciated common commensals

Blood culture 1	Blood culture 2	Report to NHSN
<i>S. epidermidis</i>	<i>Coagulase-negative staphylococci</i>	<i>S. epidermidis</i>
<i>B. cereus</i>	<i>Bacillus</i> spp. (not <i>anthracis</i>)	<i>B. cereus</i>
<i>S. salivarius</i>	<i>Strep viridans</i>	<i>S. salivarius</i>

17. An admitted patient underwent an abdominal hysterectomy (HYST) and oophorectomy (OVRV) through the same incision. 10 days after surgery the patient developed a fever, complained of pelvic pain, and an abscess was noted on imaging. An SSI must be reported to NHSN.

Q: What type of SSI and to which procedure should it be attributed?

- Deep Incisional SSI
- Organ/Space SSI-HYST, attributed to the HYST procedure
- Organ/Space SSI-OREP, attributed to the HYST procedure
- Organ/Space SSI-OVRV, attributed to the OVRV procedure

A: c. Organ/Space SSI reported as SSI-OREP, attributed to the HYST procedure

Rationale: Of the 2 procedures performed, abdominal hysterectomy (HYST) has the highest risk of SSI. NHSN provides a prioritized list of surgeries by which to assign an infection if more than one procedure was performed through the same incision and the exact site of the SSI is not clear. The infection site for organ/space SSI must be reported, not the NHSN procedure category HYST. In this case, the infection meets the criteria for OREP-other infection of the reproductive tract.

NHSN Manual Chapter 9, page 9-11, Table 3

18. A patient was admitted to your hospital on April 12 for elective small bowel resection. The MRSA active surveillance screen of the patient's nares prior to surgery was positive. The post-operative course was unremarkable and the patient was discharged to home on April 16.

On April 30, you received word from another hospital that the patient was admitted to that facility on April 29 with a red, "angry" surgical wound. The medical staff opened the incision down to (but not including) the fascia and sent a swab for culture. MRSA grew from the specimen.

Q: Is this an SSI or would this be excluded as "present or incubating on admission"?

A: SSI!

Rationale: A positive active surveillance screening for MRSA colonization does not imply the patient was infected, nor should he/she acquire an infection due MRSA. To become infected, MRSA must have an opportunity to enter a normally sterile body site.

19. Same scenario as 18 above.

Q: To which facility should the infection be attributed?

A: An SSI - Superficial incisional primary (SIP) for the hospital that performed the surgery

Rationale: The infection meets the definition for an incisional SSI, determined to be superficial because it does not involve the muscle or fascia or deeper structures. SSIs are attributed and must be reported to NHSN by the facility where the procedure was performed.

20. Same scenario as 18 above.

Q: What would you enter in NHSN as to how the infection was detected?

A: RO, readmission to a hospital other than where procedure was performed

21. A 79-year-old male patient was admitted with a fractured neck of femur following a fall in a nursing home. The transfer notes state the patient is colonized with MRSA. Consequently, while the patient was still in the ED, MRSA screening cultures were taken from the nose and groin per hospital policy. He was taken to surgery and a hip replacement procedure (HPRO) was performed.

On post-op day 2, the patient became confused. MRSA active surveillance cultures were reported as positive. Nursing notes indicated the patient began picking at his wound and the dressing had to be replaced twice.

On post-op day 5, clinical note states, "Abscess at upper aspect of incision lanced by surgeon. Purulent material obtained for C&S submitted." Ancef IV was started.

On post-op day 6, MRSA was identified in the wound culture. The antibiotic was changed.

On post-op day 9, the wound is showing improvement.

Q: Is this an HAI? If so, how would it be entered into the NHSN?

A: Yes, as a superficial incisional primary (SIP) SSI.

Rationale: Even though the patient was colonized with the infecting pathogen (MRSA) and some might believe his behavior potentially contributed to his infection, incisional wound infections, if they meet the criteria for SSI, are always attributed to the surgical procedure. Introduction of bacteria into the wound during surgical incision, operation, or closure is the most likely cause of SSI.

22. A 75 year-old woman admitted with uterine cancer undergoes abdominal hysterectomy (HYST) and removal of a tumor on the colon (COLO).

Q: In a case like this when both surgeries are done at the same time, how is the duration of surgery recorded?

A: The same incision-to-close time is entered for each procedure record.

Rationale: Whenever multiple procedures are performed during the same operation through the same incision, each of the NHSN procedure types performed has the entire period the incision was open recorded as its individual time of duration.

This is considered the duration of time the patient is at risk for introduction of bacteria via his surgical incision. If 2 procedures are done through the same incision, prior to closure both have the same time-associated risk.

Note: This is true even if your hospital is doing surveillance/reporting just one of multiple procedures performed through the same incision.

23. Mr. Smith is a trauma patient who had a spinal fusion procedure. Later on the day of surgery, he is complaining of intense “itching” from at the site of his back incision. When the dressing is changed, the patient’s back is noted to be mildly red and the incision site intact with a moderate amount of light yellow drainage.

On post-op day 1, Mr. Smith states his back incision is now tender and “burning”. When the dressing is changed, noted are a 1.0 cm long by 0.25 cm deep open area on the incision line and a small amount of purulent drainage. An aseptically obtained culture of the wound is obtained before redressing. The culture does not grow any organisms. The IP is notified of a possible SSI. The patient is discharged to home.

Q: Is this an SSI? If so, what type?

A: SIP On post-op day 1, the criteria for superficial incisional – primary incision site (SIP) SSI were met.

Rationale: By post-op day 1, the criteria have been met for a superficial incisional infection from the primary incision site, SIP (Symptom is a purulent drainage).

24. Same scenario as 23 above except patient is not discharged on post op day 1.

On post-op day 3, the incision wound has opened more (4 cm x .5 cm) and the patient is complaining of intense pain around the incision site. The surgeon is scheduled to see the patient later in the day.

Q: Does this change your assessment?

A: On post-op day 3, the SSI now meets criteria for deep incisional SSI.

Rationale: If the patient had been discharged or there was no further follow-up after day 1, the SSI would have been reported to NHSN as superficial incisional. By day 3, the presence of dehiscence with symptom of pain/tenderness are now sufficient to meet the criteria for a deep incisional SSI (regardless of surgical intervention or subsequent management.)

Of course, the IP would continue to follow this patient’s course to determine if the SSI instead involves the surgical organ/space and would change the SSI Event record accordingly.

25. Jenny, a 5 year-old pediatric patient, undergoes a T2-L3 spinal fusion procedure on February 8.

Q: What NHSN spinal fusion level would you enter for this procedure's denominator data?

- a. Cervical / Dorsal / Dorsolumbar – extends from any cervical lumbar through any lumbar levels
- b. Dorsal / Dorsolumbar – T1–L5 (any combination of thoracic and lumbar)
- c. Lumbar / Lumbosacral – L1 – S5 (any combination of lumbar and sacral)

A: b. Dorsal / Dorsolumbar – T1–L5 (any combination of thoracic and lumbar)

Rationale: See NHSN Table of Instructions or SSI Event form for spinal fusion (FUSN) and refusion (RFUSN) categories. In a surgery that involves more than one NHSN-defined spinal fusion level through a single incision, report the level in which the most vertebrae were fused. There are 24 vertebrae in the spine grouped as *cervical* (7 vertebrae), *thoracic* (12 vertebrae) and *lumbar* (5 vertebrae). A T2-L3 procedure would involve 10 thoracic vertebrae and 3 lumbar vertebrae, so would be classified accordingly.