# Surgical Site Infection (SSI) Surveillance

Surveillance of surgical site infection with feedback of appropriate data to surgeons has been shown to be an important component of strategies to reduce the SSI risk.

## Case definition

A surgical site infection (SSI) is an infection that develops as a direct result of an operative procedure. These infections are associated with increased morbidity and mortality, increased length of stay and higher healthcare costs.

**Appendix 1** provides a list of ICD 10/CMBS codes and procedure descriptions by surveillance procedure group, to assist with identification of eligible numerator and denominator inclusions.

SSI should only be reported by the hospital where the procedure was undertaken.

### Denominator:

Total number of patients who have undergone an operative procedure included in your institution's surgical site infection surveillance program, for the reporting month.

> Specific procedure risk groups are to be recorded separately when available.

If automated electronic procedure notifications are not available in your facility, identification of eligible denominator patients can be achieved by liaising with operating theatre staff using local operating theatre management systems.

### Numerator:

A surgical site infection is classified as either a superficial incisional or deep incisional/organ space infection. Information to assist with the classification of wound depth can be found in the *Australian Commission on Safety and Quality in Healthcare (ACSQHC) - Approaches to Surgical Site Infection Surveillance* document: https://www.safetyandquality.gov.au/publications-and-resources/resource-library/approaches-surgical-site-infection-surveillance

**Superficial Incisional** (refer appendix 3) **SSI must meet the following criteria:**

Infection occurs within 30 days after the operative procedure **and** involves only skin or subcutaneous tissue of the incision **and** the patient has at least one of the following:

a. purulent drainage from the superficial incision
b. significant micro-organisms are isolated from an aseptically obtained culture of fluid or tissue from the superficial incision
c. a superficial incision is deliberately opened by surgeon,
   **and** is either culture-positive with significant micro-organisms **or** was not cultured **and** the patient has at least one of the following signs or symptoms of infection at the incision site: pain, tenderness, localised swelling, redness or heat

   *NOTE: a culture-negative finding is not a surrogate for "not cultured"*
d. diagnosis of superficial incisional SSI by the surgeon or attending physician.

NOTE: Do not report the following as a SSI:

- a stitch abscess (minimal inflammation & discharge at the point of suture penetration)
- a localised stab wound infection (e.g. drain incision site)
- superficial incisions that are shown to be colonised with microorganisms by the collection of a superficial wound swab and are without clinical signs of infection as a SSI
- diagnosis of cellulitis alone does not meet superficial SSI definition unless criterion c) is met

Classify SSIs that involve both superficial and deep/organ infections as a deep/organ SSI.

**Deep/Organ SSI** (refer appendix 3) **must meet the following criteria:**
Infection occurs within the *operation specific surveillance period* (refer to appendix 1) and the infection appears to be related to the operative procedure **and** infection involves any part of the body (excluding the skin incision) **and** patient has at least one of the following:

a. purulent drainage from a deep incision or from a drain that is placed through a stab wound into the organ space.

b. an incision spontaneously dehisces or is deliberately opened by a surgeon, **and** is culture-positive with significant micro-organisms **or** not cultured **and** the patient has at least one of the following signs or symptoms of infection
   - fever (>38ºC), localised pain or tenderness.

   *NOTE: a culture-negative finding is not a surrogate for "not cultured"*

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.

d. significant micro-organisms are isolated from an aseptically obtained culture of fluid or tissue related to the procedure site.

e. diagnosis of a deep/organ SSI by a surgeon or attending physician.

NOTE: Classify SSIs that involve both superficial and deep infections as a Deep/Organ SSI.

### SSI Detection Codes[#]

**Inpatient – Initial Admission (IP-IA):** SSI identified during the admission surgery was undertaken, including hospital in the home (HITH).

**Inpatient – Re-admission (IP-RA):** SSI identified on re-admission to hospital, including HITH.

**Post discharge (PDC):** SSI identified post-discharge and patient is not re-admitted

[#]within operation specific surveillance period (refer appendix 1)

### Patient Risk Score

The patient risk score is a method of stratification of risk for infection associated with surgery. The higher the patient's risk score the higher the risk the patient has of developing an SSI. Risk-adjusted rates allow for benchmarking across participating hospitals. For public facilities with automated surveillance systems, patient risk score will be applied to both the numerator and denominator. Where automated data collection systems are not available, denominator data will be supplied as total number of procedures for each procedure group.

## Calculation of risk index

The risk index score, ranging from 0 to 3, is a figure assigned to the number of risk factors present among the following three areas:

### 1. ASA class[(1)]

The anaesthesiologist assesses the patient's preoperative physical condition using the American Society of Anaesthesiologists' (ASA) Classification. The ASA classification system is a numerical quantification of disease severity and potential for suffering complications from general anaesthesia. Patients with an ASA class of 3, 4 or 5 will be assigned a risk score of 1.

| ASA | ASA Description | Risk Score |
|---|---|---|
| 1 | A normal healthy patient | 0 |
| 2 | A patient with mild systemic disease | 0 |
| 3 | A patient with severe systemic disease | 1 |
| 4 | A patient with severe systemic disease that is a constant threat to life | 1 |
| 5 | A moribund patient who is not expected to survive without the operation | 1 |

## 2. Duration of surgery

Duration of surgery is the interval (in minutes) between skin incision and primary skin closure.

The CDC/NHSN[2] historically published duration cut points for surgical procedures which approximate the 75th percentile of the duration of surgery in minutes, that is, 75% of the operations for that procedure were shorter than the documented duration cut point and 25% were longer.

Local cut point times have been calculated using data from SA Health, Data & Reporting Services.

If the procedure under review takes longer than the reported duration cut point for the equivalent procedure then a risk score of 1 will be assigned.

NOTE: The most up to date *duration cut points* for the procedures included in the ICS surveillance program will be listed in Appendix 2.

## 3. Surgical wound classification[3]

| Surgical Wound Class | Wound Classification Description | Risk Score |
|---|---|---|
| Clean | An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital or uninfected urinary tracts are not entered. In addition, clean wounds are primarily closed and if necessary, drained with closed drainage. Operative incisional wounds that follow non-penetrating (blunt) trauma should be included in this category if they meet the criteria. | 0 |
| Clean-Contaminated | Operative wounds in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina and oropharynx are included in this category provided no evidence of infection or major break in technique is encountered. | 0 |
| Contaminated | Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g. open cardiac massage) or gross spillage from the gastrointestinal tract and incisions in which acute, non-purulent inflammation is encountered are included in this category. | 1 |
| Dirty / Infected | Includes old traumatic wounds with retained devitalised tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation. | 1 |

## 4. Calculation of patient risk score

A score is assigned for each risk factor and the total score is calculated by adding the three scores together (ASA class + duration of surgery + surgical wound classification).

For example:

ASA class of 3 = 1

Surgery Duration >75$^{th}$ percentile = 1

Surgical Wound Class “Clean” = 0

**PATIENT RISK SCORE = 2**

## Data Element Tables

The data specification table is intended to support standardised provision of SSI surveillance data by assisting with the application of definitions and identification of the minimum data requirements.

| Field Name | Description | Details |
|---|---|---|
| **UR or Postcode** | Unique record identification number | • This is the patient's medical record number (MRN) or postcode for Private hospitals that do not supply MRN<br>• Mandatory field, cannot be null |
| **Gender** | Sex of the patient | • Mandatory field, cannot be null |
| **Date of Birth** | The patients full year of birth, including day and month | • If date of birth is not known or cannot be provided, provision of a generic estimate is acceptable (the first day of the appropriate month or 01/01/ of the appropriate year.<br>• Format date as dd/mm/yyyy<br>• Mandatory field, cannot be null |
| **Date of Procedure** | Identifies the date the procedure was performed | • Format date as dd/mm/yyyy<br>• Must be within the reporting month<br>• Mandatory field, cannot be null |
| **Procedure** | Short description of procedure group | • Entry must be a valid code option<br>• Refer Appendix 1 for Procedure group codes<br>• Mandatory field, cannot be null |
| **"OTH" procedure details** | Indicates the procedure undertaken is not associated with one of the documented procedure groups | • Record a description of the procedure<br>• Mandatory if *"Procedure" = Other* |
| **Patient risk score** | A score used to predict a surgical patient's risk of acquiring a surgical site infection | • Must be in the list 0, 1, 2, 3 or NA (not available).<br>• Mandatory field, cannot be null |
| **Appropriate Surgery specific prophylaxis** | Antibiotics given for the purpose of preventing infections at the surgical site. Does not include antibiotics that have been given as a course leading up to the procedure. | • Record as either Yes or No<br>• Mandatory field, cannot be null |
| **Infection category** | Degree of infection from the surgical procedure according to definitions | • Record as either Superficial, Deep/Organ<br>• Mandatory field, cannot be null |
| **LAB Name** | Identifies the laboratory organisation that processed the specimen | • Field should not be null<br>• N/A where SSI is identified by MO diagnosis |
| **Specimen Number** | Positive specimen's unique identification number | • Identifier allocated by the laboratory to the pathology result<br>• Field should not be null<br>• N/A where SSI is identified by MO diagnosis |
| **Specimen date/SSI MO Diagnosis date** | Identifies the date the specimen was taken or if no specimen was taken, this is the date the SSI was diagnosed | • Format date as dd/mm/yyyy<br>• Mandatory field, cannot be null |
| **Specimen/Infection Site** | The site of the specimen was taken or if no specimen was taken, this is the site of infection | • Must correlate to the site of surgery<br>• Field should not be null |
| **Organism** | Record organisms associated with the surgical site infection episode, including "No Growth" for negative results | • List all identified significant organisms causing infection<br>• "Nil Specimen" where SSI is identified by MO diagnosis |
| **Comment** | Record any additional information | |
| **SSI detection** | Identifies whether the SSI was discovered during the original admission or Post-discharge | • IP-IA: Inpatient initial admission<br>• IP-RA: Inpatient re-admission<br>• PDC: Post-discharge<br>• Field should not be null |
| **Emergency or Elective** | Identifies if the surgery was planned or unplanned | • Record as either Elective or Emergency<br>• Mandatory field, cannot be null |
| **PROC Code** | The CMBS code of the procedure undertaken | • Must be a valid CMBS code (refer Appendix 1)<br>• Mandatory field, cannot be null |

## Appendix 1

| Proc Group | ACHI Codes | Description | MBS Codes | Surv Period (days) |
|---|---|---|---|---|
| CSEC | 16520-00 | Elective classical caesarean section | 16520 | 30 |
| CSEC | 16520-01 | Emergency classical caesarean section | 16520 | 30 |
| CSEC | 16520-02 | Elective lower segment caesarean section | 16520 | 30 |
| CSEC | 16520-03 | Emergency lower segment caesarean section | 16522 | 30 |
| HPRO | 47522-00 | Hemiarthroplasty of femur - Austin Moore arthroplasty | 47522 | 90 |
| HPRO | 49312-00 | Excision arthroplasty of hip | 49312 | 90 |
| HPRO | 49315-00 | Partial arthroplasty of hip | 49315 | 90 |
| HPRO | 49318-00 | Total arthroplasty of hip, unilateral, total joint replacement of hip | 49318 | 90 |
| HPRO | 49319-00 | Total arthroplasty of hip, bilateral | 49319 | 90 |
| HPRO | 49321-00 | Total arthroplasty of hip, including bone grafting, unilateral or bilateral | 49321 | 90 |
| HPRO | 49324-00 | Revision of total arthroplasty of hip | | 90 |
| HPRO | 49327-00 | Revision of total arthroplasty of hip with bone graft to acetabulum | | 90 |
| HPRO | 49330-00 | Revision of total arthroplasty of hip with bone graft to femur | | 90 |
| HPRO | 49333-00 | Revision of total arthroplasty of hip with bone graft to acetabulum & femur | | 90 |
| HPRO | 49336-00 | Revision of total arthroplasty of hip during treatment of fractured femur | | 90 |
| HPRO | 49339-00 | Revision of total arthroplasty of hip with anatomic allograft to acetabulum | | 90 |
| HPRO | 49342-00 | Revision of total arthroplasty of hip with anatomic specific allograft to femur | | 90 |
| HPRO | 49345-00 | Revision of total arthroplasty of hip with anatomic specific allograft to acetabulum and femur | | 90 |
| HPRO | 49346-00 | Revision of partial arthroplasty of hip | | 90 |
| HPRO | | Revision arthroplasty of hip, with exchange of head or liner (or both) | 49372 | 90 |
| HPRO | | Revision arthroplasty of hip, with exchange of head and acetabular shell or cup, including minor bone grafting (if performed) | 49374 | 90 |
| HPRO | | Revision arthroplasty of hip, with exchange of head and acetabular shell or cup, including major bone grafting (if performed) | 49376 | 90 |
| HPRO | | Revision arthroplasty of hip, with revision of femoral component (with no requirement for femoral osteotomy), inc minor bone grafting (if performed) | 49378 | 90 |
| HPRO | | Revision arthroplasty of hip, with revision of femoral and acetabular components (if femoral osteotomy is not required), inc minor bone grafting (if performed) | 49380 | 90 |
| HPRO | | Revision arthroplasty of hip, with revision of femoral and acetabular components (if femoral osteotomy is not required), inc major bone grafting | 49382 | 90 |
| HPRO | | Revision arthroplasty of hip, for pelvic discontinuity, with revision of acetabular component | 49384 | 90 |
| HPRO | | Revision arthroplasty of hip, with revision of femoral component with femoral osteotomy, including minor bone grafting (if performed) | 49386 | 90 |
| HPRO | | Revision arthroplasty of hip, including: (a) revision of **both** the acetabular and femoral component with femoral osteotomy **and** (b) minor bone grafting (if performed) | 49388 | 90 |
| HPRO | | Revision arthroplasty of hip, including: (a) revision of **both** the acetabular and femoral component with femoral osteotomy **and** (b) major bone grafting (if performed) | 49390 | 90 |
| HPRO | | Revision arthroplasty of hip, including: (a) revision of **either** femoral component with femoral osteotomy **or** proximal femoral replacement **and** (b) revision of acetabular component for pelvic discontinuity | 49392 | 90 |
| HPRO | | Revision arthroplasty of hip, including: (a) replacement of proximal femur; **and** (b) revision of the acetabular component **and** (c) bone grafting (if performed) | 49394 | 90 |
| HPRO | | Revision arthroplasty of hip, including: (a) revision of femoral component for periprosthetic fracture **and** (b) internal fixation **and** (c) bone grafting (if performed) | 49398 | 90 |
| HPRO | 50217-00 | Arthroplasty of joint, not elsewhere classified | 50127 | 90 |
| HPRO | 50215-03 | En bloc resection of lesion of soft tissue affecting the long bones of lower limb, with intercalary reconstruction using prosthesis | 50215 | 90 |
| HPRO | 50218-03 | En boc resection of lesion of long bone of lower limb with replacement of adjacent joint | 50218 | 90 |
| HPRO | | Malignant bone tumour, enbloc resection of, with massive anatomic specific allograft or autograft, with or without prosthetic replacement | 50227 | 90 |

| Proc Group | ACHI Codes | Description | MBS Codes | Surv Period (days) |
|---|---|---|---|---|
| KPRO | 49517-00 | Hemiarthroplasty of knee | 49517 | 90 |
| KPRO | 49518-00 | Total arthroplasty of knee, unilateral | 49518 | 90 |
| KPRO | 49519-00 | Total arthroplasty of knee, bilateral | 49519 | 90 |
| KPRO | 49521-00 | Total arthroplasty of knee with bone graft to femur, unilateral | 49521 | 90 |
| KPRO | 49521-01 | Total arthroplasty to knee with bone graft to femur, bilateral | 49521 | 90 |
| KPRO | 49521-02 | Total arthroplasty to knee with bone graft to tibia, unilateral | 49521 | 90 |
| KPRO | 49521-03 | Total arthroplasty to knee with bone graft to tibia, bilateral | 49521 | 90 |
| KPRO | 49524-00 | Total arthroplasty of knee with bone graft to femur and tibia, unilateral | 49524 | 90 |
| KPRO | 49524-01 | Total arthroplasty of knee with bone graft to femur and tibia, bilateral | 49524 | 90 |
| KPRO | 49527-00 | Revision of total arthroplasty of knee | 49527 | 90 |
| KPRO | 49530-00 | Revision of total arthroplasty of knee with bone graft to femur | 49530 | 90 |
| KPRO | 49530-01 | Revision of total arthroplasty of knee with bone graft to tibia | 49530 | 90 |
| KPRO | 49533-00 | Revision of total arthroplasty of knee with bone graft to femur and tibia | 49533 | 90 |
| KPRO | 49534-00 | Total replacement arthroplasty of patellofemoral joint of knee | 49534 | 90 |
| KPRO | 49554-00 | Revision of total arthroplasty of knee with anatomic specific allograft | 49554 | 90 |
| KPRO | 50217-00 | Arthroplasty of joint, not elsewhere classified | 50127 | 90 |
| KPRO | 50215-03 | En bloc resection of lesion of soft tissue affecting the long bones of lower limb, with intercalary reconstruction using prosthesis | 50215 | 90 |
| KPRO | 50218-03 | En boc resection of lesion of long bone of lower limb with replacement of adjacent joint | 50218 | 90 |

## Appendix 2 – SA Health Duration of Surgery Table (75th percentile)

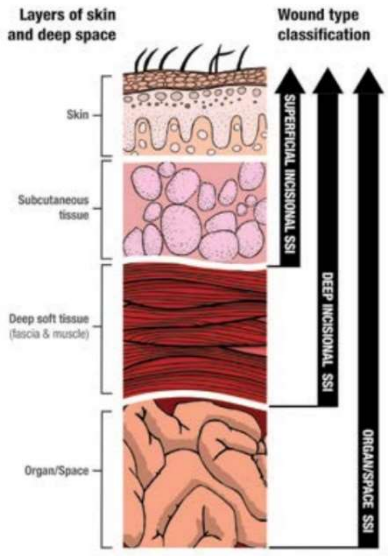
The following table presents the 75$^{th}$ percentile of procedure duration (in minutes) for the listed procedures. This is equivalent to the “cut point time”

Procedure Start time to Procedure End time (minutes)

| Year range | CSEC | HPRO | KPRO |
|---|---|---|---|
| 2017-2019 | 67 | 128 | 130 |
| 2018-2020 | 68 | 130 | 134 |
| 2019-2021 | 68 | 129 | 132 |

CSEC - Lower segment caesarean section, HPRO - Hip replacement, KPRO - Knee replacement

## Appendix 3 – Visualising wound type[4]



## References

1. American Society of Anesthesiologists (ASA). 2014. Available from: https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system.

2. Edwards. JR, Peterson. KD, Banerjee. S, Allen-Bridson. K, Morrell. G, Dudeck. MA, et al. The National Healthcare Safety Network (NHSN) report: Data summary for 2006 through 2008. American Journal of Infection Control. 2009;37:783-805.

3. Centers for Disease Control and Prevention. The National Healthcare Safety Network (NHSN) Patient Safety Component Manual. Surgical Site Infection (SSI) Event. 2017 [Guidelines and procedures for monitoring SSI. . Available from: https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscssicurrent.pdf.

4. Australian Commission on Safetey and Quality in Health Care. Approaches to surgical site infection surveillance - For acute care settings in Australia. In: Care ACoSaQiH, editor.: Australian Commission on Safety and Quality in Health Care; 2017.

## For more information

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