Public Health Agency of Canada | Agence de la santé publique du Canada

Canadian Nosocomial Infection Surveillance Program

Surveillance of Surgical Sites Infections (SSIs) Following Hip and Knee Arthroplasty

2025

Contact Information

Please direct all questions to:

Public Health Agency of Canada
Canadian Nosocomial Infection Surveillance Program (CNISP)
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Working Group

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OBJECTIVES

1. Determine the incidence of complex hip and knee SSIs among patients whose procedures were performed in CNISP participating hospitals
2. Describe the microbiology and epidemiology of complex hip and knee SSI
3. Describe the outcome associated with complex hip and knee SSIs
4. Provide antimicrobial resistance data

METHODS

Eligibility

All hospitals that are part of the CNISP network and that perform hip and knee arthroplasty procedures are eligible to participate.

The following inclusion criteria apply to the primary procedure:

- Primary total, hemi and other (e.g. unicondylar) arthroplasties (elective or urgent/emergent)
- Only clean procedures
- Admitted patients and patients undergoing same-day surgery

The following exclusion criteria apply:

- Revisions/reoperations and resurfacings (not considered as a primary procedure for surveillance, but information being collected if a consequence of a primary procedure that met eligibility earlier in in the same surveillance period)
- Surgeries in which the patient died in the operating room or within 24 hours of surgery
- Surgeries where the skin incision is not entirely closed at procedure's end

Surveillance Period

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

Numerators

The primary outcome measure is a healthcare associated complex[1] SSI following hip or knee arthroplasty. Please complete a patient questionnaire (
APPENDIX 2 – HIP & KNEE SSI Patient Questionnaire) when an infection is identified. The definitions used to classify SSIs as deep incisional or organ space can be found in (APPENDIX 3 - DATA Dictionary).

Denominators

Each participating hospital will submit the number of elective and urgent/emergent (non-elective) procedures for total and hemi hip arthroplasties and total, hemi and other knee arthroplasties. Revision procedures/reoperations are to be excluded from the denominator. Please complete a quarterly denominator form (

APPENDIX 4 - HIP & Knee Denominator Form).

Data Submission

Cases

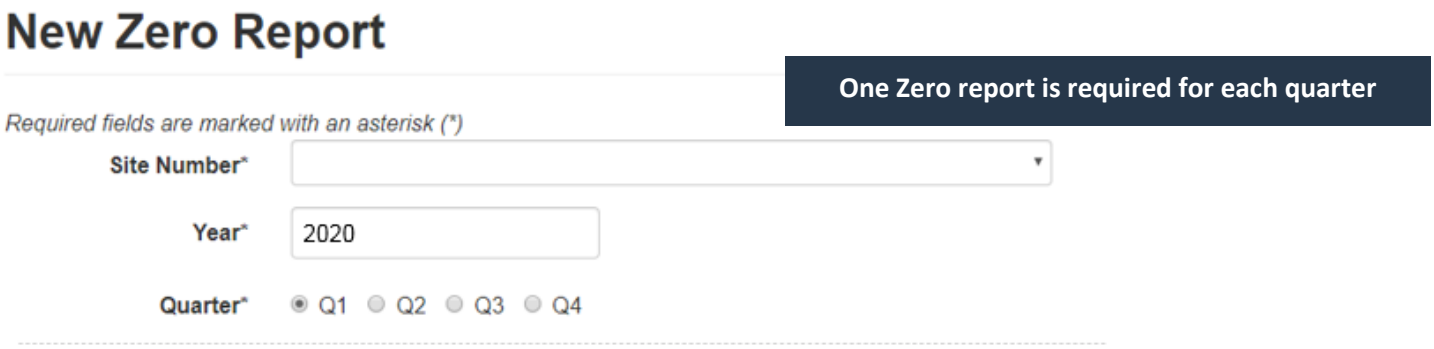
All patient data are to be entered/uploaded online through the Canadian Network for Public Health Intelligence (CNPHI) at www.cnphi-rcrsp.ca. Instructions on uploading data onto CNPHI can be found in APPENDIX 6 – DATA UPLOADER ON CNPHI. For technical assistance, questions or comments, please contact CNISP at cnisp-pcsin@phac-aspc.gc.ca

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).

Numerator (cases)	Data due by Sept 30th	Data due by Dec 31st	Data due by March 31st of following surveillance year	Data due by June 30th of following surveillance year
Zero Report (if no cases)				
Denominator				

Zero Report

For any quarter with no cases at your site, a zero report must be submitted in the CNPHI HK-SSI module so that quarters with 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

Denominators must be submitted quarterly in CNPHI under "Profiles and Denominators".

ETHICS

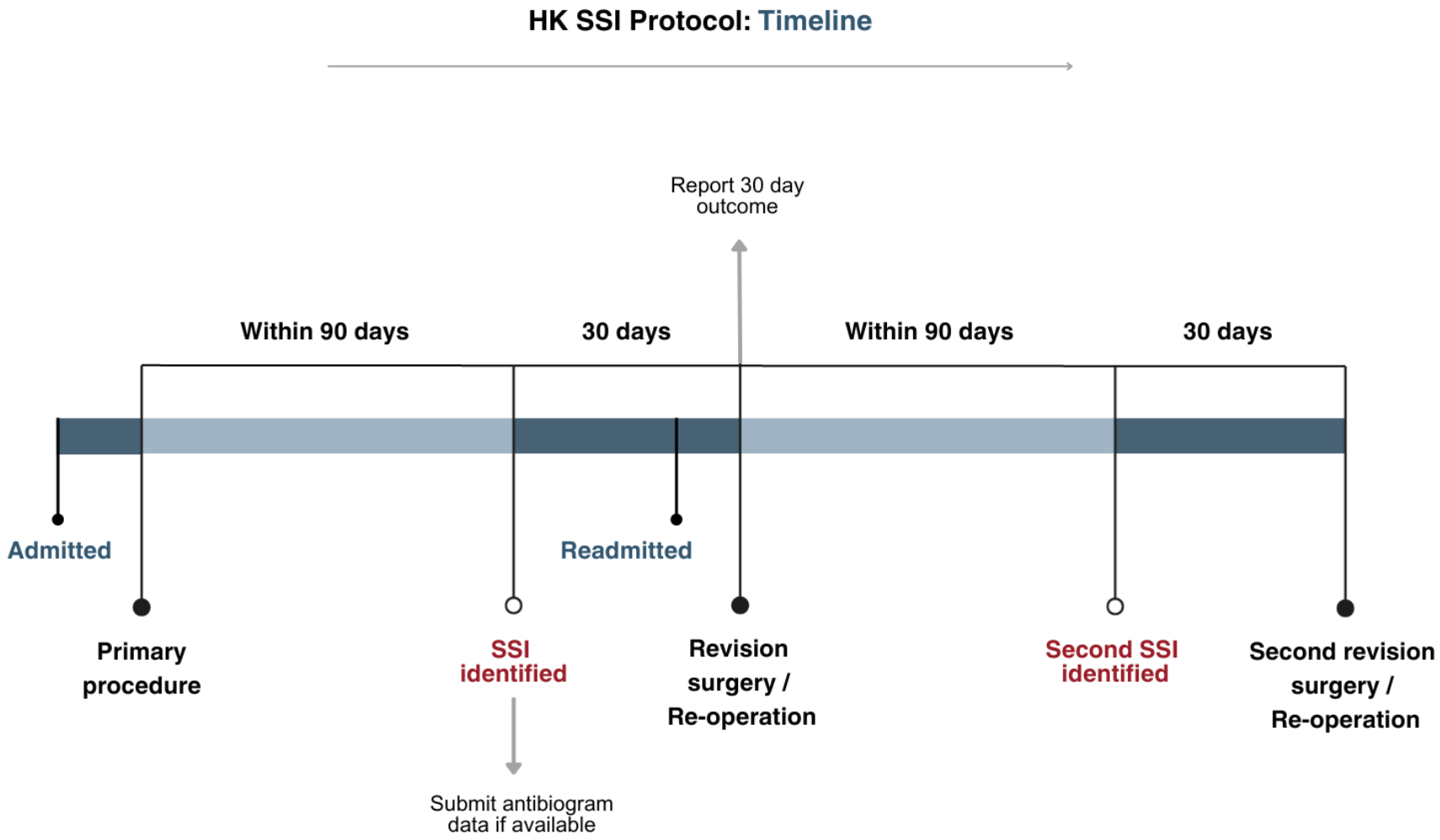
This surveillance project is observational and does not involve any alteration in patient care. Surveillance for healthcare associated infections is a routine component of quality assurance and patient care in Canadian healthcare institutions and therefore informed consent will not be required. All data 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 healthcare-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 – Surveillance Timeline



NOTE: Revision surgery/re-operation includes removal or replacement of the prosthesis or of components thereof, or simple wash-outs/irrigation with or without debridement - without removal of the prosthesis or components thereof.

Appendix 2 – Hip & Knee SSI Patient Questionnaire

Please complete for all complex cases of HK-SSI. Please see data dictionary (APPENDIX 3 - DATA Dictionary) for definitions and notes.

1.	CHEC Site : _____
2.	Unique Patient ID : _____ **YY** _____**(**e.g. 99Z20001) *(CHEC site #) (year) (case number)*
3.	Age in years: _____ years
4.	Sex: □ **Male** □ **Female**
5.	**Was this procedure elective or an urgent/emergency surgery?** □ **Elective** □ **Non-elective*** ***non-elective would be defined as urgent or emergency surgery**
6.	a. Procedure (please select **one** of the following): □ **Hip** – total arthroplasty □ **Hip** – hemi arthroplasty □ **Knee** – total arthroplasty □ **Knee** – hemi arthroplasty □ **Knee** – *Other* (e.g. unicondylar): _____ b. Please select the number of joints replaced during the procedure: □ **One** □ **Two** □ **Unknown**
7.	Date of admission: _____ / _____ / _____ DD MMM YYYY
8.	Same-day surgery: □ **Yes** **If yes, please enter the same date for date of admission, procedure, and discharge* □ **No**
9.	Date of procedure: _____ / _____ / _____ DD MMM YYYY
10.	Date of discharge: _____ / _____ / _____ DD MMM YYYY
11.	Date infection was identified: _____ / _____ / _____ DD MMM YYYY

12.	Does this patient have or meet the criteria for (please check **ONE** the following): □ **DEEP incisional SSI** □ **ORGAN/SPACE SSI**	
13.	a. Was antibiotic prophylaxis ordered? □ **Yes** □ **No** □ **Data not available**	b. If **YES,** was the antibiotic administered? □ **Yes** □ **No** □ **Data not available**
14.	What was the outcome 30 days post SSI identification? □ Patient discharged or transferred alive, please specify date: **_____ / _____ / _____** DD MMM YYYY □ Patient still alive and in hospital □ Patient died, please specify date: **_____ / _____ / _____** DD MMM YYYY □ Unknown	
15.	If the patient died within 30 days of SSI identification, please indicate the relationship of the SSI to the death. □ SSI was the cause of death □ SSI contributed to death □ Death is unrelated to SSI □ Causality between SSI and death cannot be determined	
16.	a. Was the patient re-admitted for management of SSI within 30 days of SSI identification? □ **Yes** □ **No** **If no or unknown, skip to Q19* □ **Unknown**	b. If **YES,** date of re-admission: **_____ / _____ / _____** DD MMM YYYY
17.	a. Did the patient receive revision surgery/re-operation within 30 days of SSI identification? E.g. joint replacements, irrigation and debridement, and joint washouts. □ **Yes** □ **No -** **If no or unknown, skip to Q18* □ **Unknown**	b. If **YES,** date of revision surgery/re-operation #1: **_____ / _____ / _____** DD MMM YYYY
18.	Was a SSI identified within 90 days of revision surgery/re-operation? □ **Yes** □ **No -** **If no or unknown, skip to Q18* □ **Unknown**	
19.	**a.** Did the patient require a second revision surgery/re-operation? □ **Yes**	b. If **YES,** date of revision surgery/re-operation #2: **_____ / _____ / _____**

	□ **No** □ **Unknown**	DD MMM YYYY
20.	Date of discharge (from re-admission)	_____ / _____ / _____ DD MMM YYYY

21. 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**

☐ Specimen not collected ☐ Organism not identified, no growth

Appendix 3

Appendix 3 - Data Dictionary

Definitions and notes for Patient Questionnaire (see APPENDIX 2 – HIP & KNEE SSI 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., 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. **Unique identifier code**

   The 8 characters should consist of the 3 character CHEC site # (e.g., 09A), the surveillance year (e.g., 20), 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 09A20001. An example of the thirty-fifth case would be 09A20035, and so on.

3. **Age (years)**

   Please enter the patient's age in years.

4. **Sex**

   Check male or female

5. Type of surgery
   - **a.** Elective: a procedure that has been scheduled in advance.
   - **b.** Non-Elective: a procedure that was an urgent or emergency surgery.

6. Procedure

a. Procedure type: Please indicate the procedure as either primary or hemi hip arthroplasty (THA) or primary, hemi or other knee arthroplasty (TKA).
b. Number of joints: Please indicate the number of joints replaced during the procedure.

7. Date of admission

Please indicate the date the patient was admitted to the hospital.

8. Same-day surgery

Defined as the patient was admitted and discharged on the same day as the procedure. If yes, please enter the same date for date of admission, procedure and discharge.

9. Date of procedure

Please indicate the date of procedure.

10. Date of discharge

Please indicate the date the patient was discharged from the hospital.

11. 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 infection, the date of positive culture or the date of diagnosis.

12. Category of SSI

Please select **ONE** of the following types of infection: ***deep incisional SSI*** or ***organ/space SSI.*** Note that all procedures included in this surveillance projects involve an implant. Superficial incisional SSI are no longer reportable.

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., facial and muscle layers)
AND
patient has at least **ONE** of the following:

a) purulent drainage from the deep incision;
b) deep incision that spontaneously dehisces or is deliberately opened or aspirated by the surgeon, physician* or physician designate
AND
organism(s) identified from the deep soft tissues of the incision by a culture or non-cultured based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment or culture or non-culture based microbiologic testing method is not performed. A culture or non-culture

based test from the deep soft tissues of the incision that has a negative finding does not meet this criterion.

AND

patient has at least one of the following signs or symptoms: fever (>38°C); localized pain or tenderness;

c) an abscess or other evidence of infection involving the deep incision that is detected on gross anatomical or histopathologic exam or imaging test.

**Surgeon, infectious disease physician, emergency physician, other physician on the case, or physician's designee (nurse practitioner or physician's assistant).*

An organ/space SSI must meet the following criterion:

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

AND

involves any part of the body deeper than the fascial/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 (for example, closed suction drainage system, open drain, T-tube drain, CT-guided drainage);
b) organism(s) identified from fluid or tissue in the organ/space by an culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment;
c) an abscess or other evidence of infection involving the organ/space that is detected on gross anatomical or histopathologic exam, or imaging test evidence suggestive of infection.

AND

meets at least **ONE** criterion for a specific organ/space infection site listed in Table 3 and Appendix A of the NHSN definitions for Hip and Knee prosthesis:

- BONE - Osteomyelitis
- DIP - Deep Incisional Primary

PJI - Periprosthetic joint infection adapted from the 2023 NHSN definitions:
https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscssicurrent.pdf

13. Antibiotic prophylaxis

a. **Antibiotic prophylaxis ordered:** Please indicate if antibiotic prophylaxis was ordered prior to procedure
b. **Antibiotic prohylaxis adminstered:** Please indicate if antibiotic prophylaxis was administered prior to procedure

14. Outcome at 30 days

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

15. Relationship of SSI to death

Please indicate if the SSI was the cause of death (i.e. the patient had no other condition that would have cause death during the admission); SSI contributed to death (i.e. the SSI exacerbated an existing condition that led to the patient's death), SSI was unrelated to death or unable to determine the causality between SSI and death.

16. Re-admission

a. **Re-admission for management of SSI:** Please indicate if the patient was re-admitted within 30 days of SSI identification
b. **Date of re-admission:** If the patient was re-admitted, please indicate the date of re-admission.

17. Revision/re-operation

a. **Revision surgery/re-operation:** Please indicate if the patient had a revision surgery/re-operation within 30 days of SSI identification

NOTE: Revision surgery/re-operation includes removal or replacement of the prosthesis or of components thereof, or simple wash-outs/irrigation with or without debridement - without removal of the prosthesis or components thereof.

b. **Date(s) of revision surgery:** If the patient had a revision surgery/re-operation, please indicate the date of procedure.

18. SSI identified within 90 days of revision surgery/re-operation

Please indicate if a deep or organ/space SSI was identified within 90 days of the revision surgery/re-operation.

19. Second revision/re-operation

a. **Second revision surgery/re-operation:** Please indicate if the patient required a second revision surgery/re-operation.
b. **Date of second revision surgery/re-operation:** If the patient had a revision surgery/re-operation, please indicate the date of procedure.

20. Date of discharge from re-admission

If the patient was re-admitted, please indicate the date of discharge.

21. Antibiogram results for first infection

Please indicate the organism(s) AND their susceptibility/resistance to the antibiotics tested.
(S = Susceptible, I = Intermediate or R = Resistant). Please list all microorganism(s) identified for the first infection as reported by the laboratory. 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".

Appendix 4

Appendix 4 - Hip & Knee Denominator Form

Please submit denominator data to CNPHI: www.cnphi-rcrsp.ca

CHEC site #: _____

Surveillance period (e.g. January 1 – March 31): _____

Please provide the total number of elective and non-elective[1] procedures (*excluding revisions)* for the surveillance period specified above. If unable to stratify, please specify the total number of procedures.

	Hip arthroplasties		
	Total	Hemi	Other
Elective procedures			
Non-elective procedures			
Total procedures[2]			

	Knee arthroplasties		
	Total	Hemi	Other
Elective procedures			
Non-elective procedures			
Total procedures[2]			

[1]Non-elective is defined as urgent or emergency surgery

[2]ONLY if unable to provide above information on procedure type.

Appendix 5 - Instructions on Completing Denominator Form

Definition and note for completing Denominator Form (*see* APPENDIX 4 - HIP & KNEE Denominator Form)

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.

As revisions are excluded from surveillance, please exclude revision procedures from the denominator.

Please enter/upload data to CNPHI: www.cnphi-rcrsp.ca

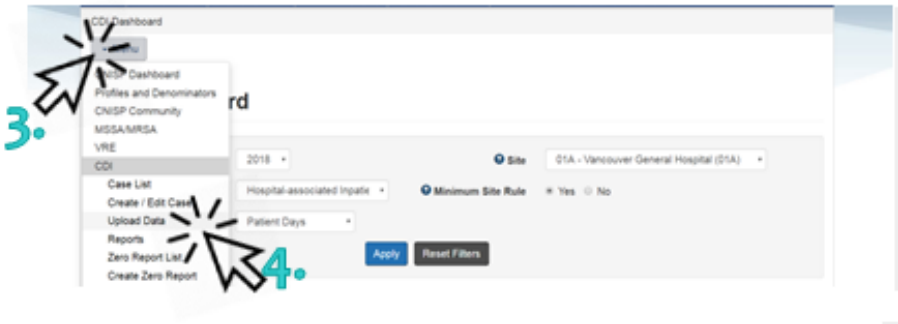
Appendix 6 – Data Uploader on CNPHI

CNPHI – UPLOAD DATA FILES

How to submit data using the uploader on CNPHI

Step 1.
Surveillance
Canadian Nosocomial Infection Surveillance Program

Step 2.
Choose an application



Step 3.
Menu

Step 4.
Upload Data

***Select surveillance year**
***Choose your file**

Step 5.
Upload Epi Data

Revision History

Date	Revisions Made
Jan 20, 2015	• Update to the surveillance period from 12 months to 90 days. Only infections that develop within 90 days of procedure are to be reported.
Dec 3, 2015	• Question 11 related to pathogen(s) identified has been removed as this will be captured under new Question 12 related to antibiogram results by pathogen. • Question 12b on type, dose and time of prophylactic antibiotic(s) was removed.
Oct 14, 2017	• Updated protocol to reflect quarterly reporting for infections and denominator data into CNPHI.
Oct 30, 2017	• The following updates were made to the protocol for 2018: o Risk stratification was removed (ASA score, procedure start and end time). o Discontinue surveillance for superficial infections. o Added the following clinical outcomes: length of stay (admission and discharge dates), re-admission, revision surgeries and 30-day outcome. o Removed question on repeat intra-operative dose of antibiotics given for surgeries lasting $\geq$ 4 hours (Q14b). o Under type of procedure, 'other' response option added.
Oct 18, 2018	• Added postal code (first 3 digits) to patient questionnaire • Removed references to calendar year.
Nov 14, 2019	• Removed postal code (first 3 digits) from patient questionnaire • Extended submission deadline by one quarter • Admitted patients as well as patients undergoing same-day surgery are included • Added question whether a SSI was identified following revision surgery
Nov 24, 2020	• Added question to link COVID-19 and HK SSI patient questionnaire data
Dec 1, 2021	• Added clarification to COVID-19 question to specify that it is related to the original admission for the patient's hip or knee arthroplasty (and not referring to the readmission)
Oct 26, 2022	• Added question to determine relation of the SSI to the death
Nov 8, 2023	• Added question to collect elective or non-elective procedures • Added clarification to the exclusion criteria, and following the primary hip or knee procedure • Added clarification to Question 17, defined the types of revision procedures to include in CNISP surveillance • Removed Question 21 to link COVID-19 question and HK SSI patient questionnaire data • Added an option to stratify the denominator data into elective and non-elective (urgent/emergency) procedures
Dec 13, 2024	• Updated working group list