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CNISP·PCSIN

Canadian Nosocomial Infection Surveillance Program

Surveillance of Cerebrospinal Fluid (CSF) Shunt Associated Surgical Site Infections (SSIs)

Surveillance Protocol

2025

Contact Information

Please direct all questions to:

Public Health Agency of Canada
CNISP Surveillance
E-mail: cnisp-pcsin@phac-aspc.gc.ca

Working Group

Blanda Chow, Jeannette Comeau, John Conly, Meghan Engretson, George Gubb, Jennifer Happe, Kevin Katz, Vinita Kumar, Joanne Langley (Chair), Bonita Lee, Diane Lee*, Marie-Astrid Lefebvre, Cassandra Lybeck*, Annie-Kim Nguyen (Epi Lead)*, Senthuri Paramalingam†, Caroline Quach, Jocelyn Srigley, Reena Titoria, Joseph Vayalumkal

* Public Health Agency of Canada (PHAC)
† IPAC Canada

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

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OBJECTIVES

The objective of this Canadian Nosocomial Infection Surveillance Program (CNISP) initiative is to conduct ongoing surveillance for Cerebrospinal Fluid (CSF) Shunt associated surgical site infections (CSF shunt SSI) within the CNISP hospital network and provide national benchmark rates that hospitals may use for internal and external comparison. Specifically, this CNISP initiative seeks to

1. Determine the incidence of CSF shunt SSI in patients of all ages admitted to Canadian hospitals participating in the CNISP.
2. Describe the microbiology and epidemiology of CSF shunt SSI in all patients with:
    a. New shunts and/or;
    b. Revisions to an existent internalized shunt.

METHODS

Site Eligibility

1. Able to perform year-round surveillance for CSF shunt SSI
2. Able to document the number of surgical placements and revisions of shunts

Patient population

Patient Inclusions:
Person of any age admitted to a CNISP hospital who undergoes placement or revision of a CSF shunting device **AND** has an infection that occurs within **90 days** (3 months) of surgery.
Adult patients: Aged 18 years and older
Pediatric patients: Aged less than 18 years

Patient Exclusions:

- Patients with transcutaneous or external shunting devices or non-shunting devices (e.g. Ommaya reservoir).
- Patients whose CSF was culture positive (bacterial or fungal) at the time of placement of the shunt.
- Infections in which the device associated with the positive organism was not placed at the hospital where the infection was identified, i.e. the hospital should not report the infection.

Surveillance period

CSF shunt-associated Infections that develop within **90 days** (3 months) of the shunt procedure will be included and reported retrospectively **based on the date of procedure**.

NOTE: *The surveillance year of a CSF shunt SSI case is determined by the date of procedure NOT the date of infection.*

Numerators

CSF Shunt-associated Surgical Site infection case definition
A patient is identified as having CSF shunt SSI if the patient meets the following criteria:

Criterion 1: An internalized CSF shunting device is in place
AND
Criterion 2: A bacterial or fungal pathogen(s) is identified from the cerebrospinal fluid

AND

Criterion 3: ONE of the following conditions present:

1. fever (temperature ≥38º C);
   OR
2. neurological signs or symptoms;
   OR
3. abdominal signs or symptoms;
   OR
4. signs or symptoms of shunt malfunction or obstruction.

Re-infection case definition

Re-infection of a shunt is an infectious episode occurring after diagnosis of a CSF shunt infection and/or completion of antibiotic therapy, with a CSF bacterial or fungal isolate *different* from the previous infection. Such a patient would be eligible to be counted as a new CSF shunt-associated infection.

NOTE: *Relapse of a shunt infection is an infectious episode occurring within 1 month of completion of therapy with an isolate of the same pathogen. This event is* ***NOT*** *eligible to be counted as a new CSF shunt SSI.*

Denominators

The denominator for the CSF shunt SSI rate is the number of shunt surgeries at the site.

Each participating hospital will submit the following via the Shunt Denominator Form (APPENDIX 3 -CSF SHUNT DENOMINATOR AND ZERO REPORT Form).

- The number of surgical placements for **new** CSF shunts for pediatric (< 18 years) and adult (≥ 18 years) cases.
- The number of surgical revisions to **existing** CSF shunts for pediatric (< 18 years) and adult (≥ 18 years) cases.

Data Submission

What forms need to be completed? Each time an infection is identified, complete a *Shunt Patient Questionnaire* (APPENDIX 1 -CSF SHUNT PATIENT QUESTIONNAIRE). Each year a facility has captured CSF shunt data, complete APPENDIX 3 -CSF SHUNT DENOMINATOR AND ZERO REPORT Form. For instructions on how to access Web Data forms under CNPHI's Collaboration Center see APPENDIX 5 -WEB DATA FORM SUBMISSION CNPHI.

Where to submit data? Please enter both the *Shunt Patient Questionnaire* and the *Denominator Data and Zero Report Form* on the Canadian Network for Public Health Intelligence (CNPHI) web form (Collaboration > Web Data > CSF Shunt SSI Patient Questionnaire & CSF Shunt Denominator and Zero Report Form).

When to submit data? Please see CNISP CSF Shunt Data SSI submission Timeline below.

Cases

How are patients identified? Patients with a CSF shunt SSI will be identified through review of positive CSF organisms from the microbiology laboratory. Once a positive organism is identified, a chart (health record) review will be conducted to determine if the device associated with that organism was placed at the hospital where the infection was identified and that the surgery occurred in the previous 90 days (3 months). For more information on the identification of CSF shunt SSI cases to report to CNISP, please refer to APPENDIX 6 – CSF SHUNT SSI SURVEILLANCE ALGORITHM.

Zero Report

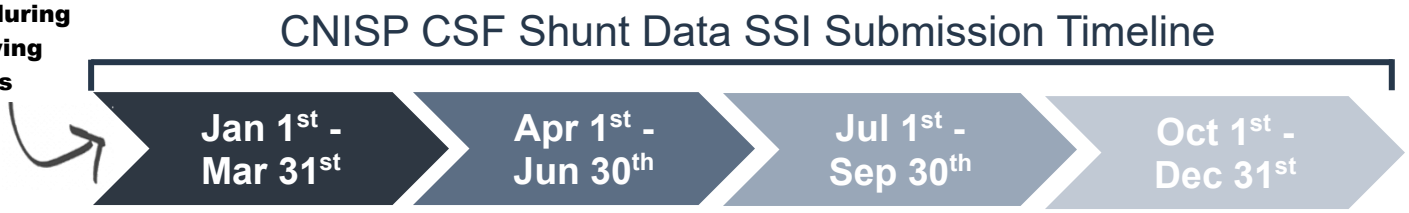
For no cases at your site, a zero report must be submitted so that zero counts can be differentiated from missing data. If no cases are submitted and you are missing zero reports for a surveillance year, your hospital data will not be included in rates.

Denominators

The number of CSF shunts in your facility is collected annually based on the calendar year.

NOTE: *When entering data into CNPHI, please ensure that the case is entered in the correct surveillance year based on the date of procedure and NOT the date the infection was identified (e.g. procedure Dec 20, 2019; infection identified Jan 17, 2020 – this is a 2019 case).*

Surgeries Performed during the following quarters



Numerator (cases)	Patient questionnaires due by Sep 30th	Patient questionnaires due by Dec 31st	Patient questionnaires due by Mar 31st of the following year	Patient questionnaires due by June 30th of following year
Denominators /Zero Report	Due by March 31st of the following year			

For technical assistance, questions or comments, please contact CNISP at cnisp-pcsin@phac-aspc.gc.ca

ETHICS

This surveillance project is observational and does not involve any alteration in patient care. Surveillance for healthcare associated infections is a routine component of quality assurance and patient care in Canadian healthcare institutions and therefore informed consent will not be required. All data submitted to the Public Health Agency of Canada are kept strictly confidential. Each questionnaire will be identified by a unique number and no personal identifiers will be transmitted to the Public Health Agency of Canada. This unique number will be linked to the patient's name or hospital number only at the local CHEC site and will be kept strictly confidential under secure conditions.

PRIVACY

There is current demand for public disclosure of hospital-associated infections. Any data released by CNISP will be in summary format and will not identify individual hospitals. Hospital administrators should be made aware that national reporting of aggregate data will occur.

Appendix 1

Appendix 1 -CSF Shunt Patient Questionnaire

Please complete for all cases of CSF Shunt-associated infections. Please see Data Dictionary (

APPENDIX 2 -DATA dictionary) for definitions and notes.

1.	CHEC Site: _____
2.	Date of birth: _____ / _____ / _____ **OR** Age _____ ☐ Years ☐ Months ☐ Days DD MMM YYYY
3.	Unique Patient ID : _____ YY _____(e.g. 99Z19001) *(CHEC site #) (year) (case number)*
4.	Sex: □ Male □ Female
5.	Pathogen (s) isolated from CSF. Please check **all** that apply: □ Coagulase negative *Staphylococcus* (CONS) □ *Corynebacterium* species □ *Cutibacterium acnes (Propionibacterium acnes)* □ *Enterococcus* species (*please indicate VRE/VSE below) □ Vancomycin-resistant *enterococcus* species (VRE) □ Vancomycin-resistant *enterococcus* species (VSE) □ *Escherichia coli* □ *Pseudomonas aeruginosa* □ *Haemophilus influenza* type B □ *Staphylococcus aureus* (*please indicate MRSA/MSSA below) □ Methicillin resistant *Staphylococcus aureus* (MRSA) □ Methicillin susceptible *Staphylococcus aureus* (MSSA) □ *Viridans Streptococci* (formerly listed as Alpha-hemolytic *Streptococcus*) □ **Other**, please specify (Genus and species) _____
6.	a. Method of identification: ☐ Culture ☐ Molecular **if molecular method used, also complete 6b* b. If **molecular** method, please specify type: _____
7.	Date of CSF shunt procedure: _____ / _____ / _____ DD MMM YYYY
8.	Date organism was obtained from CSF: _____ / _____ / _____ DD MMM YYYY
9.	Type of shunt surgery. Please check **ONE** of the following:

☐ revision of an existing internal shunt
☐ placement of an entirely new shunt

10. Type of CSF shunt inserted. Please check **ONE** of the following:
☐ VP (ventriculoperitoneal)
☐ LB (lumbo-peritoneal)
☐ VA (ventriculoatrial)
☐ Other, please specify: _____

11. 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):

Please specify the organism:	Organism 1: _____	Organism 2: _____
Amikacin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Amphotericin B	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Ampicillin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Amoxicillin-clavulanic acid	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Caspofungin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Cefazolin (Ancef)	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Cephalexin (Keflex)	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Cefepime	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Cefotaxime	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Ceftriaxone	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Cefuroxime	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Ciprofloxacin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Clindamycin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Cloxacillin / Oxacillin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Ertapenem	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Erythromycin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Fluconazole	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Gentamicin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Imipenem	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Levofloxacin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Linezolid	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Meropenem	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Micafungin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Moxifloxacin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Penicillin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Piperacillin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Piperacillin-tazobactam	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Rifampin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Ticarcillin-clavulanic acid	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**

Trimethoprim-sulfamethoxazole	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Tobramycin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Vancomycin	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Voriconazole	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**
Other, specify: _____	□ **R** □ **I** □ **S**	□ **R** □ **I** □ **S**

Appendix 2

Appendix 2 -Data dictionary

Definitions and notes for completing Patient Questionnaire (*see* APPENDIX 1 -CSF SHUNT PATIENT QUESTIONNAIRE)

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., 99, 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., 99A.

2. **Unique patient identifier**

   This number should never be longer than 10 characters. The 10 characters should consist of the 3 character CHEC site # (e.g., 99A), the surveillance year the infection occurred in (e.g., 15), and a consecutive number starting at 001 and continuing on with each additional case. An example of the first case in an institution would be 99A-15-001. An example of the thirty-fifth case would be 99A-15-035, and so on.

Please DO NOT include dashes as separators in between the sets of characters

3. **Date of Birth (DOB) or age**

   Please enter Day (##), Month (May) and Year (1947) in this order. If the date of birth is not available, please enter the patient's age (in years, months or days).

4. **Sex**

   Check male or female.

5. **Pathogen (isolated)**

   Please list all microorganisms isolated from the CSF as reported by the laboratory. If 'other' pathogen is checked, please specify the organism in the text field.

6. **Methods**
   - **a.** Method of identification: Please indicate if the oranism was identified by culture or a molecular method
   - **b.** Molecular method: if identified by molecular method, please indicate the method used (e.g. PCR)

7. **Date of shunt procedure**

   Please enter Day (##), Month (May) and Year (2018) in this order.

8. **Date organism was obtained**

Please enter the date the positive CSF organism was obtained Day (##), Month (May) and Year (2018).

9. Type of shunt surgery

Please indicate whether the surgery was for the revision of an existing internal shunt or the placement of an entirely new shunt. If an existing shunt is completely removed and a new device is placed at the same time, please check placement of a new shunt. Please check only ONE box.

10. Type of shunt inserted

Please indicate the type of CSF shunt system inserted (i.e. ventriculoperitoneal, ventriculoatrial, lumbo-peritoneal shunt or other). If other, please specify in the text field.

Patients with transcutaneous or external shunting devices or non-shunting devices (e.g. Ommaya reservoir, external ventricular drain [EVD], lumbar drain) are excluded from CSF Shunt SSI surveillance

11. Antibiogram results

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

Appendix 3

Appendix 3 -CSF Shunt Denominator and Zero Report Form

Please submit the Denominator data to Web Data Form on CNPHI (via Collaboration Centre > Web Data) by March 31st of the following surveillance year.

1. CHEC site #: _____
2. Surveillance period: January 1 – December 31: _____
   (surveillance year)
3. Please provide the following number of surgical placements for the surveillance period year:

	< 18 years of age	≥ 18 years of age	**Total**
Number of surgical placements of new CSF shunts			
Number of surgical revisions to existing CSF shunts placements			
Total			

4. For the surveillance year specified above, were there zero (0) cases reported for your site?

□ **Yes** □ **No**

Appendix 4 - CNISP CSF shunt-associated SSI record

Note: This is a resource/tool for sites to assist with record keeping. It is not a requirement for sites to use this table. Please feel free to modify as needed. Please do **NOT** send to CNISP.

Patient unique identifier	Sex (M/F)	Date of Birth (DD/MM/YYYY)	Procedure Date (DD/MM/YYYY)	Date positive organism (DD/MM/YYYY)	Date patient questionnaire sent to CNISP	Recorder initials
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
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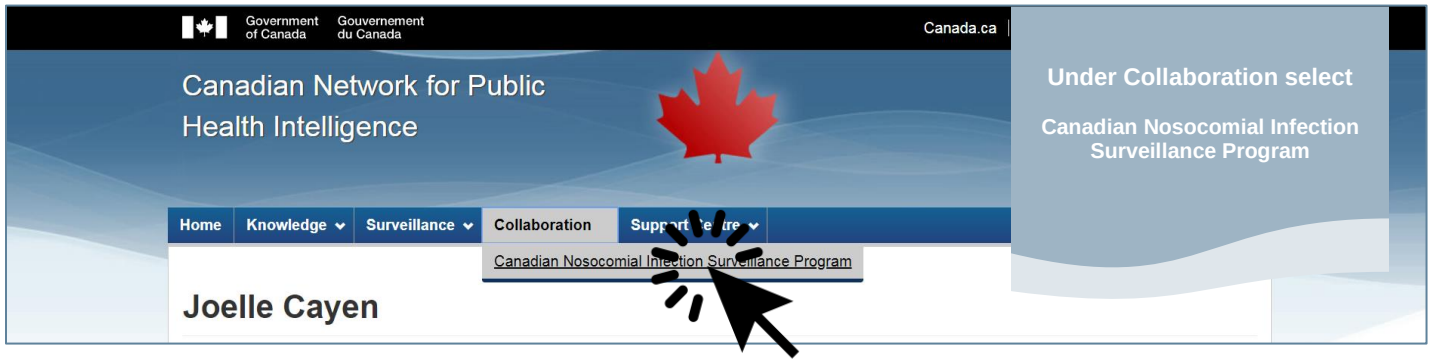
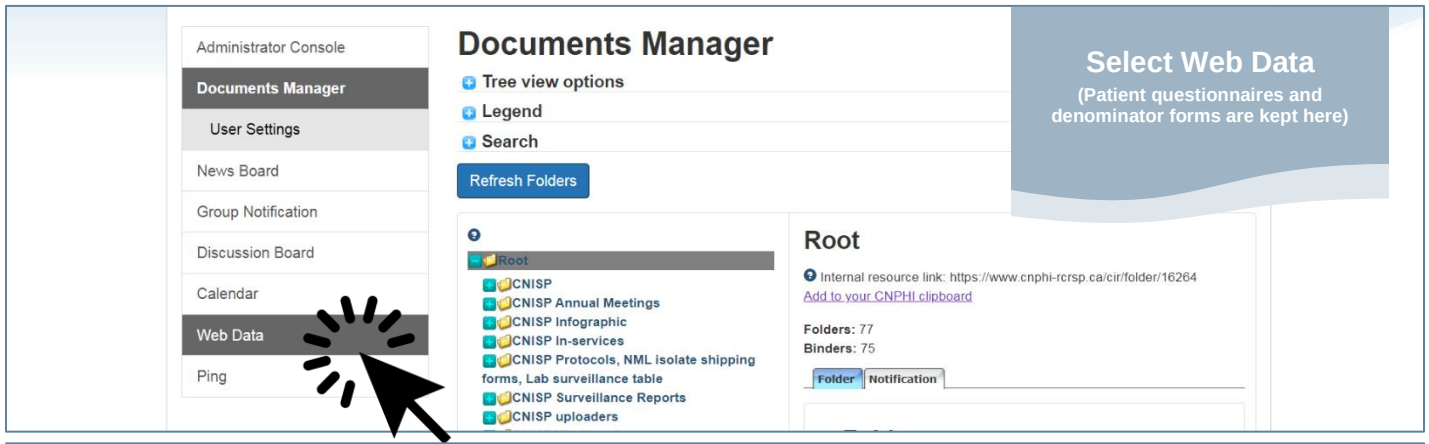
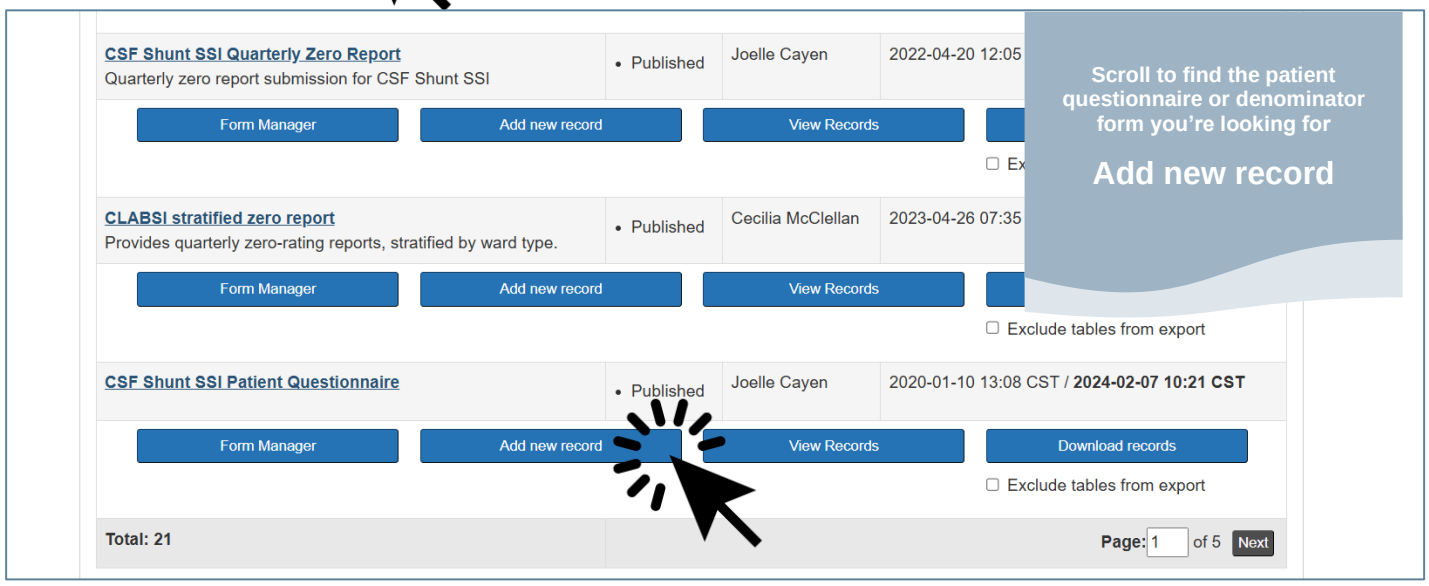
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					
…………YY…………… *CHEC# case#*	☐ Male ☐ Female					

Appendix 5

Appendix 5 -Web Data Form Submission CNPHI

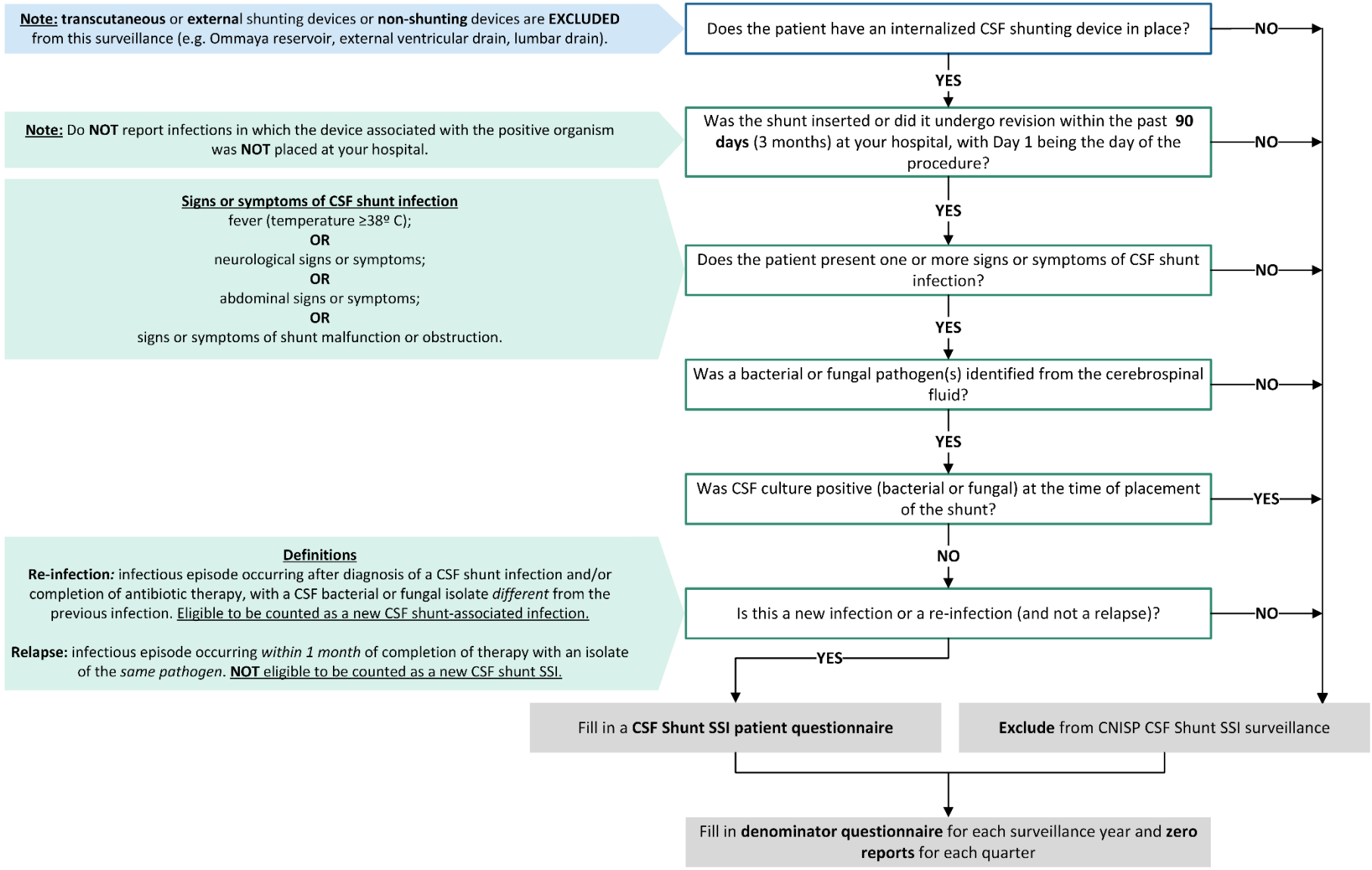






Appendix 6

Appendix 6 – CSF Shunt SSI Surveillance Algorithm



Revision History

Date	Revisions Made
November 2017	• Question regarding method of identification (e.g. culture or molecular) was added • Option to indicate zero cases reported on denominator form • Included a tool to assist sites with record keeping (• APPENDIX 4 - CNISP CSF SHUNT-ASSOCIATED SSI record)
December 2017	• Removed surveillance year as protocol will no longer be updated annually
December 2019	• Changed surgery follow period from 1 year to 3 months • Updated formatting • Added Appendix 5 (Instructions on how to access the new form on the Collaboration center of CNPHI under Web Data
December 2020	• A new question added: During this admission or in the 14 days prior to this admission, did this patient test COVID-19 positive for the first time?
January 2022	• Updated the working group list and email address for CNISP
December 2022	• Updated the working group list • COVID-19 question removed: During this admission or in the 14 days prior to this admission, did this patient test COVID-19 positive for the first time?

November 2023	• Updated the working group list
	• Updated the organism list:
	  ○ Replaced Alpha hemolytic streptococci with Viridans Streptococci
	  ○ Replaced *Propionbacterium* species with *Cutibacterium acnes*
	  ○ Added *Pseudomonas aeruginosa*
	  ○ Removed *Haemophilus influenza* type B
	• Updated the antimicrobials/anti-fungals list

November 2024	• Updated the working group list • Added a CSF shunt SSI surveillance algorithm to assist with identifying CNISP cases (Appendix 6) • Added additional examples of devices excluded from surveillance in “Appendix 2 – Data dictionary” under “10. Type of shunt inserted” • Modified the definition of a relapse to specify that the isolate must be from the same pathogen, not only the same genus