NHS National Services Scotland

Surgical site infection surveillance protocol

Edition 7.1.

(Updated May 2019)

Scottish surveillance of healthcare associated infection programme.

Summary of major changes

The first SSI surveillance protocol was produced in 2002. Changes have been applied, either based on the issue of Scottish Government directives or to align Scotland's SSI surveillance programme internationally to enable comparison. This document is an update of SSI surveillance protocol 7th edition.

The main changes include:

1. Revision of presentation to surgery definitions; **planned** surgery procedures include operations that have been planned at a time to suit both patient and surgeon, **unplanned** surgery procedures are unplanned, immediate life-saving operations and operations conducted as soon as possible after resuscitation.
2. For mandatory and **voluntary** procedures inpatient and readmission surveillance is required to **30 days** (voluntary for caesarean section) for both implant and non-implant procedures.
3. All patients of 16 years old and over should be included in the surveillance.
4. Day case procedures (when patients have not stayed over-night) should be excluded.
5. Minimally invasive procedures (keyhole surgery); where the entire operative procedure is performed using an endoscope/laparoscope, are not included in the surveillance.

Contents

1. Specific objectives of Surgical Site Infection (SSI) surveillance

At Hospital level:

- To monitor the incidence of SSI infection.
- Lower the incidence of SSI by collaborating with clinicians to:
    - comply with evidence based guidelines
    - correct or improve specific practices
    - develop, implement and evaluate new preventative practices through follow-up, inter-hospital comparisons of adjusted (where possible) SSI rates and of compliance with key preventative measures.

At National level:

- Monitor trends, including the detection of outbreaks and provide early warning and investigation of problems and subsequent planning and intervention to control.
- Provide analysis at national level.
- Examine the impact of interventions.
- Gain information on the quality of care.
- Prioritise the allocation of resources.

Healthcare providers can conduct SSI surveillance for each procedure either using the light or standard (full) surveillance methodologies unless any mandatory requirements are in place. Light surveillance methods are only recommended after a period of standard surveillance, this is to ensure the risk factors for SSI are fully understood within the patient population. Therefore it is a requirement that new mandatory procedures (large bowel and vascular procedures) are conducted using standard surveillance until further notice.

2. Data Collection

2.1. Inclusion criteria

Data is collected at hospital level. Each healthcare provider should undertake surveillance on all patients within the four mandatory operation categories, these are: caesarean section, hip arthroplasty, large bowel* and vascular* procedures where these operation categories are carried out. Where mandatory procedures are not carried out surveillance must be conducted on at least two operational categories by the addition of voluntary procedures.

***Mandatory large bowel and vascular procedures only include planned procedures.

NB The denominator for the SSI surveillance programme is procedures, not patients.

Appendix 1 lists all included OPCS codes (https://www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71/)

Mandatory procedures:

- caesarean section
- hip arthroplasty
- large bowel surgery - (planned procedures only)
- vascular surgery - (planned procedures only)

Voluntary procedures:

- abdominal hysterectomy
- breast surgery
- cardiac surgery
- coronary artery by-pass grafting (CABG)
- cranial surgery
- knee arthroplasty
- reduction of long bone fracture
- repair of neck of femur

Identification of study population

- A method must be in place locally to ensure that all patients who have had the specified operations are included in the surveillance. Theatre and ward staff should be fully aware of which groups of surgical patients are under surveillance and reminded of this at regular intervals by local surveillance staff.

- Inclusion of the procedure in the surveillance is based on the OPCS-4 code for the main procedure.

- All patients of 16 years old and over should be included in the surveillance.

- Day case procedures (when patients have not stayed over-night) should be excluded.

- Minimally invasive procedures (keyhole surgery); where the entire operative procedure is performed using an endoscope/laparoscope, are not included in the surveillance. However, laparoscopic assisted procedures, which are surgery where an operative procedure was carried out using a laparoscope, are included. For a more detailed description on laparoscopic and laparoscopic-assisted surgery see below:

    - **Laparoscopic surgery** refers to a technique where the surgeon makes several small incisions to insert laparoscope or other instruments (port sites)

    - **Laparoscopic-assisted surgery** is used to describe a procedure that is performed largely laparoscopically and then completed through an extended incision or by creating larger abdominal incision to remove the specimen from the abdomen.

- For large bowel and vascular procedures, only <u>planned</u> procedures are included.

    - **Planned surgery definition** – This includes operations that have been planned at a time to suit both patient and surgeon (for example elective hip or knee replacements), and operations on more serious cases arranged around theatre time. For example, open reduction of fractured neck of femur on patients admitted following trauma and classified as 'emergency admission' but where there is time to carry out pre-operative preparation.

    - **Unplanned surgery definition** - This should be applied to immediate life-saving operations, and operations conducted as soon as possible

after resuscitation. For example, patients admitted as an emergency with critical conditions or inpatients whose condition suddenly deteriorates and there is no time for the usual preparation.[1]

2.2. Monitoring patient for SSI

2.2.1. Standard SSI surveillance

- Standard surveillance includes both inpatient and readmission surveillance to 30 days for all procedures (both implant and non-implant) except caesarean section which is mandatory for inpatient and post-discharge surveillance to 10 days and voluntary for (readmission surveillance to 30 days .
- Medical and nursing records, information from clinical personnel and positive microbiology cultures can be used as sources for potential identification of SSIs.
- If a patient has any reintervention (i.e. reoperation at the same site through the same incision in order to make corrections for a previous operation) within 24 hours of initial procedure the reintervention operating times should be added to the form. If a procedure is carried out via the same site after 24 hours; the surveillance period ends and a new surveillance period is commenced as long as the second operation code is included in the OPCS codes supplement (Appendix 1). SSIs are normally attributed to the most recent trip to theatre.
- Date and signs and symptoms of SSI **onset** must be recorded on the surveillance form. The discharge date is required unless it is after the 30 days surveillance period.
- Surveillance of the surgical wounds ends 30 days after the procedure was carried out, regardless of whether a SSI is confirmed. Reasons for ending surveillance before 30 days are: death, reoperation at the same site after 24 hrs or the patient has been transferred out of the health board area. If a patient is transferred to another hospital within the same health board during the surveillance period, surveillance must continue. Surveillance mechanisms should be in place locally for any patients who are transferred, to ensure that completed forms are returned from all hospitals to the local surveillance co-ordinator. If a patient is readmitted with SSI within 30 days of an operation that took place in a different health board, this should be reported to the SSI coordinator for the hospital where the operation took place.

- If **no** infection is detected this should be recorded on the form on completion of the surveillance. A superficial infection may develop into a deep or organ/space infection. In such cases, the date of SSI detection is when the first signs and symptoms of infection are seen. However, the type of infection recorded should be the most serious infection at the end of the surveillance period. Therefore surveillance needs be continued to the end of the surveillance period. If SSI develops following an operation carried out on a dirty wound, and the same causative organism is identified this should be recorded as SSI.

- The SSI surveillance denominator is the total number of procedures not the total number of incisions. When a procedure involves multiple incisions only one form is required, e.g. a vascular procedure with multiple access incisions requires one form. However, two forms should be completed for bilateral procedures, i.e. the procedures for the left and right side are counted separately and require separate forms.

- For procedures that involved multiple incisions, if more than one incision site becomes infected, the most serious infection to develop within the surveillance period should be recorded. The date of SSI is when the signs and symptoms of the most serious SSI were detected.

- Data is uploaded to the SSIRS website and is completed by the quarterly data entry deadline (supplied by HPS) to enable report data to be analysed by HPS. All SSI reporting timescales can be found – https://www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71/

- For Web Based Reporting, see Appendix 3, SSIRS User Manual https://www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71/

2.2.2. Light SSI Surveillance

Denominator and SSI data

- All procedures within the chosen category (all included OPCS codes) must be totalled and entered monthly onto the SSIRS denominator page.
- Local processes should be in place to ensure that all patients diagnosed with a SSI are captured locally.
- Mechanisms are required locally to ensure that all patients diagnosed with a SSI, (as an inpatient or readmitted due to SSI) have surveillance data recorded.
- Patients diagnosed with a SSI must have ALL data collected as per the Standard SSI surveillance. This may be data collected from local software systems and/or patient records.
- Infection data are required to be uploaded onto SSIRS website by the specified dates in the reporting timescale.

2.2.3. Detection of SSI after discharge

- All categories of surgery included in the national surveillance programme must undertake readmission surveillance for 30 days (voluntary for caesarean section) post-operatively for both implant and non-implant procedures.
  - Currently hospitals undertaking caesarean section surveillance must undertake PDS for this category until day 10 post-operatively.
    - ✓ In order to report SSI detected following C-section, please record SSI detected while still an inpatient as **"During the admission period".**
    - ✓ SSI detected by mandatory 10 day post-discharge surveillance, either in the community or on readmission, as **"Post-discharge (within 10 days)".**
    - ✓ After 10 days mandatory surveillance boards can continue voluntary readmission surveillance up to day 30 with SSIs entered on SSIRS as being detected **"On readmission (within 30 days)".**
  - Voluntary SSI procedures must as a minimum include readmission surveillance to 30 days.

2.3. Data items for national dataset

The following tables describe the data items that should be collected for each procedure.

- Essential data: SSI forms cannot be uploaded to SSIRS without this information.

- Required data: this information is required for risk factor analysis however SSI forms can be uploaded to SSIRS if the response is unknown.

Remember

- In case of a reintervention within 24hrs after the primary procedure, the duration of the reintervention will be added to the duration of the primary procedure.

- Record both readmission admission and discharge date.

- Planned operations include patients admitted as an emergency but scheduled into theatre after pre-operative preparation.

2.3.1. Pre-operative

Notes for completion:

Data item	Description	Response Type
Hospital	Hospital in which the operation is performed.	**Format:** Select one option / Alphabetic frame on paper forms. **Requirement:** Essential for all procedures.
Patient CHI Number	Community Health Index (CHI) number. Unique identifier for patients receiving healthcare in Scotland.	**Format:** 10 digit numeric frame. **Requirement:** Essential for all procedures.
Presentation to surgery	Whether patient was taken to theatre as a planned surgery or was an unplanned surgery.	**Format:** Select one option. **Requirement:** Essential for all procedures. Default to 'Planned' for Large Bowel and Major Vascular Surgery.
Sex	Sex of the patient: Male, Female or Unknown.	**Format:** Select one option. Default to 'Female' for caesarean section. **Requirement:** Essential for all procedures.
Age	Age of patient in years on day of operation. SSI surveillance excludes patients under age of 16.	**Format:** 3 digit numeric frame. **Requirement:** Essential for all procedures. If not known, record as 999.

Data item	Description	Response Type
Date of admission	Date patient was admitted to the hospital for the stay which included the procedure under surveillance.	**Format:** Date frame. **DD/MM/YYYY** **Requirement:** Essential for all procedures. If the date is not known, record as 09/09/9999
Date of operation	Date on which the operative procedure under surveillance was carried out.	**Format:** Date frame. **DD/MM/YYYY** **Requirement:** Essential for all procedures. If the date is not known, record as 09/09/9999.
Height	Height of patient in centimetres. For caesarean section procedures, booking height should be recorded. Used to calculate BMI.	**Format:** 3 digit numeric frame. **Requirement:** Required for all procedures. If not known, record as 999.
Weight	Weight of patient in kilograms. For caesarean section procedures, booking weight should be recorded. Used to calculate BMI.	**Format:** 3 digit numeric frame. **Requirement:** Required for all procedures. If not known, record as 999.
Hair removal	What hair removal technique, if any, was used pre-op: - None - Clipping only - Shaving - Unknown	**Format:** Select one option **Requirement:** Required for all procedures. Structure and process indicator.
Diabetic patient?	Has the patient been diagnosed with diabetes mellitus?	**Format:** Select one option **Requirement:** Required for Large Bowel Surgery and Major Vascular Surgery only.

Data item	Description	Response Type
Renal failure?	Does the patient suffer from chronic kidney disease or acute kidney failure?	**Format:** Select one option **Requirement:** Required for Major Vascular Surgery only.
Critical limb ischemia?	Does the patient suffer from ischemic leg pain, ulcers and gangrene, attributable to arterial disease?	**Format:** Select one option. **Requirement:** Required for Major Vascular Surgery only.
Claudication?	Does the patient suffer from pain and cramping caused by reduced blood flow to the legs?	**Format:** Select one option. **Requirement:** Required for Major Vascular Surgery only.
Diagnosis / Reason for surgery	The diagnosis and primary reason for surgery.	**Format:** Select one option. **Requirement:** Required for Large Bowel Surgery, Orthopaedic Surgery and Cranial Surgery.
Cranial radiation treatment in the last year	Has the patient received cranial radiation treatment in the last year pre-operatively?	**Format:** Select one option. **Requirement:** Required for Cranial Surgery only.
Chemotherapy in last month	Has the patient received chemotherapy treatment in the last month pre-operatively?	**Format:** Select one option. **Requirement:** Required for Cranial Surgery only.
Long term (>one week) steroid therapy	Has the patient received long term steroid therapy i.e. of duration greater than one week?	**Format:** Select one option. **Requirement:** Required for Cranial Surgery only.

2.3.2. Peri-operative

Notes for completion:

Data Item	Description	Response Type
Duration of labour	Duration of labour is the length of time the state of labour lasts from onset to the delivery of the placenta, expressed as the number of completed hours.	**Format:** 4 digit numeric frame (24hr clock). **Requirement:** Required for Caesarean Section Surgery only. If not known, record as 9999.
Anaesthesia type	Type of anaesthetic given for the procedure. This can be general (GA) where drugs or gases are given to render the patient unconscious, local (LA) where the area being operated on is infiltrated with chemicals or regional (Spinal) where the lower area of the body is paralysed with chemicals.	**Format:** Select all options that apply **Requirement:** Required for all procedures.
ASA classification	An assessment by the anaesthetist of the patient's pre- operative physical condition using the American Society of Anaesthesiologists (ASA) classification of physical status. This is an element of the National Nosocomial Infection Surveillance (NNIS) SSI risk index.	**Format:** Select one option **Requirement:** Essential for all procedures.
Was patient given antibiotic prophylaxis	This is an antibiotic given to prevent infection. **NB** This includes antibiotic given several days or hours prior to surgery (e.g. for existing infection) if this is considered as a prophylactic antibiotic regime. Although this question is on the peri-operative section of the surveillance form it does not	**Format:** Select one option **Requirement:** Essential for all procedures. The term 'more than one' refers to the number of different named antibiotics given, not the number of doses of the same antibiotic.

Data Item	Description	Response Type
	apply exclusively to the antibiotic given in theatre.	
If more than one dose given (antibiotic prophylaxis) state reason	For Caesarean Section procedures please type in the box the reason for repeated dose(s).	**Format:** Open text **Requirement:** Required for Caesarean Section Surgery only.
Name of antibiotic(s) given (list up to 4)	Which antibiotic prophylaxis was given to the patient?	**Format:** Select one option / Open text on paper forms. **Requirement:** Required for all mandatory procedures.
Date & time prophylactic antibiotics first given	Date and time (in 24 hour clock) of administration of the first prophylactic antibiotic dose. Conditional on patient receiving antibiotics.	**Format:** Date/Time frame. DD/MM/YYYY hh:mm (24hr clock) **Requirement:** Required for all procedures where antibiotics given. If the date and time is not known, record as 09/09/9999 99:99
Use of alcohol-based skin preparatory agent for pre-op antisepsis	Was alcohol-based antisepsis agent used for skin preparation in the operating room (if no patients contraindication exists).	**Format:** Select one option **Requirement:** Required for all procedures. Structure and process indicator.
Start time of operation	Date and time (in 24 hour clock) of skin incision.	**Format:** Date/Time frame. DD/MM/YYYY hh:mm (24hr clock) **Requirement:** Essential for all procedures. If the time is not known, record as 09/09/9999 99:99
Completion time of operation	Date and time (in 24 hour clock) of skin closure. Required to calculate duration of operation.	**Format:** Date/Time frame. DD/MM/YYYY hh:mm (24hr clock) **Requirement:** Essential for all procedures. If the time is not known, record as 09/09/9999

Data Item	Description	Response Type
		99:99
Which grade of surgeon performed the operation	Grade of surgeon who performed operation, includes grade of locums: F2, specialist registrar, non-consultants career grade, consultant, unknown. Where more than one surgeon performs the operation, the principle operator should be recorded.	**Format:** Select one option **Requirement:** Required for all procedures.
Was a consultant present in the theatre	Surgeon present in the theatre for the majority (at least half) of the procedure.	**Format:** Select one option **Requirement:** Required for all mandatory surveillance procedures.
Consultant code responsible for patient care	Enter code of named consultant responsible for the care of the patient. A 3-digit code is provided by participating hospital/board.	**Format:** 3 digit numeric frame. If not known, record as 999 **Requirement:** Required for all mandatory surveillance procedures.
Was operation carried out by a locum	Does the surgeon who is operating hold a locum appointment?	**Format:** Select one option **Requirement:** Required for Orthopaedic Surgery only.
Category of procedure	An operation category is the category that the specific operation fits into.	**Format:** Select one option **Requirement:** Essential for Orthopaedic Surgery only.
Perioperative glucose monitoring performed and documented	Is the glucose monitoring in place and documented in patient charts or checklists. This should be checked for every patient not just diabetic patient.	**Format:** Select one option **Requirement:** Required for all procedures. Structure and process indicator.
Laterality of procedure	Specify which side of body the procedure was performed on, if applicable. If a bilateral procedure is carried out **two** forms should be completed stating the laterality of each procedure.	**Format:** Select one option **Requirement:** Required for Orthopaedic Surgery, Major Vascular Surgery and voluntary procedures.

Data Item	Description	Response Type
OPCS code	Classification of operations and surgical procedures produced by the Office of Population Censuses and Surveys. If this is not known then operative procedure in full text should be provided in part b of the field. Please check that the procedure code is included in Appendix 1 OPCS codes supplement.	**Format:** 4 digit alphanumeric frame or open text **Requirement:** Essential for all procedures.
Cranioplasty type	Which cranioplasty type has been used? Autologous, Acryllic, Metallic, Other or Unknown.	**Format:** Select one option **Requirement:** Required for Cranial Surgery only**.**
Is intracranial monitoring in place	For cranial procedures is intracranial monitoring in place?	**Format:** Select one option **Requirement:** Required for Cranial Surgery only**.**
Wound class of procedure	An assessment of the likelihood and degree of contamination of a surgical wound at the time of the operation. Wounds are divided into four classes: Clean, Clean-contaminated, Contaminated and Dirty or infected. (see SSI risk index).	**Format:** Select one option **Requirement:** Essential for all procedures. This is used to calculate SSI risk.
Prosthetic implant inserted	A nonhuman-derived foreign body that is permanently placed in the patient during an operative procedure and is not routinely manipulated for diagnostic or therapeutic purposes. Examples are joint prosthesis, nonhuman vascular graft, and mechanical heart valves. Screws, wires and mesh that are left permanently must also be considered implants. Non absorbable sutures and sternal wires are not counted as implants.	**Format:** Select one option **Requirement:** Required for all procedures except Caesarean section.
Was antibiotic loaded cement used?	Was antibiotic loaded cement used during the surgery.	**Format:** Select one option **Requirement:** Required for Orthopaedic Surgery only.

Data Item	Description	Response Type
More than one procedure performed	More than one procedure was performed through the same incision during the same trip to the operating theatre.	**Format:** Select one option **Requirement:** Required for all procedures.
Minimally invasive surgery	The entire operative procedure was performed using an endoscope/laparoscope i.e. keyhole surgery.	**Format:** Default set to 'No'. **Requirement:** Keyhole surgeries should not be included in national SSI surveillance or entered on SSIRS.
Laparoscopic-assisted open surgery	An open surgical procedure where part of the operation was carried out using a laparoscope.	**Format:** Select one option **Requirement:** Required for Large Bowel Surgery only.
Was blood loss greater than 1.5 litres	Major significant blood loss during the caesarean section surgery greater than 1500ml.	**Format:** Select one option **Requirement:** Required for Caesarean Section only.
Was this revision surgery	Is this revision surgery i.e. the patient has had a previous procedure which is being revised.	**Format:** Select one option **Requirement:** Required for Cranial Surgery only.
Drain type	Which type of drain has been used - Wound, CSF, Unknown, None?	**Format:** Select one option **Requirement:** Required for Cranial Surgery only.
Patient's normothermia within one hour of the end of operation	Was the patient's temperature checked within one hour of the end of operation 36-38°C (rectal measurement) or 35.5-37.5°C (non-rectal measurement), if no contraindication?	**Format:** Select one option **Requirement:** Required for all procedures except Cardiac Surgery and CABG. Structure and process indicator.

2.3.3. Post-operative

Notes for completion:

Data Item	Description	Format
Reintervention required within 24 hours	A reintervention was carried out within **24** hours after the primary procedure e.g. for haematoma evacuation. In case of a reintervention or in case of multiple operations through the same incision within 24hrs after the primary procedure, the duration of the reintervention will be added to the duration of the primary procedure.	**Format:** Select one option **Requirement:** Essential for all procedures.
Start time of reintervention	Date and time (in 24 hour clock) of skin incision for the reintervention procedure carried out within 24 hours after the primary procedure. This is required to calculate total duration of operation for SSI risk.	**Format:** Date/Time frame. DD/MM/YYYY hh:mm (24hr clock) **Requirement:** Essential for all procedures with reintervention within 24 hrs. If the time is not known, record as 09/09/9999 99:99
Completion time of reintervention	Date and time (in 24 hour clock) of skin **closure** for the reintervention procedure carried out within 24 hours after the primary procedure. This is required to calculate total duration of operation for SSI risk.	**Format:** Date/Time frame. DD/MM/YYYY hh:mm (24hr clock) **Requirement:** Essential for all procedures with reintervention within 24 hrs. If the time is not known, record as 09/09/9999 99:99
Was patient given thromboprophy-laxis	Thromboprophylaxis given any time during the inpatient stay.	**Format:** Select one option. **Requirement:** Required for all procedures.
Date prophylactic antibiotic last given	Date patient was given the last dose of antibiotic prophylaxis (if more than one administration).	**Format:** Date frame. **DD/MM/YYYY** **Requirement:** Required

Data Item	Description	Format
		for all procedures where antibiotics given. If the date is not known, record as 09/09/9999
Time prophylactic antibiotic last given	Time patient was given the last dose of antibiotic prophylaxis.	**Format:** 4 digit numeric frame (24hr clock). **Requirement:** Required for all procedures where antibiotics given. If not known, record as 9999.
Is patient receiving prophylactic antibiotics >24hrs following surgery	**N.B.** If a patient is not on antibiotics before the surgery, any antibiotic prescribed after operation won't be considered prophylactic.	**Format:** Select one option **Requirement:** Required for all procedures.
If yes, reason why?	State the reason for why the patient is being given antibiotic prophylaxis for longer than 24 hours after the skin incision.	**Format:** Open text **Requirement:** Required if patient receiving prophylactic antibiotics >24hrs following surgery
Was antibiotic prophylaxis in line with local guidelines	If there are local guidelines and policies set up for the use of antibiotic prophylaxis, was this administration in line with that. This refers to both questions regarding antibiotic administration in peri-op and post-operative section of the form.	**Format:** Select one option **Requirement:** Required for all procedures.
Surgical site infection – has the patient developed a SSI	If patients developed any sign and symptom of wound infection.	**Format:** Select one option **Requirement:** Essential for all procedures.
Type of SSI	For surveillance classification purposes, SSI is divided into incisional SSI and organ/space SSI. Incisional SSIs are further classified into those involving only the skin and subcutaneous tissue (called superficial incisional SSI) and those	**Format:** Select one option **Requirement:** Essential for all SSI.

Data Item	Description	Format
	involving deep soft tissues of the incision (called deep incisional SSI e.g., fascia and muscle layers). Organ/space SSI involve any part of the anatomy (e.g. organs or spaces), other than the incision, opened or manipulated during the operative procedure. (see 3.1).	
Specific site of organ space	Specific sites are assigned to organ/space SSI to further identify the location of the infection.	**Format:** Select all options that apply **Requirement:** Required for all SSI.
Criteria used to determine SSI	Indicate which of the listed criteria in 3.1. SSI case definitions and appendix 2 (https://www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71/) were used to diagnose SSI.	**Format:** Select all options that apply **Requirement:** Essential for all SSI.
When was SSI detected	Identification of when the infection was detected: during post-op inpatient stay or it was detected on readmission to hospital. For caesarean section only: if SSI was detected in the community within 10 days.	**Format:** Select one option **Requirement:** Essential for all SSI.
Was patient readmitted for SSI within 30 (10) days	Was the patient readmitted to hospital for a confirmed infection within 30 days of the operation – this would be 10 days for caesarean section.	**Format:** Select one option **Requirement:** Essential for all SSI.
Date of confirmed SSI	The date when the first clinical evidence of the SSI was detected or the date the specimen used to make or confirm the diagnosis was collected, whichever comes first.	**Format:** Date frame. DD/MM/YYYY **Requirement:** Essential for all SSI. If the date is not known, record as 09/09/9999
Date of discharge or death	Date on which the patient died or was discharged from hospital following the procedure under surveillance. If the patient is still in hospital after the surveillance period ends,	**Format:** Date frame. DD/MM/YYYY **Requirement:** Essential for all SSI. If the date is not known

Data Item	Description	Format
	please record 09/09/9999 as the date of discharge.	or the patient has not been discharged, record as 09/09/9999.
Date of hospital readmission	Date the patient was readmitted during the follow up period to the hospital where the operation took place for SSI related reason.	**Format:** Date frame. DD/MM/YYYY **Requirement:** Required for all SSI detected on readmission. If the date is not known, record as 09/09/9999
Date of discharge or death following readmission	Date on which the patient died or was discharged from hospital following readmission for SSI. If the patient is still in hospital after the surveillance period ends, please record 09/09/9999 as the date of discharge.	**Format:** Date frame. DD/MM/YYYY **Requirement:** Required for all SSI detected on readmission. If the date is not known or the patient has not been discharged, record as 09/09/9999
Date surveillance discontinued	This is the date on which the surveillance ended for the given reason.	**Format:** Date frame. DD/MM/YYYY **Requirement:** Essential for all procedures. If the exact date is not documented, record as 09/09/9999.
Reason surveillance discontinued	Reason why surveillance has ceased for this individual patient. SSI Surveillance ends 30 days after operation. Other reasons for ending surveillance are: death, reoperation at the same site after 24 hrs, the patent is transferred outside the health board and lost to follow-up.	**Format:** Select one option **Requirement:** Essential for all procedures.

Data Item	Description	Format
Death related to SSI	An assessment of the relationship of the death of the patient to SSI. If the patient dies before the end of the 30 day surveillance period, the reason discontinued should always be 'Death' and the Death related to SSI question must be completed.	**Format:** Select one option **Requirement:** Essential where reason discontinued was Death.

2.3.4. Microorganism and Antimicrobial data

Notes for completion:

Data Item	Description	Format
Microorganism 1	Microorganism codes from wound sample result If there is no microbiology data, one of the following options should be selected: -***Examination not done*** ***-Results not available*** ***-Microorganism not identified*** ***-Sterile examination***	**Format:** Select microorganism from dropdown list. **Requirement:** Required for all SSI.
Microorganism 1 antibiotic susceptibility	List up to 5 antibiotics for each microorganism reported in the lab result that microorganism shows sensitivity, resistance and intermediate reaction.	**Format:** Select relevant codes from list **Requirement:** Required for all SSI.
Microorganism 2	Microorganism codes from wound sample result.	**Format:** Select microorganism from dropdown list (if more than 1 identified) **Requirement:** Required for all SSI.
Microorganism 2 antibiotic susceptibility	List up to 5 antibiotics for each microorganism reported in the lab result that microorganism shows sensitivity, resistance and intermediate reaction.	**Format:** Select relevant codes from list. **Requirement:** Required for all SSI.
Microorganism 3	Microorganism codes from wound sample result.	**Format:** Select microorganism from dropdown list (if more than 2 identified) **Requirement:** Required for all SSI.
Microorganism 3 antibiotic susceptibility	List up to 5 antibiotics for each microorganism reported in the	**Format:** Select relevant codes from

Data Item	Description	Format
	lab result that microorganism shows sensitivity, resistance and intermediate reaction.	list **Requirement:** Required for all SSI.
Is the patient receiving antimicrobials?	Is the patient receiving antibiotic(s) for wound infection?	**Format:** Select one option **Requirement:** Required for all SSI.
Antimicrobial	List up to 3 antibiotics prescribed for patients.	**Format:** Select relevant codes from list **Requirement:** Required for all SSI.

Individual data collection forms can be designed for hospitals. Some additional local reporting data fields can be accommodated. Please contact HPS to discuss addition of local fields. These items will be collected and the facility to extract this data locally is available however local data items will not be analysed or reported on by HPS.

3. Definitions

3.1. SSI case definitions

Table 1 – SSI Case definitions[2;3] These definitions are the same as previous except for implant* SSI surveillance to 90 days.

SUPERFICIAL INCISIONAL

Infection occurs within 30 days after the operation and infection involves only skin and subcutaneous tissue of the incision and at least one of the following:

1. Purulent drainage with or without laboratory confirmation, from the superficial incision
2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
3. At least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat and superficial incision is deliberately opened by surgeon, unless incision is culture-negative.
4. Diagnosis of superficial incisional SSI made by a surgeon or attending physician.

DEEP INCISIONAL

Infection occurs within 30 days after the operation if no implant* is left in place or within 90 days if implant* is in place and the infection appears to be related to the operation and infection involves deep soft tissue (e.g. fascia, muscle) of the incision and at least one of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (>38°C), localized pain or tenderness, unless incision is culture-negative.
3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of deep incisional SSI made by a surgeon or attending physician.

ORGAN/SPACE

Infection occurs within 30 days after the operation if no implant* is left in place or within 90 days if implant* is in place and the infection appears to be related to the operation and infection involves any part of the anatomy (e.g., organs and spaces) other than the incision which was opened or manipulated during an operation and at least one of the following:

1. Purulent drainage from a drain that is placed through a stab wound into the organ/space .
2. Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space.
3. 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.
4. Diagnosis of organ/space SSI made by a surgeon or attending physician.

*Implant definition: a nonhuman-derived implantable foreign body (prosthetic heart valve, nonhuman vascular graft, machanical heart or hip prosthesis) that is perminantly placed in a patient during surgery.

For specific site of organ/space infection definitions see Appendix 2 (https://www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71/)

3.2. SSI Risk Index

The SSI Risk Index is the index used by National Healthcare Safety Network NHSN and assigns surgical patients into categories based on the presence of three major risk factors:

1. Operations lasting more than the duration cut point hours, where the duration cut point is the approximate 75th percentile of the duration of surgery in minutes for the operative procedure, rounded to the nearest whole number of hours.

2. Contaminated (Class 3) of Dirty/Infected (Class 4) wound class.

3. ASA classification of 3, 4 or 5.

The patient's SSI risk category is the number of these factors present at the time of the operation.

Table 2 – Calculation of SSI Risk Index

Calculation	**Score =0, if:**	**Score=1, if:**
Wound contamination class	W1, W2	W3 W4
ASA classification	A1 A2	A3 A4 A5
Duration of operation T (value in table 5)	≤T	>T
Basic SSI Risk Index =	**Sum of scores**	

3.3. Wound Contamination Class

Wound contamination class as described by Altemeier *et al.* [4]

Table 3 – Wound Contamination Classification

W1	A **CLEAN WOUND** is 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 trauma should be included in this category
W2	**CLEAN-CONTAMINATED WOUNDS** are operative wounds in which the respiratory, alimentary, genital or uninfected urinary tracts are entered under controlled condition 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.
W3	**CONTAMINATED WOUNDS** include open, fresh, accidental wounds. In addition operations with major breaks in sterile technique or gross spillage from the gastrointestinal tract, and incisions in which acute, nonpurulent inflammation is encountered are included in this category.
W4	**DIRTY OR INFECTED WOUNDS** include old traumatic wounds with retained devitalised tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing post-operative infection were present in the operative field before the operation.*

*** If this patient develops SSI following operation with the same organism, this should be included as a SSI within the surveillance.**

3.4. The ASA Physical status classification (ASA Score)

Physical status classification developed by the American Society of Anaesthesiology (ASA)[5].

Table 4 – ASA Physical status Classification

A1	N**ORMALLY HEALTHY PATIENT.**
A2	Patient with **MILD SYSTEMIC DISEASE.**
A3	Patient with **SEVERE SYSTEMIC DISEASE** that is not incapacitating.
A4	Patient with an **INCAPACITATING SYSTEMIC DISEASE** that is a constant threat to life.
A5	M**ORIBUND** patient who is not expected to survive for 24 hours with or without operation.

3.5. Duration of operation

The table below shows the 75th percentile cut-off values for the included operative procedures.

In case of a reintervention or in case of multiple operations through the same incision within 24hrs after the primary procedure, the duration of the reintervention needs to be added to the duration of the primary procedure.

Table 5 – Cut-off values for duration of operative procedure categories *

Description	***75th percentile cut-off value, in hours***
Cardiac	5 hrs
CABG – chest & donor site	5 hrs
CABG – chest only	4 hrs
Craniotomy	4 hrs
Breast	3hrs
Caesarean Section	1hr
Abdominal Hysterectomy	2 hrs
Reduction of long bone fracture	2hrs
Hip Arthroplasty	2 hrs
Knee Arthroplasty	2 hrs
Vascular	3 hrs
Other nervous system	2 hrs
Colon	3 hrs
Rectal	4 hrs
Amputation	1 hrs

*The reference for most of these procedures is ECDC guideline[6]. Where the procedure was not included in ECDC guideline, CDC[7] and PHE [1]guidelines have been used as references.

3.6. Cumulative incidence of SSI by category

The cumulative incidence of infection is the number of new infections that occur in a defined population during a given period of time. This measure is reported as the number of SSIs per 100 operations. The cumulative incidence of SSI is calculated as:

3.7. SSI incidence density

To allow for differences in post-operative length of stay it is possible to calculate a rate of SSI that uses the number of post-operative days of follow-up as the denominator rather than the number of procedures. This rate is called the incidence density and is calculated as:

Confidence Intervals: All confidence limits within reports are produced using the Wilson's approximation to the binomial distribution[8].

3.8. Antimicrobial resistance markers and codes

The antimicrobial resistance (AMR) marker should be reported according to ECDC protocol https://ecdc.europa.eu/en/publications-data/surveillance-surgical-site-infections-and-prevention-indicators-european.

For each AMR marker, it should be indicated whether the microorganism was susceptible (S), intermediate (I), resistant (R) or unknown (U), for the following antimicrobials:

Organism		Antimicrobials		
Staphylococcus aureus	meticillin-resistant *S. aureus* (MRSA)	oxacillin	Or other marker of MRSA such as: cefoxitin, cloxacillin, dicloxacillin, flucloxacillin, meticillin	
	vancomycin-intermediate or vancomycin-resistant *S. aureus* (VISA, VRSA)	glycopeptides	vancomycin	teicoplanin
Enterococcus spp	Vancomycin-resistant *Enterococcus spp.* (VRE)	glycopeptides	vancomycin	teicoplanin
Enterobacteriaceae/ Enterobacteriales	*Escherichia coli, Klebsiella spp., Enterobacter spp., Proteus spp., Citrobacter spp., Serratia spp., Morganella spp.*	**third-generation cephalosporins** • cefotaxime • ceftriaxone • ceftazidime		**carbapenems:** imipenem, meropenem, doripenem
Pseudomonas aeruginosa		**carbapenems:** imipenem, meropenem, doripenem		
Acinetobacter spp		**carbapenems:** imipenem, meropenem, doripenem		

References

(1) Public Health England. protocol for the surveillance of surgical site infection. 2013 https://www.gov.uk/government/publications/surgical-site-infection-surveillance-service-protocol-procedure-codes-and-user-manual

(2) Centers for Disease Control and Prevention. National Healthcare Safety Network (NHSN):surgical site infection (SSI) event. 2011; 2011.

(3) Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. Hospital Infection Control Practices Advisory Committee. Infect Control Hosp Epidemiol 1999 Apr;20(4):250-78..

(4) Altemeier W, Burke J, Pruitt B, Sandusky W. Manual on control of infection in surgical patients. 2nd edition. Philadelphia, PA: JB Lippincott. 1984.

(5) Owens WD, Felts JA, Spitznagel EL, Jr. ASA physical status classifications: a study of consistency of ratings. Anesthesiology 1978 Oct;49(4):239-43..

(6) ECDC. Surveillance of surgical site infections and prevention indicators in European hospitals. HAI-Net SSI protocol.version2.2. 2017 https://ecdc.europa.eu/sites/portal/files/documents/HAI-Net-SSI-protocol-v2.2.pdf

(7) Culver DH, Horan TC, Gaynes RP, Martone WJ, Jarvis WR, Emori TG, et al. Surgical wound infection rates by wound class, operative procedure, and patient risk index. National Nosocomial Infections Surveillance System. Am J Med 1991 Sep 16;91(3B):152S-7S.

Appendices

The following appendices can be found at https://www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71/

1 OPCS Codes

2 Organ space infection definitions supplement

3 SSIRS User Manual

4 SSI Data Management

5 SSI Microorganism & Antimicrobial Lists

6 SSI Questions & Answers

7 Setting up Surveillance

Supplementary Content

The following supplementary content can be found at https://www.hps.scot.nhs.uk/web-resources-container/surgical-site-infection-surveillance-protocol-and-resource-pack-edition-71/

- **SSI Posters – Wound Class and SSI Definitions**
- **SSI data submission timetable**
- **Mandatory requirements for SSI surveillance**