



## Canadian Nosocomial Infection Surveillance Program (CNISP)

SURVEILLANCE OF SURGICAL SITE INFECTIONS FOLLOWING ADULT CARDIAC SURGERY

### Contact Information

Please direct all questions to:

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CNISP Surveillance  
E-mail: [cnisp-pcsin@phac-aspc.gc.ca](mailto:cnisp-pcsin@phac-aspc.gc.ca)

### Working Group

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\* Public Health Agency of Canada (PHAC)

We would like to express our sincere appreciation to Robyn Mitchell, whose significant contributions were instrumental in the development of this protocol.

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## OBJECTIVES

- To quantify the burden of complex<sup>1</sup> surgical site infections (SSIs) following adult cardiac surgery within the CNISP hospital network.
- To determine surveillance methods used to identify SSI following adult cardiac surgery within the CNISP hospital network.

## METHODOLOGY

### Eligibility

All hospitals that are part of the CNISP network and perform cardiac surgery among adults ( $\geq 18$  years of age).

The following **inclusion** criteria apply to the **primary procedure**:

- Patient must be admitted to the hospital on or before the day of procedure
- Sternotomy including minimally invasive mini-sternotomy or hemi-sternotomy (i.e. any surgical access that requires opening of (part of) the sternum)
- Coronary artery bypass graft (CABG), valve repair and/or replacement surgery (including those which involve aortic root surgery), or combined CABG/valve surgery

The following **exclusion** criteria apply:

- Revisions/Reoperations within 90 days of the primary procedure or if a consequence of the primary procedure
- Aortic root surgery without valve repair or replacement
- Cardiac surgery without sternotomy (e.g. mini-thoracotomy/intercostal access)
- Transplants
- Transarterial valve implantation (TAVI) without minimally invasive mini-sternotomy
- Procedures in patients  $< 18$  years of age

### Surveillance Period

Infections that develop within 90 days (3 months) of procedure will be included and reported retrospectively based on the date of primary procedure.

### Numerators

The primary outcome measure is a healthcare associated complex<sup>1</sup> SSI at the sternal surgical site following a primary cardiac surgery procedure. Please complete a patient questionnaire (Appendix A) when an infection is identified. The definitions used to classify SSIs as deep incisional or organ space can be found in Appendix D. Superficial infections will NOT be included.

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<sup>1</sup> Complex surgical site infections include deep and organ space infections.

## Denominators

Each participating facility will submit the total number of eligible procedures (see above under eligibility). Please complete the quarterly denominator data form (Appendix B).

## Data Submission

Please complete the annual cardiac surgery surveillance methods (Appendix C) for each participating hospital.

Please submit case and denominator data quarterly as follows:

- Cases identified from procedures performed from January 1<sup>st</sup> through March 31<sup>st</sup>: submit to CNISP by September 30<sup>th</sup>
- Cases identified from procedures performed from April 1<sup>st</sup> through June 30<sup>th</sup>: submit to CNISP by December 31<sup>st</sup>
- Cases identified from procedures performed from July 1<sup>st</sup> through September 30<sup>th</sup>: submit to CNISP by March 31<sup>st</sup> of the following year
- Cases identified from procedures performed from October 1<sup>st</sup> through December 31<sup>st</sup>: submit to CNISP by June 30<sup>th</sup> of the following year

Please enter all data into CNPHI via Web Data: [www.cnphi-rcrsp.ca](http://www.cnphi-rcrsp.ca)

## Zero Report

For any quarter with no cases at your site, a zero report must be indicated on Appendix B (denominator data). If no cases are submitted and you are missing zero reports for a surveillance year, your hospital data will not be included in rates.

## APPENDICES

### Appendix A – Cardiac SSI Patient Questionnaire

1.	CHEC Site: _____
2.	Surveillance year: _____
3.	Unique Patient ID: _____ <b>YY</b> _____ (e.g. 99Z22001) (CHEC site #) (year) (case number)
4.	Age in years: _____ years
5.	Sex: <input type="checkbox"/> <b>Male</b> <input type="checkbox"/> <b>Female</b>
6.	Weight: _____ kg
7.	Diabetic: <input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
8.	Current Smoker: <input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> <input type="checkbox"/> <b>Unknown</b>
9.	Primary Cardiac Procedure (please select <b>one</b> of the following):  <input type="checkbox"/> CABG <input type="checkbox"/> Valve <input type="checkbox"/> CABG + valve
10.	Did the patient undergo valve surgery for infective endocarditis (actively infected)? <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> Unknown
11.	Date of admission when primary procedure occurred: ____ / ____ / ____ DD MMM YYYY
12.	Date of primary procedure: ____ / ____ / ____ DD MMM YYYY
13.	Date of discharge (of primary procedure): ____ / ____ / ____ DD MMM YYYY
14.	Date sternal SSI was identified: ____ / ____ / ____ DD MMM YYYY

15.	<p>Was the patient re-admitted for the management of the sternal SSI?</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes</p> <p>If yes, please indicate the date of readmission: ____ / ____ / ____  DD      MMM      YYYY</p>
16.	<p>Which type of SSI criteria are met for this patient? (please check <b>ONE</b> the following):</p> <p><input type="checkbox"/> <b>DEEP incisional SSI</b></p> <p><input type="checkbox"/> <b>ORGAN/SPACE SSI</b></p>
17.	<p>What was the outcome 30 days post SSI identification?</p> <p><input type="checkbox"/> Patient discharged, please specify date: ____ / ____ / ____  DD      MMM      YYYY</p> <p><input type="checkbox"/> Patient transferred alive, please specify date: ____ / ____ / ____  DD      MMM      YYYY</p> <p><input type="checkbox"/> Patient still alive and in hospital</p> <p><input type="checkbox"/> Patient died, please specify date: ____ / ____ / ____  DD      MMM      YYYY</p> <p><input type="checkbox"/> Unknown</p>
18.	<p>Did the patient have at least one sternal revision surgery/reoperation related to the management of a sternal surgical site infection within 90 days following the date of procedure?</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes</p> <p>If yes, how many days following the date of the primary procedure: ____</p> <p><input type="checkbox"/> Unknown</p>
19.	<p>Were organisms identified for this sternal SSI?</p> <p><input type="checkbox"/> Specimen not collected</p> <p><input type="checkbox"/> Organism not identified, no growth</p> <p><input type="checkbox"/> Yes, please indicate below</p> <p>Organism 1: _____ (please select one from the drop-down menu below)</p> <p>Organism 2: _____ (please select one from the drop-down menu below)</p> <p>Organism 3: _____ (please select one from the drop-down menu below)</p> <p><input type="checkbox"/> <i>Acinetobacter baumannii</i></p> <p><input type="checkbox"/> Alpha-hemolytic <i>Streptococcus</i></p>

	<input type="checkbox"/> <i>Candida albicans</i> <input type="checkbox"/> <i>Candida</i> other <input type="checkbox"/> Coagulase-negative staphylococci <input type="checkbox"/> <i>Corynebacterium</i> species <input type="checkbox"/> <i>Enterobacter</i> species <input type="checkbox"/> <i>Enterococcus</i> species <input type="checkbox"/> <i>Escherichia coli</i> <input type="checkbox"/> <i>Klebsiella pneumoniae</i> <input type="checkbox"/> <i>Propionibacterium</i> species <input type="checkbox"/> <i>Pseudomonas aeruginosa</i> <input type="checkbox"/> <i>Staphylococcus aureus</i> <input type="checkbox"/> Other, specify: _____																																																																				
20.	<p>Is antimicrobial susceptibility data available to report?</p> <p> <input type="checkbox"/> No  <input type="checkbox"/> Yes  <input type="checkbox"/> N/A         </p> <p>Please indicate the organism(s) AND their susceptibility/resistance for any of the following antimicrobials/anti-fungals listed below: (R for resistant, S for susceptible, I for intermediate):</p> <table border="1"> <thead> <tr> <th>Please specify the organism:</th><th>Organism 1:</th><th>Organism 2:</th><th>Organism 3:</th></tr> </thead> <tbody> <tr> <td>Amikacin</td><td><input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S</td><td><input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S</td><td><input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S</td></tr> <tr> <td>Amphotericin B</td><td><input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S</td><td><input type="checkbox"/> R <input type="checkbox"/> I 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	Vancomycin	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	
	Voriconazole	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	
	Other, specify: _____	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	
	Other, specify: _____	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	<input type="checkbox"/> R <input type="checkbox"/> I <input type="checkbox"/> S	



## Appendix B – Adult Cardiac SSI Denominator Form

Please submit denominator data quarterly to CNPHI Web Data: [www.cnphi-rcrsp.ca](http://www.cnphi-rcrsp.ca)

1. CHEC site #: \_\_\_\_\_

2. Surveillance year: \_\_\_\_\_

3. Surveillance period (e.g. January 1 – March 31): \_\_\_\_\_

4. Please provide the total number of procedures for the surveillance period specified above:

Procedure type	Number of procedures	Zero report
<b>1. CABG</b>		<input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
<b>2. Valve</b> (Total – if unable to provide endocarditis vs. non-endocarditis)		<input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
2a. Valve (for infective endocarditis (actively infected))		<input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
2b. Valve (for reasons other than infective endocarditis (actively infected))		<input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
<b>3. CABG + Valve</b>		<input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
<b>Total number of procedures (CABG, Valve, CABG + Valve)</b>  ( <b>ONLY</b> if unable to provide above information on procedure type)		<input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>

## Appendix C – Cardiac Surgery Surveillance Methods Questionnaire

1.	CHEC Site : _____
2.	Surveillance year: _____
3.	<p>Please indicate which methods were used to identify complex sternal surgical site infection (check all that apply):</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> review of clinical notes for in-patient stay (including re-operation records, readmissions)</li> <li><input type="checkbox"/> review of clinical notes from out-patient clinics (e.g. cardiac surgery office, emergency) when available</li> <li><input type="checkbox"/> calling the patients at/after 3 months</li> <li><input type="checkbox"/> (suspected) infections discussed/adjudicated with cardiac surgeon</li> <li><input type="checkbox"/> (suspected) infections reviewed with Infection Prevention and Control physician</li> <li><input type="checkbox"/> review of microbiology laboratory results</li> <li><input type="checkbox"/> review of diagnostic imaging results</li> </ul>
4.	<p>Are you able to identify the numerator of sternal SSIs as well as the denominator specifically for patients undergoing valve surgery for infective endocarditis (actively infected)</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Already reporting</li> <li><input type="checkbox"/> Can likely add in future years</li> <li><input type="checkbox"/> Impossible for us to add</li> </ul>
5.	<p>Please indicate how adult cardiac surgery denominators are determined at your site (check all that apply):</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Administrative database (i.e., CCI codes)</li> <li><input type="checkbox"/> Chart review</li> <li><input type="checkbox"/> Other, please specify: _____</li> </ul>

## Appendix D – Instructions on Completing Patient Questionnaire (Appendix A)

### 1. CHEC Site

This will be the **3-character** alphanumeric number assigned to your institution. It will always begin with the two digit number assigned to your CHEC member e.g., 07, 15, and a letter assigned by the CHEC member for that specific institution e.g., A, B, C, etc. The CHEC site # for each institution should always be the same for all the CHEC/CNISP surveillance projects and will always have all three alphanumeric digits reported as the CHEC site #, e.g., 07A, 15A.

### 2. Surveillance year

Please specify the surveillance year (i.e. 2022).

### 3. Unique identifier code

The 8 characters should consist of the 3 character CHEC site # (e.g., 99Z), the surveillance year (e.g., 22), and a consecutive number starting at 001 and continuing on with each additional case. An example of the first case in a hospital would be 99Z22001. An example of the thirty-fifth case would be 99Z22035, and so on.

### 4. Age (years)

Please enter the patient's age in years.

### 5. Sex

Check male or female

### 6. Weight

Please enter patient's weight in kilograms.

### 7. Diabetes

Either known type 1 or type 2 diabetes.

### 8. Current Smoker:

Patient is currently smoking.

### 9. Cardiac Procedure Performed

Coronary artery bypass graft surgery (CABG) and/or valve surgery (open heart valve repair or replacement)

**10. Valve surgery for infective endocarditis (actively infected)**

Please indicate if the patient underwent valve surgery for infective endocarditis (actively infected)

**11. Date of admission**

Please indicate the date the patient was admitted to the hospital when the primary cardiac procedure was performed.

**12. Date of procedure**

Please indicate the date of primary cardiac procedure.

**13. Date of discharge (of primary procedure)**

Please indicate the date of discharge following the primary procedure.

**14. Date infection was identified**

Please enter the date that the infection was identified. The date the infection was identified may be defined as the onset date of symptoms of infection, the date of positive culture or the date of diagnosis. The date must be within 90 days of surgery to qualify.

**15. Readmission related to management of sternal SSI**

Please indicate if the patient was readmitted for the management of a sternal SSI.

**16. Category of SSI**

Please select **ONE** of the following types of infection: **deep incisional SSI** or **organ/space SSI** (See **Appendix E**). Superficial incisional SSI are not included.

**17. Outcome at 30 days**

Please indicate the patient's outcome at 30 days following identification of the complex sternal SSI.

**18. Sternal revision surgery/reoperation for management of SSI within 90 days**

Please indicate if the patient had a revision surgery/reoperation at the sternal site for the management of an SSI within 90 days of date of cardiac procedure.

**NOTE:** Revision surgery/reoperation related to the sternal surgical site infection following cardiac surgery includes re-entry at the sternal site in an operating room setting for management of the infection, including but not limited to debridement and drainage (i.e., mediastinal, pericardial).

#### 19. Identified organisms

If a specimen was not collected, please specify “specimen not collected”. If a specimen was collected but an organism was not identified, please specify “organism not identified, no growth”. If organisms identified, please specify all that were identified on relevant specimen.

#### 20. Antibigram results

If available, please indicate the organism(s) AND their susceptibility/resistance to the antibiotics tested (S = Susceptible, I = Intermediate or R = Resistant).

### Appendix E – Infection definitions and criteria

#### Complex surgical site infections

Based on NSHN definitions: <https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscscsscurrent.pdf>

#### ***A deep incisional SSI must meet the following criterion:***

Infection occurs within 90 days after the operative procedure (where day 1 = procedure date)

**AND**

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

**AND**

patient has at least **ONE** of the following:

a) Purulent drainage from the deep incision but not from the organ/space component of the surgical site.

b) Deep incision that spontaneously dehisces or is deliberately opened by the 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.

#### ***An organ/space SSI must meet the following criterion:***

Infection occurs within 90 days after the operative procedure (where day 1 = procedure date)

**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 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.

**AND**

meets at least one criterion for a specific cardiac related organ/space infection site, including mediastinitis, myocarditis/pericarditis or endocarditis as defined in the CDC/ NHSN Surveillance Definitions for Specific Types of Infections.

**Mediastinitis must meet at least one of the following criteria:**

- 1. Patient has organism(s) identified from mediastinal tissue or fluid by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
- 2. Patient has evidence of mediastinitis on gross anatomic or histopathologic exam.
- 3. Patient has at least one of the following signs or symptoms: fever (>38.0°C), chest pain\*, or sternal instability. \*

And at least **one** of the following:

- a. purulent drainage from mediastinal area
- b. mediastinal widening on imaging test

**Myocarditis or pericarditis must meet at least one of the following criteria:**

- a) patient has organism(s) identified from pericardial tissue or fluid by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
- b) patient has at least **two** of the following signs or symptoms:
  - fever (>38.0°C), chest pain\*, paradoxical pulse\*, or increased heart size\*
  - **And at least one of the following:**
    - a. abnormal EKG consistent with myocarditis or pericarditis.
    - b. evidence of myocarditis or pericarditis on histologic exam of heart tissue.
    - c. 4-fold rise in paired sera from IgG antibody titer.

- d. pericardial effusion identified by echocardiogram, CT scan, MRI, or angiography.

\* With no other recognized cause

### **Other related infection criteria**

**Endocarditis of a natural or prosthetic heart valve must meet at least one of the following criteria:**

1. Organism(s) identified from cardiac vegetation\*†, embolized vegetation (for example, solid-organ abscess) documented as originating from cardiac source, or intracardiac abscess by a culture or nonculture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing ASC/AST).
2. Organism(s) seen on histopathologic examination of cardiac vegetation\*, embolized vegetation, for example, solid organ abscess, documented as originating from cardiac source, or intracardiac abscess.
3. Endocarditis seen on histopathologic examination of cardiac vegetation\* or intracardiac abscess.
4. At least **one** of the following echocardiographic evidence of endocarditis\*†:
  - i. vegetation on cardiac valve or supporting structures
  - ii. intracardiac abscess
  - iii. new partial dehiscence of prosthetic valve

And at least **one** of the following:

- a. typical infectious endocarditis organism(s) (specifically, Viridans group streptococci, *Streptococcus bovis*, *Haemophilus* spp., *Actinobacillus actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens*, *Kingella* spp., *Staphylococcus aureus*, *Enterococcus* spp.) identified from ≥2 matching blood collections drawn on separate occasions with no more than 1 calendar day between specimens by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing ASC/AST).
  - b. *Coxiella burnetii* identified by anti-phase I IgG antibody titer >1:800 or identified from blood by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
5. At least **three** of the following (Note: Meaning one element from i, ii, iii, or iv and only one condition within each element can be used.)
    - i. prior endocarditis, prosthetic valve, uncorrected congenital heart disease, history of rheumatic heart disease, hypertrophic obstructive cardiomyopathy, or known IV drug use.<sup>§</sup>
    - ii. fever (>38.0°C)

iii. vascular phenomena: major arterial emboli (specifically, embolic stroke, renal infarct, splenic infarct or abscess, digital ischemic/gangrene from embolic source), septic pulmonary infarcts, mycotic aneurysm (documented by imaging, seen in surgery, or described in gross pathological specimen), intracranial hemorrhage, conjunctival hemorrhages, or Janeway's lesions documented.

iv. immunologic phenomena: glomerulonephritis (documented in chart, or white cell or red blood cell casts on urinalysis), Osler's nodes, Roth's spots, or positive rheumatoid factor.

And at least **one** of the following:

- a. typical infectious endocarditis organism(s) (specifically, Viridans group streptococci, *Streptococcus bovis*, *Haemophilus* spp., *Actinobacillus actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens*, *Kingella* spp., *Staphylococcus aureus*, *Enterococcus* spp.) identified from  $\geq 2$  matching blood collections drawn on separate occasions with no more than 1 calendar day between specimens by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
- b. *Coxiella burnetii* identified by anti-phase I IgG antibody titer  $>1:800$  or identified from blood by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).

6. At least **one** of the following\*†:

- i. vegetation on cardiac valve or supporting structures seen on echocardiogram
- ii. intracardiac abscess seen on echocardiogram
- iii. new partial dehiscence of prosthetic valve seen on echocardiogram

And at least **three** of the following (Note: Meaning one element from a, b, c, d, or e and only one condition within each element can be used.):

- a. prior endocarditis, prosthetic valve, uncorrected congenital heart disease, history of rheumatic heart disease, hypertrophic obstructive cardiomyopathy, or known IV drug use.<sup>§</sup>
- b. fever ( $>38.0^{\circ}\text{C}$ )
- c. vascular phenomena: major arterial emboli (specifically, embolic stroke, renal infarct, splenic infarct or abscess, digital ischemic/gangrene from embolic source), septic pulmonary infarcts, mycotic aneurysm (documented by imaging, seen in surgery, or described in gross pathological specimen), intracranial hemorrhage, conjunctival hemorrhages, or Janeway's lesions documented.
- d. immunologic phenomena: glomerulonephritis (documented in chart, or white cell or red blood cell casts on urinalysis), Osler's nodes, Roth's spots, or positive rheumatoid factor.
- e. identification of organism(s) from the blood by at least **one** of the following methods:
  - recognized pathogen(s) identified from blood by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).



- same common commensal organism(s) identified from  $\geq 2$  blood collections drawn on separate occasions on the same or consecutive days by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).

7. All of the following criteria (Note: Meaning one element from a, b, c, d, or e and only one condition within each element can be used.):

- a. prior endocarditis, prosthetic valve, uncorrected congenital heart disease, history of rheumatic heart disease, hypertrophic obstructive cardiomyopathy, or known IV drug use.<sup>§</sup>
- b. fever ( $>38.0^{\circ}\text{C}$ )
- c. vascular phenomena: major arterial emboli (specifically, embolic stroke, renal infarct, splenic infarct or abscess, digital ischemic/gangrene from embolic source), septic pulmonary infarcts, mycotic aneurysm (documented by imaging, seen in surgery, or described in gross pathological specimen), intracranial hemorrhage, conjunctival hemorrhages, or Janeway's lesions documented.
- d. immunologic phenomena: glomerulonephritis (documented in chart, or white cell or red blood cell casts on urinalysis), Osler's nodes, Roth's spots, or positive rheumatoid factor.
- e. identification of organism(s) from the blood by at least one of the following methods:
  - recognized pathogen(s) identified from blood by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).
  - same common commensal organism(s) identified from  $\geq 2$  blood collections drawn on separate occasions on the same or consecutive days by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment, for example, not Active Surveillance Culture/Testing (ASC/AST).

#### Footnotes

\* Cardiac vegetation can be found on a cardiac valve, pacemaker/defibrillator lead or ventricular assist device (VAD) components within the heart.

† The following can also meet the definition of a "cardiac vegetation":

- Positive culture from a cardiac valve, pacemaker/defibrillator lead or ventricular assist device (VAD) components within the heart.

‡ Which if equivocal is supported by clinical correlation (specifically, physician documentation of antimicrobial treatment for endocarditis).

§ May be documented outside of the infection window period or SSI surveillance period.

## Appendix F – Instructions on Completing Denominator Form (Appendix B)

### 1. CHEC Site

This will be the **3-character** alphanumeric number assigned to your institution. It will always begin with the two digit number assigned to your CHEC member e.g., 07, 15, and a letter assigned by the CHEC member for that specific institution e.g., A, B, C, etc. The CHEC site # for each institution should always be the same for all the CHEC/CNISP surveillance projects and will always have all three alphanumeric digits reported as the CHEC site #, e.g., 07A, 15A.

### 2. Surveillance year

Please specify the surveillance year (i.e. 2022).

### 3. Surveillance period

Please specify one of the following surveillance periods:

- January 1<sup>st</sup> - March 31<sup>st</sup>
- April 1<sup>st</sup> - June 30<sup>th</sup>
- July 1<sup>st</sup> - September 30<sup>th</sup>
- October 1<sup>st</sup> - December 31<sup>st</sup>

### 4. Total number of procedures

Please specify the total number of procedures for each procedure type. Indicate whether your site had zero cases of cardiac SSI for each corresponding procedure type for the specified surveillance period. If you are unable to stratify by procedure type, please provide the total number of CABG, valve, and CABG/valve procedures.

## Appendix G – Instructions on Completing Methods Questionnaire (Appendix C)

### 1. CHEC Site #

This will be the **3-character** alphanumeric number assigned to your institution. It will always begin with the two digit number assigned to your CHEC member e.g., 07, 15, and a letter assigned by the CHEC member for that specific institution e.g., A, B, C, etc. The CHEC site # for each institution should always be the same for all the CHEC/CNISP surveillance projects and will always have all three alphanumeric digits reported as the CHEC site #, e.g., 07A, 15A.

### 2. Surveillance year

Please specify the surveillance year (i.e. 2022).

### 3. Method of identifying complex sternal surgical site infection

Please indicate steps that are included in the routine surveillance of sternal surgical site infections after cardiac surgery at your center.

### 4. Valve surgery among those with infective endocarditis (actively infected)

Please indicate whether your site's adult cardiac SSI surveillance can identify numerator and denominators specific to patients undergoing valve surgery for infective endocarditis (actively infected).

### 5. Adult cardiac surgery denominators

Please indicate the method used to identify adult cardiac surgery procedures at your site.

## REVISION HISTORY

December 2019	First draft of protocol completed
February 2020	Revised draft sent to the WG
April 2022	Protocol finalized and CNPHI web data forms created
November 2023	<p>Clarification added to inclusion criteria – include valve surgeries which also include aortic root surgeries</p> <p>Question removed - Surgical wound category (clean/contaminated)</p> <p>Question added - Did the patient undergo valve surgery for infective endocarditis (actively infected)?</p> <p>Question added - Did the patient have a revision surgery within 90 days post-op? If so how many days post-op? If yes, was revision surgery/reoperation for management of a sternal surgical site infection?</p> <p>Methods question added - How were cardiac surgery denominators determined at your site?</p> <p>Methods question added - Are you able to identify the numerator of sternal SSIs as well as the denominator specifically for patients undergoing valve surgery for infective endocarditis (actively infected)</p> <p>Valve denominators stratified to collect endocarditis vs. non-endocarditis procedures, if available</p>
November 2024	<p>Updated surveillance objectives</p> <p>Updated patient questionnaire to ask if antimicrobial susceptibility data was available to report (Yes/No/NA)</p> <p>Added question on readmission</p> <p>Added clarification to revision exclusion criteria</p> <p>Added definition of revision/reoperation</p>