UK Health Security Agency

Protocol for the Surveillance of Surgical Site Infection

Surgical Site Infection Surveillance Service

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Foreword

On 1 October 2021, Public Health England (PHE) transferred its health protection functions into the UK Health Security Agency (UKHSA).

The Surgical Site Infection Surveillance Service (SSISS) has been transferred to UKHSA and retains the same functions as under PHE.

This revision of the protocol for the surveillance of surgical site infection reflects the organisational change. We acknowledge the enduring commitment of hospitals in undertaking surveillance of SSI. The SSISS team will continue to support you conducting SSI surveillance as we did under PHE.

Surgical Site Infection Surveillance Service
November 2021

Section 1. Surgical site infection surveillance

1.1 Background

1.1.1 Infections acquired in hospital

Infections acquired in hospital are recognised as being associated with significant morbidity. They result in extended length of hospital stay, pain, discomfort and sometimes prolonged or permanent disability (1, 2). Infections of the surgical site account for approximately 16% of all hospital acquired infections (HAI), are estimated to double the length of post-operative stay in hospital and significantly increase the cost of care (1, 2, 3, 4).

The Study on the Efficacy of Nosocomial Infection Control (SENIC) showed that well-organised surveillance and infection control programmes that included feedback of infection rates to surgeons were associated with significant reductions in surgical site infection (5). Similar findings were reported by Cruse and Foord (6).

1.1.2 External benchmarks

External benchmarks of surgical site infection can be a powerful driver for effecting change but require effort and co-ordination to develop (7). A number of national SSI surveillance systems, including SSISS in England, have demonstrated significant reductions in rates of SSI in hospitals that participate in these benchmarking schemes (3, 8, 9, 10).

1.1.3 Valid benchmarks

Valid benchmarks must be based on standardised definitions and monitoring systems. The Surgical Site Infection Surveillance Service (SSISS) national co-ordinating centre serves to enhance the value of surveillance by providing high quality comparative data based on a standardised approach to data collection, analysis and interpretation (11, 12).

1.2 Aim of SSISS

1.2.1 Enhancing patient care quality

The aim of SSISS is to enhance the quality of patient care by encouraging hospitals to use data obtained from surveillance to compare their rates of SSI over time and against a benchmark rate, and to use this information to review and guide clinical practice.

1.2.2 Main principles

In order to meet these aims the principles that underpin the surveillance are that:

- the dataset will be the minimum required to enable benchmarking of rates of SSI taking account of key risk factors for infection that may explain variation
- hospitals will be provided with tools that enable them to collect and analyse data in a standardised way
- error checking mechanisms will be employed to assure, as far as possible, the accuracy of data
- hospitals will receive standard reports of their data and comparisons with benchmark rates derived from all participating hospitals; this will enable the results of surveillance to be used to inform and guide the review or change of local practice where results indicate these may be necessary to improve the quality of care

1.3 Developments to the Surgical Site Infection Surveillance protocol

1.3.1 National surveillance system

A national surveillance system for SSI was established in England in 1997 as part of the PHLS Nosocomial Infection National Surveillance Scheme. This early scheme evolved into the Health Protection Agency Surgical Site Infection Surveillance Service (SSISS), followed by Public Health England (PHE) and now co-ordinated by UKHSA. The prevention of healthcare-associated infection (HCAI) has been highlighted as a priority for action by successive Chief Medical Officers.

In April 2004 surveillance of SSI in orthopaedic surgery became mandatory for all English NHS Trusts and data handling systems redeveloped to accommodate the extension in participation (13, 14).

1.3.2 Focus of surveillance

When the SSI surveillance scheme was established, the surveillance was focused on the inpatient stay as this enabled accurate data to be collected in a cost-effective way. Subsequent marked reductions in post-operative hospital stay, particularly following elective surgery, increasingly meant that data were not captured on a significant proportion of SSIs that occured after the patient had been discharged from hospital (15).

This adversely affected the ability of the data captured to accurately reflect rates of SSI and enable comparisons between hospitals. SSISS therefore developed a system to facilitate post discharge surveillance (PDS) and the comparison of rates incorporating SSI detected post-discharge.

In addition, improvements in technology allowed a wholly web-based data handling and reporting system to be implemented. The main changes to the surveillance protocol are listed below.

1.4 Overview of amendments to the SSI surveillance protocol since 2004

1.4.1 Hip hemiarthroplasty

Hip hemiarthroplasty category replaced by repair of neck of femur category. Dynamic hip screw (DHS) procedures have historically been included in the open reduction of long bone fracture (ORLBF) category. However, it is acknowledged that these procedures are commonly performed to repair a fractured neck of femur and SSISS data shows that the risk of SSI and age of patients on which they are performed are dissimilar to other procedures in the ORLBF category but similar to the hip hemiarthroplasty category, a procedure undertaken for similar reasons to DNS. Thus, the hip hemiarthroplasty category was replaced by a category termed repair of neck of femur in July 2008 which includes both hip hemiarthroplasties and DNS.

1.4.2 Post discharge surveillance

Evidence from user surveys suggests that at least one third of SSISS hospitals already carry out some form of post-discharge surveillance (PDS) (16). However, if comparable rates that include SSI detected post-discharge are to be reported then a standard approach to PDS must be used that is able to systematically and accurately identify patients with SSI.

The SSISS protocol was therefore developed to include a defined approach to finding SSIs that occur after the patient has been discharged using the following case-finding methods:

- identification of patients readmitted with SSI (required)
- detection of SSI at outpatient clinic, other return visit to hospital or review by healthcare staff (optional)
- patient questionnaire completed at 30 days post-op (optional)

This approach was informed by a review of the published literature and a survey of current users to establish the extent to which they undertook PDS and the methods they employed (16, 17 to 23). From July 2008, all hospitals have been required to establish systems to identify and report SSIs in patients included in the surveillance who are readmitted to hospital. The other case-finding methods are optional although we would strongly recommend that hospitals use them as they will considerably enhance the value of the data as a quality improvement measure. In reflection of the optional nature of these additional methods, the only method of post discharge surveillance included in the benchmark is readmission.

1.4.3 Web based data entry and reporting

A web-based data capture system enabling records to be entered, saved and retrieved and edited until ready for submission was launched in July 2008. Hospitals can generate reports of their data directly from the website, either in the form of specific user-defined tables or as a summary report for any period in which data have been collected.

1.4.4 New categories for spinal, cranial, breast and cardiac surgery

Four new categories have been added to the SSISS programme since 2008. Spinal surgery was added in July 2008 and cranial, breast and cardiac (non-CABG) in April 2010. The procedures included in these categories are based on those used for SSI surveillance by the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) SSI surveillance (27).

Section 2. Surveillance methodology

2.1 Introduction

2.1.1 Central aim

A central aim of this surveillance service is to enable participating hospitals to compare their rates of surgical site infection (SSI) in a specific group of surgical procedures against a benchmark – the pooled mean rate for participating hospitals. For this comparison to be valid the data collection methods used by participating hospitals must be similar, since the sensitivity with which different surveillance methods identify hospital-acquired infections varies, and requires active and prospective methods of surveillance (24, 25).

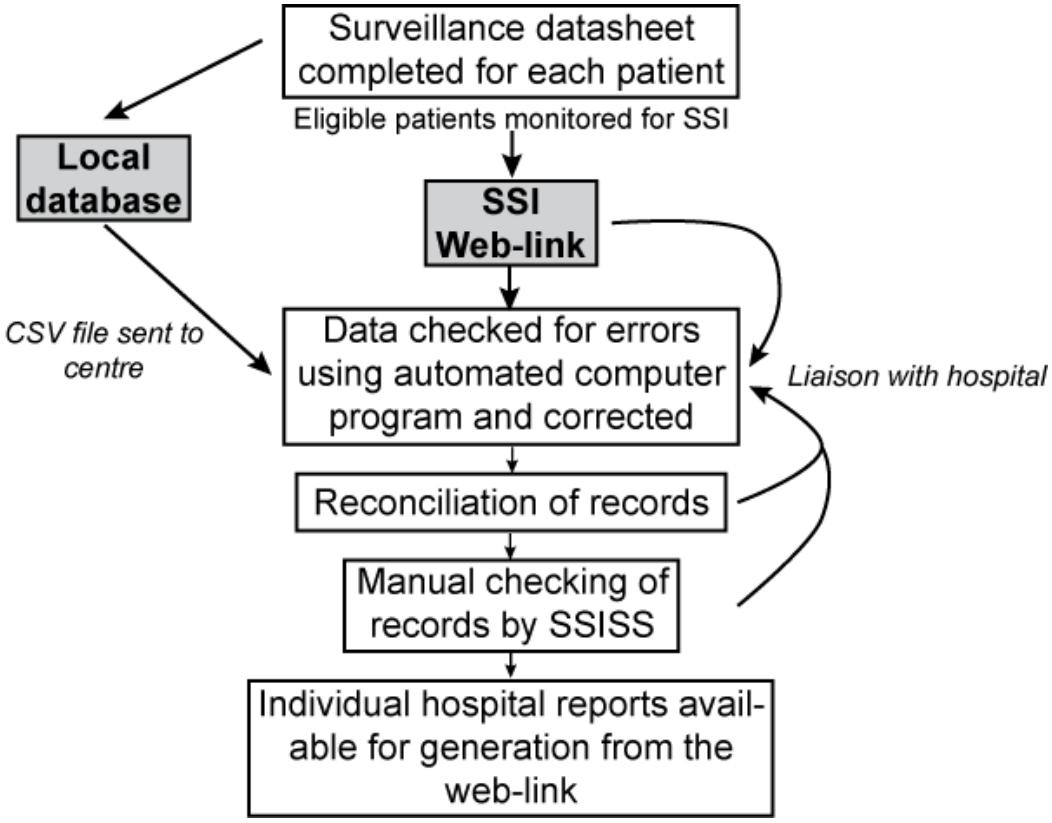
2.1.2 Active surveillance

Active surveillance is where designated, trained personnel use a variety of methods to identify cases of infection. In contrast, passive methods rely on infections being reported by staff who do not have designated responsibility for the surveillance programme and such an approach is associated with a lower case-finding sensitivity. Prospective surveillance is the application of methods to detect surgical site infection from the time of exposure (the surgical procedure). This method is more likely to identify cases of infection than retrospective review of case-records after the patient has been discharged from hospital.

2.1.3 Methods of data collection

This section describes the active, prospective methods of data collection that hospitals participating in the surveillance should use to enable them to compare their incidence of SSI with other participating hospitals. The surveillance is patient-based with data collected at an individual level on all eligible patients at risk of acquiring SSI, with active follow-up to identify those who develop SSI. The process is summarised in Figure 1.

Figure 1. Summary of the SSISS data handling process



Accessible text equivalent of Figure 1. Summary of the SSISS data handling process

Survellance datasheet completed for each patient. (Eligible patients monitored for SSI.)
Either information is sent to a local database, or information is sent to the SSI web-link.

From the local database a CSV file is sent to the centre.
From the SSI web-link information is sent to step 2.

Step 2
Data is checked for errors using automatied computer program and corrected.

Step 3
Reconciliaton of records.

Step 4
Manual checking of records by SSISS.

Step 5
Individual hospital reports are available for generation from the web-link.

From the SSI web-link or steps 3 and 4 there is liaison with the hospital.

2.2 Categories of procedure included in the surveillance

2.2.1 Surveillance target

The surveillance is targeted at surgical procedures that are relatively common, are associated with a relatively high risk of infection or have far-reaching consequences for the patient when infections occur. These are procedures where the maximum benefit from surveillance is likely to be obtained. Any procedure that is not listed in our OPCS code supplement should not be included in the surveillance. For all patients whose procedure is listed in the OPCS code, readmission surveillance is the minimum requirement for post-discharge surveillance.

The use of other post-discharge methods based on a systematic follow-up principle is also recommended (see Box 1 for details of other methods of follow-up). While most procedures included in the surveillance are likely to require a few days of post-operative inpatient stay, those categories where this is likely to be very short (for example, spinal, breast surgery and reduction of long bone fracture), hospitals must ensure prior to surveillance that they have in place a system for undertaking systematic follow-up of patients after hospital discharge. If you have any queries about the eligibility of patients for inclusion in your dataset, please contact a member of the SSISS team.

2.2.2 Surgical procedures

The surgical procedures are grouped into categories of clinically similar procedures (see Table 1). The full list of procedures included within each category, together with their corresponding OPCS surgical procedure codes (26) are given in the SSI Protocol OPCS Codes Supplement.

2.2.3 Participating hospitals

Participating hospitals are able to choose from one or more of the 17 categories of surgical procedures (see Table 1 and the SSI Protocol OPCS Codes Supplement). These are based on those described by the NHSN system in the USA (27). The study population consists of those patients admitted to hospital who undergo a surgical procedure in the chosen category.

2.2.4 Patient inclusion in surveillance

All patients undergoing any of the surgical procedures in the chosen categories are eligible for inclusion in the surveillance even if the procedure was performed as an emergency, or if it was not the original, or main reason for surgery, for example, abdominal hysterectomy performed due to complications during an explorative laparotomy.

2.2.5 Exclusion of certain procedures

The following procedures are excluded from the surveillance:

a. Procedures not included in the chosen category. Check the SSI Protocol OPCS Codes Supplement for eligible procedures.
b. Procedures performed by endoscopy or laparoscopy. These procedures have a different risk of developing SSI and short length of post-operative stay. Some laparoscopic-assisted bowel, bile duct and liver and vascular procedures where part of the procedure is performed endoscopically but the procedure is completed via an incision are included (see the OPCS Supplement).
c. Procedures where primary closure of the incision is not completed in theatre (with the exception of cardiac surgery). For example, debridement, drainage of haematoma.
d. Diagnostic procedures performed in the operating theatre for example, biopsy, gastroscopy, aspiration, injection (for example, OPCS code, Spinal category V54.4), or catheterization.
e. First stage of revision of hip replacement where a spacer implant is used.

2.3 Surveillance periods

2.3.1 Eligible patients

All eligible patients must be recruited into the surveillance throughout the selected minimum 3 month period. Hospitals may choose to participate in the following periods:

1 January to 31 March
1 April to 30 June
1 July to 30 September
1 October to 31 December

For the mandatory surveillance of SSI following orthopaedic surgery, all NHS Trusts must participate in a minimum of one surveillance period in at least one category of orthopaedic procedures during a financial year. The financial year runs from 1 April in one year to 31 March in the following year, for example, 1 April 2013 to 31 March 2014.

2.3.2 Intent to participate

A hospital must indicate on the SSISS web link their intention to participate in a specific period. Data for the period cannot be entered until this is done (please refer to the web user guide).

2.3.3 Surveillance in more than one consecutive period

Surveillance in more than one consecutive period is recommended for hospitals that perform few operations in their chosen category. Hospitals may also choose to undertake continuous surveillance so that more precise rates can be estimated from a larger set of cumulative data.

If the number of operations in the chosen category is likely to be less than 10 in a surveillance period, then please discuss this with a member of the SSISS team prior to commencing surveillance.

Table 1. Categories of surgical procedures included in the surveillance

Category	Summary of surgical procedures
Abdominal hysterectomy	Excision of uterus through an abdominal incision with or without concurrent excision of ovary and/or fallopian tube.
Bile duct, liver, or pancreatic surgery	Operative procedures on the bile duct, gall bladder, liver or pancreas, excluding cholecystectomy without exploration of the bile duct and biopsy of lesions.
Breast surgery	Breast reconstruction, mammoplasty, excision of lesion, tissue or breast including radical, modified, or quadrant resection, lumpectomy, incisional biopsy.
Cardiac surgery (non -CABG)	Open chest procedures on valves or septum of heart; excludes coronary artery bypass graft, surgery on vessels, heart transplantation, or pacemaker implantation.
Cranial surgery	Incision through the skull to excise, repair, or explore the brain, excludes taps or punctures.
Cholecystectomy (non-laparoscopic)	Partial or total excision of the gall bladder, excluding laparoscopic approach and procedures involving exploration of the bile duct.
Coronary artery bypass graft	Open chest procedure to perform direct revascularization of heart, for example, using a vein graft.
Gastric surgery	Incision, excision or anastomosis of stomach, including partial or total gastrectomy, vagotomy, pyloromyotomy, pyloroplasty and gastroenterostomy.
Hip replacement	Replacement of the hip joint including resurfacing of the joint, acetabulum replacement and revision of a previous replacement and conversion from a previous hemiarthroplasty or bone fixation.
Knee replacement	Replacement of all or part of knee joint (with or without patella resurfacing), including revision of a previous replacement. Excludes patella replacement.
Large bowel surgery	Incision, excision or anastomosis of the large bowel, including procedures which involve anastomosis of small to large bowel.
Limb amputation	Total or partial amputation or disarticulation of the upper or lower limbs, including digits
Reduction of long bone fracture	Open or closed reduction of fracture of long bones requiring surgical incision to apply internal or external fixation. Excludes replacement or open fixation of hip fracture, of small bones or intraarticular fracture.

Category	Summary of surgical procedures
Repair of neck of femur	Replacement of the head of femur, including revision of a previous hemiarthoplasty (but excluding conversion to total joint replacement) and reduction of a fractured neck of femur using open fixation, for example, dynamic hip screw.
Small bowel surgery	Incision, excision or anastomosis of small intestine, excluding procedures which involve anastomosis of small to large bowel.
Spinal surgery	Surgical procedures on the vertebral structures of the spine including the exploration or decompression of the spinal cord, the removal or resection of intervertebral discs, spinal fusion; and repair of fractures or deformities.
Vascular surgery	Operative procedure involving arteries or veins includes aortic aneurysm repair, vascular grafts, and carotid, iliac, femoral or popliteal artery operations. Excludes varicose vein repair, creation of arterial shunts, coronary artery bypass graft, or procedures involving the pulmonary artery.

See SSI Protocol OPCS Codes Supplement for detailed lists of eligible procedure codes.

2.4 Ensuring all eligible patients are included in the surveillance

2.4.1 Categories of surgical procedure

Once the category or categories of surgical procedure that are intended to be included in the surveillance have been selected, refer to the SSI Protocol OPCS Codes Supplement to ensure that all relevant procedures are identified and included in the surveillance.

2.4.2 Data on eligible procedures

Data should be collected on each eligible procedure and this should commence as soon after the operation as possible. Although operating theatre computer systems may provide a list of eligible operations these must be available immediately after the procedure has been performed to ensure active follow up of patients for SSI.

2.4.3 Multiple sources of data

More than one source of data may need to be reviewed on a daily basis to ensure that all eligible procedures are included in the surveillance, for example, operating theatre records, emergency theatres, ward operating and admission lists.

2.5 Collecting the surveillance dataset

2.5.1 Demographic and operation data

The standard set of demographic and operation data should be completed for each procedure included in the surveillance. These data items are defined in Section 5 and staff collecting the data should refer to this to ensure accuracy and completeness of data.

2.5.2 Surveillance data sheets

These provide a paper copy of the data items required for the surveillance together with space to record the patient's name, NHS number, and ward details to aid their follow-up. The data for each patient included in the surveillance should initially be collected onto one of these forms.

A copy can be obtained via the SSISS web link for local printing and they can be adapted for local use if required. Three data sheets are available, one for joint replacement procedures (hip and knee replacements; repair of neck of femur), one for cardiac (non-CABG) and the third for all other categories (see Appendix 1, Appendix 2 and Appendix 3).

2.5.3 Bilateral procedure

If a patient has a bilateral procedure, for example bilateral knee replacement or bilateral breast surgery, a separate form must be completed for each procedure.

2.5.4 Documentation from theatre staff

Theatre staff should be encouraged to document important information for retrieval from patient records notes or theatre computer systems. They may also be able to contribute to the collection of demographic and operation data provided they are trained in the definitions of the data items for example, incision to closure time, discuss ASA score with anaesthetist.

2.5.5 Linking to post-discharge surveillance data

When the patient is discharged, systems must be in place to ensure that the Surveillance Data Sheet can be linked to post-discharge surveillance data. A completed patient wound healing questionnaire (see Appendix 5) if available, should be attached to the original data sheet matched by name and serial number and any patient reported and confirmed SSI added to the record on the web link.

2.5.6 Late completion of patient questionnaires

Late completion of the patient questionnaire may result in recall issues for the patient. Pursuing late questionnaires is resource intensive, therefore it should be decided locally how many attempts should be made to recover questionnaires or complete questionnaires over the telephone such that data reconciliation and availability of reports on the data are not delayed.

However, at least 70% of operations should have post-discharge questionnaires recovered to gain a good indication of the burden of SSIs occurring post-discharge.

2.6 Methods for finding cases of SSI

2.6.1 Review of patients to locate cases of SSI

Review of patients to find cases of SSI should start as soon after the date of surgery as possible. Finding cases of SSI requires designated staff who have been trained in applying the surveillance methods and definitions of SSI to ensure that the sensitivity of case-finding is high and consistent with other participating hospitals.

2.6.2 Active, systematic follow-up

Every patient included in the surveillance should be actively and systematically followed up from the time of surgery to establish whether they develop signs and symptoms that meet the definition of SSI (see Section 3). This includes monitoring during the post-operative hospital stay, on readmission or any other return visit to the hospital, for example, outpatient clinic. SSI may also be reported by the patient in a post-discharge questionnaire. These methods are detailed in Box 1.

2.6.3 Post discharge surveillance methods

The post discharge surveillance methods will provide more complete data on SSIs that occur post-discharge but these infections will not be included with those detected in inpatients or readmissions when reporting comparative rates of SSI. Rates based on patient reported SSI will be analysed separately because they use different criteria and it is not possible to determine the type of SSI.

Rates based on other post discharge follow-up, which can be confirmed as meeting the definition of SSI, will also be analysed separately since follow-up and reporting using these methods are unlikely to be consistent across all participating hospitals.

2.6.4 Recording on symptoms of SSI

Notes on any signs or symptoms of SSI should be recorded on the Surveillance Data Sheet at each review as this may be required to confirm how the SSI was defined.

2.6.5 Follow-up period

This is the maximum period of follow-up depends on whether the surgical procedure involved the insertion of an implant.

No implant inserted

surveillance for SSI should be stopped on the 30th day after the operation (since an infection that develops after the 30 days would not meet the definition of SSI, see Section 3).

Implant inserted

A deep incisional or organ/space SSI may meet the definition of SSI for up to 1 year after the operation. Surveillance should therefore be continued for the duration of the patients' post-operative stay.

If a patient with an implant is still in hospital more than 60 days after the end of a surveillance period, submit the record for the correct surveillance period (ie based on the date of operation) and continue to monitor for SSI until discharge.

If a deep or organ space SSI occurs up to a year following the date of operation, the SSI can still be reported to SSISS, for example, if the patient is readmitted with an infection in the joint following hip replacement. If an SSI is detected after data submission this should be recorded and a request sent to the SSISS team for the infection to be added.

Superficial incisional infections should be reported only if they occur within the first 30 days after operation.

If the patient is given a post-discharge patient questionnaire it should still be completed at 30 days after the operation and returned promptly.

2.6.6 Identifying SSIs which meet the definitions of infections

The identification of SSIs that meet the definitions of infection can be facilitated by the following measures:

- encourage medical and nursing staff to clearly document the clinical symptoms of SSI they observe both in case notes and on laboratory request forms
- encourage medical staff to write a diagnosis of SSI in the case notes
- develop clear guidance for staff on when a wound swab should be taken: there should be some signs of infection, for example, discharging pus, redness, swelling, heat, pain
- microbiology results should be interpreted in conjunction with clinical information. Advice from a Medical Microbiologist should be sought if there is doubt about the interpretation of a result. A positive microbiology report is not a clear indication of infection. The result must also indicate the presence of pus cells or there should be other clinical signs of an infection (see Section 3)

Please contact the SSI Surveillance Manager at UKHSA if there are any doubts regarding the criteria for identifying SSI.

Box 1. Methods of surveillance to identify SSI

1. Follow-up of patients during the inpatient stay (required)

From the day after surgery until the patient is discharged from hospital designated staff trained to undertake the surveillance should actively and systematically monitor each patient for signs of infection using the following methods:

a) Liaise with ward staff and review medical and nursing records, temperature and treatment charts at least 3 times a week to identify signs and symptoms that may indicate an SSI.

b) Regularly review microbiology reports to find any positive surgical site cultures from patients in the study population and check with the ward why the cultures were taken and if there are clinical signs of infection.

Information obtained from this systematic review should be used to determine whether any of the criteria defining a surgical site infection have been met (see Section 3).

2. Detecting SSI in patients readmitted to hospital (required)

Systems must be in place to identify patients included in the surveillance that are subsequently readmitted with SSI. These must meet the criteria for SSI and be reported as 'SSI detected at readmission'. These are likely to include the more severe deep and organ/space SSI. These infections will be included with the SSI detected during the admission when calculating rates of SSI.

The following measures should be used to ensure that patients included in the surveillance that are readmitted are identified:

1. Wards most likely to receive patients readmitted with SSI: patients with SSI may not be readmitted to the same ward they were discharged from. Wards that could accept such readmissions should be identified and contacted regularly to ask about patients readmitted with SSI. The staff working on them should be made aware of the surveillance, and asked to document clinical signs of SSI and report them to designated surveillance personnel.

2. Patient Administration Systems: establish systems to alert designated surveillance staff if a patient included in the surveillance is readmitted.

3. Medical notes: could be flagged to prompt reporting to designated surveillance staff if the patient is readmitted with an SSI.

4. Accident and Emergency: staff working in A&E should be made aware of the surveillance and asked to document clinical signs of SSI and report them to designated surveillance

personnel. Reminder notices could be placed in the A&E triage area to remind staff to report possible SSI.

5. Bed managers: should be made aware of the surveillance and asked to inform designated surveillance staff about patients readmitted following surgery.

If a patient is admitted with an SSI resulting from an operation performed in another hospital the surveillance co-ordinator should liaise with surveillance staff at the hospital in which the procedure took place so that they can report the infection to SSISS.

SSI detected by healthcare professional during systematic post discharge follow up (optional)

Surveillance staff trained in applying definitions follow-up patients with SSI detected using these methods to confirm the SSI meets the definitions and this should be reported as detected by 'other post discharge follow up'. SSI may be detected and confirmed as meeting the definition of SSI by the following methods:

Method A: Patient returns to hospital if they have a problem with their wound

All patients discharged before 30 days will be given details of a key person to contact if they have concerns about their wound. If the patient makes contact, arrangements should be made for the wound to be reviewed by the hospital. A drop-in clinic could be established to facilitate this.

Method B: Patient reviewed at outpatient clinic (OPC)

All patients included in the surveillance attend OPC after their operation and this provides an opportunity to review their wound for SSI. Clinicians should be provided with standard definitions and they should clearly indicate symptoms on a standard report form (Appendix 4).

The form should be completed whether or not an SSI is detected and indicate that the patient was part of a systematic post-discharge surveillance programme.

Method C: Systematic review by community-based trained healthcare professional (HCP)

Where a Bridging Team or Homecare Team visit all post-operative patients in their own home. They should be trained to apply the standard definitions and clearly indicate symptoms on a standard report form (Appendix 4). The form should be completed whether or not an SSI is detected and indicate that the patient was part of a systematic post-discharge surveillance programme.

Note: If a hospital or community-based HCP notifies surveillance staff of an SSI on an ad hoc basis, and the SSI can be confirmed as meeting the case definitions, it can be reported as an SSI detected by other post-discharge follow up.

SSI reported by systematic patient post-discharge wound healing questionnaire (PDQ, optional)

To obtain more complete data on SSI that develop post-discharge, patients can be asked to report problems with the healing of their wound 30 days after the operation (see post-discharge wound healing questionnaire - Appendix 5) using one of the following methods:

On discharge, all patients who are discharged before 30 days should be given a copy of the PDQ and the details of designated staff to contact if they are readmitted, or an SSI is suspected. The 30th post-op date and patient details must be written on the questionnaire and a pre-paid addressed envelope should be provided to encourage return. Patients who do not return the questionnaire should be followed-up by letter or telephone.

Designated staff telephone patients on or soon after their 30th post-operative day and ask them the set of questions on the PDQ. Patients will need to be informed on discharge that they will be contacted following their operation to find out if their wound has healed satisfactorily.

If the responses in the questionnaire are indicative of an SSI, the patient should be contacted by surveillance staff to confirm the symptoms and record as SSI if one of the criteria for patient reported SSI are met (see Appendix 5).

If a healthcare professional, for example, GP, practice or district nurse, have examined the wound they should be contacted to confirm the symptoms of SSI and check that any antibiotics given were prescribed for the SSI

If a wound swab was taken, the result should be pursued.

SSIs that are detected as a result of PDQ (even if evidence for an SSI is also obtained by contacting the GP or other community HCP) should be recorded as ‘patient reported’.
If an SSI reported by the patient has also been identified and confirmed by another method (methods 1, 2 or 3) only the confirmed SSI should be recorded as detected ‘during admission’ or ‘at readmission’ or ‘other post discharge’ method and not as patient reported.

2.7 Data submission

2.7.1 Records are submitted to SSISS via a secure web link

Records are submitted to SSISS via a secure web link. A user manual to guide data entry is available from the web link. A unique user name and password is issued to each participating hospital to enable them to access the web link. Data should be entered using Microsoft Internet Explorer™ versions 6,7 or 8.

2.7.2 Data form entry corresponding with surveillance data sheet

Data are entered into a form that corresponds with the Surveillance Data Sheet. Error messages indicate when required data items have not been entered or the data entered are inconsistent or unusual (see Section 5.7).

2.7.3 Records retrieval

Records can be saved and retrieved for editing, for example until the data from post-discharge surveillance has been obtained. These will appear on the web link as records 'in progress'. Once the record has been completed it must be 'submitted'. Changes to the record can then only be made by contacting SSISS.

2.7.4 Unique serial number

The unique serial number generated on each record entered into the web link should be entered onto the Surveillance Data Sheet in the space provided. This number will be required to deal with any future queries about the record. Please note patients' names and NHS numbers should not be included in any correspondence with the SSISS, as these are not routinely accessible to the SSISS administrative staff.

2.7.5. Data submission within 60 days

All data for a surveillance period must be submitted within 60 days of the end of the period. A message indicating the submission deadline will be displayed on the web link when the user logs on (see Table 2).

2.7.6 Un-submit record button

An un-submit record button has been added to the summary (read only) mode of a record in progress. It is only available prior to reconciliation for you to make final edits to a record. If you need to make a change to a submitted record, for example, to add an SSI, you will need to contact SSISS who will make any necessary changes on your behalf.

2.8 Batch submission of data held in local database (CSV file)

2.8.1 Hospitals data collection systems

Hospitals who have their own data collection systems and database capable of storing data required for the SSI surveillance can submit the set of records via the web link as a CSV file.

2.8.2. Data format to correspond with national database

The format of the data submitted will need to correspond with that of the national database and arrangements with the co-ordinating centre will therefore need to be made before data can be transferred in this way.

2.8.3 CSV files and unique serial numbers

Hospitals submitting data as CSV files must ensure that each record submitted to SSISS is given a unique Serial Number in the form of a long integer value. The set of data is imported into the web link and appear as 'in progress' until errors are corrected from individual records. Each record is then submitted separately. Instructions on how to reconcile CSV imported data will be provided by SSISS.

2.9 Data reconciliation

2.9.1 Message logged after 4 weeks

Approximately 4 weeks after the end of each surveillance period a message will appear on the 'log on' page of the web link requesting that data for the surveillance period is 'reconciled'. This can only be done once all the records for all the categories under surveillance during the surveillance period have been submitted.

Table 2. The annual surveillance schedule

Period start (start including eligible patients)	Period end (stop including eligible patients)	Reconcile data (check all records and all data entered)	Data must have been submitted and reconciled
1 January	31 March	15 May	30 June
1 April	30 June	15 August	30 September
1 July	30 September	15 November	31 December
1 October	31 December	15 February	31 March

2.9.2 Matching total number of records collected to reconciliation form number

To complete the reconciliation the number of Surveillance Data Sheets and SSIs should be carefully counted to confirm that the total number of records collected match the number shown in the reconciliation form. If the records match, then data reconciliation can be confirmed via the web link.

2.9.3 When the total numbers do not agree

If numbers do not agree, the following checks should be made:

1. Re-count the data sheets and records with SSI, check whether the SSI was detected during admission, on readmission, other post-discharge or patient reported.
2. Ensure records for different categories have not been miscounted or submitted into the wrong category.
3. If data is entered for more than one hospital site check that the hospital codes are correct.
4. If there are more records in the database than Surveillance Data Sheets the same record may have been entered twice. Check for duplicates by reviewing the data submitted for records with the same name, date of birth and operation date.

2.9.4 Completion of reconciliation

Once the reconciliation has been completed the SSISS team will activate your reports and a message will appear on the 'log on' page of the web link indicating that the 'summary data report' for your hospital is ready for printing. You will then be able to run reports on the data you have collected for this period from the web link (see Figure 2).

Figures in the reports may be subject to change following the validation of records by the SSISS team.

2.10 Data validation

2.10.1 Validation of submitted data

Once all hospitals have reconciled their data, the SSISS staff will undertake a validation of submitted data to ensure it is complete and accurate.

2.10.2 Warning messages generated

Any records that have generated 'warning' messages will be cleared if appropriate comments have been entered into the text box at the bottom of the data entry page.

Please enter a comment for each query in the comment box, for example, 'the operation duration of 250 minutes is correct, it was a complex procedure' and 'date of birth 12 January 1998 is correct'.

2.10.3 Checking for missing data

Records will also be checked for missing data that are not detected in the automated error checking performed by the database software.

2.10.4 Outstanding errors in serial numbers

Any serial numbers with outstanding errors will be sent by email to the hospital main contact and any corrections will be made by SSISS staff.

2.11 Data sharing and publication

2.11.1 Data sharing at end of surveillance period

At the end of each surveillance period, aggregate SSI data are shared with health protection staff at local UKHSA Centres. Anonymised data are also sent annually to the European Centre for Disease Prevention and Control (ECDC). ECDC collates surveillance data on key infectious diseases including nosocomial infections from member states across Europe.

All member states contributing data for the SSI module follow a standard protocol to ensure consistency in reporting across all participating hospitals (28). The publication of comparative analyses including trends provides an important opportunity to examine the variation in SSI incidence between European countries and to improve our understanding of how these infections may be prevented. Only a limited part of the dataset is used and this does not include any information that enables records to be traced back to individual patients, surgeons or named hospitals.

2.11.2 Data published in annual reports

Data collected as part of the SSISS is published by UKHSA in annual reports available on the UKHSA web site. Individual hospitals' SSI surveillance data is not published or shared by UKHSA with the exception of that collected as part of the Department of Health's mandatory surveillance scheme (orthopaedic surgery), published on the UKHSA web site, or where a Trust has given permission for the data to be shared.

Aggregate (pooled) SSI surveillance data are also analysed and presented at scientific meetings and published in peer-review journals by the SSI team.

Section 3. Definitions of surgical site infections

3.1 Classification of surgical site infections

3.1.1 Definitions of surgical site infections

Definitions of surgical site infections are based on those published by CDC in 1992, and are classified as incisional (superficial or deep), or organ/space infection (29).

3.1.2 Superficial incisional infection

This is defined as a surgical site infection that occurs within 30 days of surgery and involves only the skin or subcutaneous tissue of the incision, and meets at least one of the following criteria:

Criterion 1: Purulent drainage from the superficial incision.

Criterion 2: The superficial incision yields organisms from the culture of aseptically aspirated fluid or tissue, or from a swab and pus cells are present.

Criterion 3: At least 2 of the following symptoms and signs:

- pain or tenderness
- localised swelling
- redness
- heat

and a) the superficial incision is deliberately opened by a surgeon to manage the infection, unless the incision is culture-negative
or b) the clinician diagnoses a superficial incisional infection

Note: Stitch abscesses are defined as minimal inflammation and discharge confined to the points of suture penetration, and localised infection around a stab wound. They are not classified as surgical site infections.

3.1.3 Deep incisional infection

This is defined as a surgical site infection involving the deep tissues (that is, fascial and muscle layers) that occurs within 30 days of surgery if no implant is in place, or within a year if an implant is in place and the infection appears to be related to the surgical procedure, and meets at least one of the following criteria:

Criterion 1: Purulent drainage from the deep incision but not from the organ/space component of the surgical site.

Criterion 2: The deep incision yields organisms from the culture of aseptically aspirated fluid or tissue, or from a swab and pus cells are present.

Criterion 3: A deep incision that spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following symptoms or signs (unless the incision is culture-negative):

- fever (greater than 38^{o}C)
- localized pain or tenderness

Criterion 4: An abscess or other evidence of infection involving the deep incision that is found by direct examination during re-operation, or by histopathological or radiological examination.

Criterion 5: Diagnosis of a deep incisional surgical site infection by an attending clinician.

Note:An infection involving both superficial and deep incision is classified as deep incisional SSI unless there are different organisms present at each site.

Organ/space infection: this is defined as a surgical site infection involving any part of the anatomy (that is, organ/space), other than the incision, opened or manipulated during the surgical procedure, that occurs within 30 days of surgery if no implant is in place, or within one year if an implant is in place and the infection appears to be related to the surgical procedure, and meets at least one of the following criteria:

Criterion 1: Purulent drainage from a drain that is placed through a stab wound into the organ/space.

Criterion 2: The organ/space yields organisms from the culture of aseptically aspirated fluid or tissue, or from a swab and pus cells are present.

Criterion 3: An abscess or other evidence of infection involving the organ/space that is found by direct examination, during re-operation, or by histopathological or radiological examination.

Criterion 4: Diagnosis of an organ/space infection by an attending clinician.

Notes

1. Occasionally, an organ/space infection drains through the incision. Such infection generally does not require re-operation and is considered to be a complication of the incision, and is therefore classified as a deep incisional infection.
2. Where doubt exists, refer to the Definitions of specific site of organ/space infection to determine if the organ/space infection meets the definition

The organ/space infection should be allocated to one of the specific sites in the following list:

- arterial or venous
- bone (osteomyelitis)
- breast abscess or mastitis
- endocardium (endocarditis)
- female genital tract (not vaginal cuff)
- includes vagina, uterus, ovaries, or other deep pelvic tissue
- gastrointestinal tract - includes oesophagus, stomach, small and large bowel and rectum (excluding appendicitis and gastroenteritis.
- intra-abdominal - includes peritoneum, sub-phrenic or sub-diaphragmatic space, gall bladder, bile duct, liver (excluding hepatitis), spleen, pancreas, or other intra-abdominal tissue or area not specified elsewhere
- intracranial abscess
- joint or bursa
- mediastinum (mediastinitis)
- meninges (meningitis)
- myocardium or pericardium (myocarditis or pericarditis)
- spinal abscess (without meningitis)
- vaginal cuff
- vertebral disc space

See section 3.4 for the criteria used to define the organ/space infection at each specific site.

3.2 Definitions applied to patient reported SSI

3.2.1 Patient reported SSI

Since patient reported SSI can only be confirmed through discussion of the symptoms and treatment with the patient, and where possible other healthcare professionals who have seen the wound, the surveillance coordinator will need to interpret the answers given by the patient on the post-discharge questionnaire to assess whether what the patient described and/or the treatment they were given was indicative of SSI.

Modified criteria for patient reported SSI should therefore be applied as follows:

Criterion 1 Discharge pus AND antibiotics prescribed

Criterion 2 Clinical signs* AND dehiscence

Criterion 3 Clinical signs* AND antibiotics prescribed

* Clinical signs – at least 2 of the following must be present: pain, heat, redness or swelling.

3.2.2 Applying criteria with patient reported SSI

The criteria that apply should be entered with the Patient Reported SSI but a type of SSI is not recorded (since without a clinician's review of the wound, this cannot be determined).

3.3 Notes on the application of definitions of surgical site infections

3.3.1 Clinician's diagnosis

These should be carefully evaluated before being accepted as meeting the definition of SSI (29). The prescription of antimicrobials would not be sufficient evidence of a clinician's diagnosis of SSI without confirmation that an SSI was the reason for treatment (30). If the reason for antimicrobial treatment has not been documented the surveillance staff should discuss the case with the medical staff.

A clinician's diagnosis can be confirmed verbally if it is not documented in the notes but to meet the definition of superficial SSI there must also be at least 2 clinical signs of infection.

For the purpose of this surveillance, a GP's diagnosis of a surgical site infection is not considered as a clinician's diagnosis as the SSI cannot be directly confirmed as meeting the case definition.

3.3.2 Micro-organisms from culture

A positive culture does not necessarily imply infection and a negative result may not necessarily exclude infection. Microbiology results should be interpreted in conjunction with the information from clinical sources and advice from a medical microbiologist should be sought if there is doubt about the interpretation of a result.

The presence of pus cells in wound culture is required to avoid the inclusion of positive cultures that reflect colonization rather than infection of the wound. Not all laboratories look for pus cells when examining wound swabs. Micro-organisms reported from wound cultures are not necessarily indicative of SSI and if pus cells are not indicated as present in the wound culture report there must also be at least 2 clinical symptoms of infection and a clinician's diagnosis.

3.3.3 More than one SSI from the same incision

Occasionally, more than one surgical site infection (which meets one of the definitions) may occur from the same surgical procedure. This should only be considered as a different infection when a specimen, obtained from the same wound, yields organisms that are unrelated to the previous infection.

If a superficial SSI progresses into a deep SSI, report the deep SSI only. It may be possible for a patient to have an organ/space SSI in addition to a SSI affecting the incision (superficial or deep) but if more than one SSI is reported each must meet the case definition.

3.3.4 Case-finding

The steps required to select the study population and to identify patients with surgical site infection are described below.

a) From Table 1 choose one or more categories of surgical procedures to be included in the surveillance. The category is selected when entering a record and thus a serial number is assigned to a category.

b) All patients undergoing any of the eligible surgical procedures in your chosen categories must be included otherwise rates will not be comparable between hospitals.

For patients undergoing more than one surgical procedure during the same operation, only those procedures that fall into your chosen categories of surveillance should be included (complete list is shown in Appendix 1).

For example, if your chosen category is a large bowel surgery and a patient with a traumatic stab wound undergoes total gastrectomy and partial colectomy only include the large bowel procedure (colectomy) in the surveillance.

3.3.5 Documentation of clinical signs of infection

Information about the presence of clinical signs is essential to establish if SSI meet the definitions. Encourage medical and nursing staff to document clear, specific information about surgical wounds and any signs of SSI they observe on care plans, microbiology request forms and medical notes.

For example, ‘yellow or green pus leaking from the upper section of the wound’ rather than ‘wound leaking ++’.

3.4 Specific sites of organ/space surgical site infection

Definitions of specific sites of organ/space surgical site infection are based on those used by Centers for Disease Control and Preventions' National Healthcare Safety Network, USA (29).

3.4.1 Arterial or venous infection

Arterial or venous infection, including arteriovenous graft, must meet at least one of the following criteria:

Criterion 1: Organisms are cultured from arteries or veins removed during a surgical operation, and blood culture yielded no organisms or was not done.

Criterion 2: There is evidence of arterial or venous infection during a surgical operation or on histopathological examination.

Criterion 3: The patient has purulent drainage at the vascular site and blood cultures yielded no organisms or were not done.

3.4.2 Breast abscess or mastitis

A breast abscess or mastitis must meet at least one of the following criteria:

Criterion 1: Patient has a positive culture of affected breast tissue or fluid obtained by incision and drainage or needle aspiration.

Criterion 2: Patient has a breast abscess or other evidence of infection seen during a surgical operation or histopathologic examination.

Criterion 3: Patient has fever (>38°C) and local inflammation of the breast

and

physician diagnosis of breast abscess

3.4.3 Endocarditis

This includes endocarditis of a natural or prosthetic heart valve, and must meet at least one of the following criteria:

Criterion 1: Organisms are cultured from valve or vegetation.

Criterion 2: The patient has 2 or more of the following signs or symptoms with no other recognised cause: fever (>38°C), new or changing murmur, embolic phenomena, skin manifestations (that is, petechiae, splinter haemorrhages, painful subcutaneous nodules), congestive heart failure, or cardiac conduction abnormality,* and at least one of the following:

a. organisms cultured from 2 or more blood cultures
b. organisms seen on Gram stain of valve, when blood cultures were negative or not done
c. valvular vegetation seen during a surgical operation or autopsy
d. positive antigen test on blood or urine (for example, *H. influenzae, S. pneumoniae, N. meningitidis*, or group B streptococci)
e. evidence of new vegetation seen on echocardiogram

and if the diagnosis is made antemortem, the physician institutes appropriate antimicrobial therapy.

* For patients ≤1 year of age at least 2 of the following signs or symptoms with no other recognised cause: fever (>38°C), hypothermia (<37°C), apnoea, bradycardia, new or changing murmur, embolic phenomena, skin manifestations (ie petechiae, splinter haemorrhages, painful subcutaneous nodules), congestive heart failure, or cardiac conduction abnormality.

3.4.4 Female genital tract (not vaginal cuff)

Other infections of the female reproductive tract including vagina, ovaries, uterus or other deep pelvic tissues (excluding endometritis or vaginal cuff infections), must meet at least one of the following criteria:

Criterion 1: Organisms are cultured from tissue or fluid from affected site.

Criterion 2: There is an abscess or other evidence of infection of affected site seen during a surgical operation or histopathological examination.

Criterion 3: The patient has 2 of the following signs or symptoms with no other recognised cause: fever (>38°C), nausea, vomiting, pain, tenderness, or dysuria, and at least one of the following:

a. organisms cultured from blood
b. diagnosis by physician

3.4.5 Gastrointestinal tract infection

This includes oesophagus, stomach, small and large bowel, and rectum (excluding gastroenteritis and appendicitis), and must meet at least one of the following criteria:

Criterion 1: There is an abscess or other evidence of infection seen during a surgical operation or on histopathological examination.

Criterion 2: Patient has at least 2 of the following signs or symptoms with no other recognised cause and compatible with infection of the organ or tissue involved: fever (>38°C), nausea, vomiting, abdominal pain, or tenderness, and at least one of the following:

a. organisms cultured from drainage or tissue obtained during a surgical operation or endoscopy, or from a surgically placed drain
b. organisms seen on Gram stain or multinucleated giant cells seen on microscopic examination of drainage or tissue obtained during a surgical operation or endoscopy or from a surgically placed drain
c. organisms cultured from blood

d. evidence of pathological findings on radiological examination
e. evidence of pathological findings on endoscopic examination (for example, Candida oesophagitis or proctitis)

3.4.6 Intra-abdominal infection

This includes gall bladder, bile ducts, liver (excluding viral hepatitis), spleen, pancreas, peritoneum, sub-phrenic or sub-diaphragmatic space, or other intra-abdominal tissue or area not specified elsewhere, and must meet at least one of the following criteria:

Criterion 1: Organisms are cultured from purulent material from intra-abdominal space obtained during a surgical operation or needle aspiration.

Criterion 2: There is an abscess or other evidence of intra-abdominal infection during a surgical operation or on histopathological examination.

Criterion 3: The patient has at least 2 of the following signs or symptoms with no other recognised cause: fever (>38°C), nausea, vomiting, abdominal pain, or jaundice, and at least one of the following:

a. organisms cultured from drainage from surgically placed drain (for example, closed suction drainage system, open drain, T-tube drain)
b. organisms seen on Gram stain of drainage or tissue obtained during surgical operation or needle aspiration
c. organisms cultured from blood and radiographic evidence of infection, for example, abnormal findings on ultrasound, CT scan, magnetic resonance imaging (MRI), or radiolabelled scans (gallium, technetium and so on) or on abdominal x-ray

3.4.7 Intra-cranial infection

Intracranial infection must meet at least one of the following criteria:

Criterion 1: Patient has organisms cultured from brain tissue or dura.

Criterion 2: Patient has an abscess or evidence of intracranial infection seen during a surgical operation or histopathologic examination.

Criterion 3: Patient has at least 2 of the following signs or symptoms with no other recognized cause: headache, dizziness, fever (>38°C), localizing neurologic signs, changing level of consciousness, or confusion at least one of the following:

a. organisms seen on microscopic examination of brain or abscess tissue obtained by needle aspiration or by biopsy during a surgical operation or autopsy
b. positive antigen test on blood or urine

c. radiographic evidence of infection, (for example, abnormal findings on ultrasound, CT scan, MRI, radionuclide brain scan, or arteriogram)
d. diagnostic single antibody titre (IgM) or 4-fold increase in paired sera (IgG) for pathogen

and

if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

Criterion 4: Patient ≤1 year of age has at least 2 of the following signs or symptoms with no other recognized cause: fever (> 38°C rectal), hypothermia (< 37°C rectal), apnea, bradycardia, localizing neurologic signs, or changing level of consciousness and at least **one** of the following:

a. organisms seen on microscopic examination of brain or abscess tissue obtained by needle aspiration or by biopsy during a surgical operation or autopsy
b. positive antigen test on blood or urine
c. radiographic evidence of infection, (eg, abnormal findings on ultrasound, CT scan, MRI, radionuclide brain scan, or arteriogram)
d. diagnostic single antibody titre (IgM) or 4-fold increase in paired sera (IgG) for pathogen

and

e. if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

3.4.9 Joint or bursa infection

Joint or bursa infections must meet at least one of the following criteria:

Criterion 1: Organisms are cultured from joint fluid or synovial biopsy.

Criterion 2: There is evidence of joint or bursa infection seen during a surgical operation or histopathological examination.

Criterion 3: The patient has at least 2 of the following signs or symptoms with no other recognised cause: joint pain, swelling, tenderness, heat, evidence of effusion or limitation of motion, and at least one of the following:

a. organisms and white blood cells seen on Gram stain of joint fluid
b. positive antigen test on blood, urine, or joint fluid
c. cellular profile and chemistry of joint fluid compatible with infection and not explained by an underlying rheumatological disorder
d. radiographic evidence of infection, for example, abnormal findings on x-ray, CT scan, magnetic resonance imaging (MRI), radiolabelled scan (gallium, technetium and so on)

3.4.9 Mediastinitis

Mediastinitis must meet at least one of the following criteria:

Criterion 1: Organisms are cultured from mediastinal tissue or fluid obtained during a surgical operation or needle aspiration.

Criterion 2: There is evidence of mediastinitis seen during a surgical operation or histopathological examination.

Criterion 3: The patient has at least one of the following signs or symptoms with no other recognised cause: fever (>38°C), chest pain, or sternal instability,* and at least one of the following:

a. purulent discharge from mediastinal area
b. organisms cultured from blood or discharge from mediastinal area
c. mediastinal widening on x-ray

* For patients ≤ 1 year of age at least one of the following signs or symptoms with no other recognised cause: fever (> 38° C), hypothermia (< 37° C), apnoea, bradycardia, or sternal instability.

3.4.10 Meningitis or ventriculitis

If meningitis and a brain abscess are present together, report the infection as Intracranial Meningitis or ventriculitis must meet at least 1 of the following criteria:

Criterion 1: Patient has organisms cultured from cerebrospinal fluid (CSF).

Criterion 2: Patient has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C), headache, stiff neck, meningeal signs, cranial nerve signs, or irritability

and at least 1 of the following:

a. increased white cells, elevated protein, and/ or decreased glucose in CSF
b. organisms seen on Gram's stain of CSF
c. organisms cultured from blood
d. positive antigen test of CSF, blood, or urine
e. diagnostic single antibody titre (IgM) or 4-fold increase in paired sera (IgG) for pathogen

and

if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy

Criterion 3: Patient ≤1 year of age has at least 1 of the following signs or symptoms with no other recognized cause: fever (>38°C rectal), hypothermia (<38°C rectal), apnoea, bradycardia, stiff neck, meningeal signs, cranial nerve signs, or irritability
and at least one of the following:

a. positive CSF examination with increased white cells, elevated protein, and/or decreased glucose
b. positive Gram's stain of CSF
c. organisms cultured from blood
d. positive antigen test of CSF, blood, or urine
e. diagnostic single antibody titre (IgM) or 4-fold increase in paired sera (IgG) for pathogen

and

if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

3.4.11 Myocarditis or pericarditis

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

Criterion 1: Organisms are cultured from pericardial tissue or fluid obtained by needle aspiration or during a surgical operation.

Criterion 2. The patient has at least 2 of the following signs or symptoms with no other recognised cause: fever (>38°C), chest pain, paradoxical pulse, or increased heart size,* and at least one of the following:

a. abnormal ECG consistent with myocarditis or pericarditis
b. positive antigen test on blood (for example, *H. influenzae*, *S. pneumoniae*)
c. evidence of myocarditis or pericarditis on histological examination of heart tissue
d. 4-fold rise in type-specific antibody with or without isolation of virus from pharynx or faeces
e. pericardial effusion identified by echocardiogram, CT scan, magnetic resonance imaging (MRI), or angiography

* For patients ≤ 1 year of age at least 2 of the following signs or symptoms with no other recognised cause: fever (>38°C), hypothermia (< 37°C), apnea, bradycardia, paradoxical pulse, or increased heart size.

3.4.12 Osteomyelitis

Osteomyelitis must meet at least one of the following criteria:

Criterion 1: Organisms are cultured from bone.

Criterion 2: There is evidence of osteomyelitis on direct examination of the bone during a surgical operation or histopathological examination.

Criterion 3: The patient has at least 2 of the following signs or symptoms with no other recognised cause: fever (>38°C), localised swelling, tenderness, heat, or drainage at suspected site of bone infection, and at least one of the following:

a. organisms cultured from blood
b. positive blood antigen test (for example, *H. influenzae*, *S. pneumoniae*)
c. radiographic evidence of infection, for example, abnormal findings on x-ray, CT scan, magnetic resonance imaging (MRI), radiolabel scan (gallium, technetium and so on)

3.4.13 Spinal abscess (without meningitis)

An abscess of the spinal epidural or subdural space, without involvement of the cerebrospinal fluid or adjacent bone structures, must meet at least one of the following criteria:

Criterion 1: Patient has organisms cultured from the spinal epidural or subdural space.

Criterion 2: Patient has abscess in the spinal epidural or subdural space seen during a surgical operation or at autopsy of evidence of an abscess seen during a histopathologic examination.

Criterion 3: Patient has at least one of the following signs or symptoms with no other recognised cause: fever (>38ºC), back pain, focal tenderness, radiculitis, paraparesis, or paraplegia and if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy

and at least one of the following:

a. organisms cultured from blood
b. radiographic evidence of a spinal abscess, for example, abnormal findings on myelography, ultrasound, CT scan, MRI or other scans (for example, gallium or technetium)

3.4.14 Vaginal cuff

Vaginal cuff infection must meet at least one of the following criteria:

Criterion 1: Post-hysterectomy patient has purulent drainage from the vaginal cuff.

Criterion 2: Post-hysterectomy patient has an abscess at the vaginal cuff.

Criterion 3: Post-hysterectomy patient has pathogens cultured from fluid or tissue obtained from the vaginal cuff.

3.4.15 Vertebral disc space

Vertebral disc space infection must meet at least one of the following criteria:

Criterion 1: Patient has organisms cultured from vertebral disc space tissue obtained during a surgical operation or needle aspiration.

Criterion 2: Patient has evidence of disc space infection seen during a surgical operation or histopathologic examination.

Criterion 3: Patient has fever (>38^{o}C) with no other recognised cause or pain at the involved vertebral disc space and radiographic evidence of infection, for example, abnormal findings on x-ray, CT scan, magnetic resonance imaging (MRI), radiolabel scan with gallium or technetium.

Criterion 4: Patient has fever (>38^{o}C) with no other recognised cause and pain at the involved vertebral disc space and positive antigen test on blood or urine (for example, *H. influenza, S. pneumoniae, N. meningitidis,* or group B *Streptococcus)*.

Section 4. Organising the surveillance

4.1 Introduction

4.1.1 Accuracy of data from results of surveillance

If the results of surveillance are to be of value in informing clinical practice then they must be based on accurate data. Hospitals should therefore have systems in place to ensure that:

- all eligible patients in the chosen category are identified at the time of surgery
- systematic, active surveillance for SSI is undertaken prospectively on them until they are discharged from hospital
- systems are in place to identify patients subsequently readmitted with SSI
- if post-discharge surveillance is undertaken this complies with the protocol

4.1.2 Issues with quality and reliability of data

Problems with the quality of data and reliability of the results are likely to be encountered if staff are not designated or trained to undertake the surveillance and if arrangements to cover absence of staff responsible for the surveillance are not made.

Departures from the standard methodology described in this protocol may render comparison with national benchmark rates of SSI invalid.

4.2 Registration with SSISS

4.2.1 Hospital participation in surveillance

Hospitals wishing to participate in the surveillance should be registered with the SSISS. Registered hospitals are assigned a unique number (hospital code) that is then used to distinguish the surveillance data they submit. If your hospital is already registered you should use the existing hospital code.

4.2.2 Individual hospital surveillance participation

Where an NHS Trust has more than one hospital or facility participating in the surveillance, each hospital is registered separately and allocated a separate hospital code so that the surveillance data collected at each hospital can be interpreted separately and appropriate local action taken.

4.3 Role of the Surveillance Co-ordinator or administrator

4.3.1 Surveillance co-ordinator or administrator

Each hospital should nominate a surveillance coordinator or administrator who is responsible for coordinating surveillance activity and should be identified as the 'main' contact on the web portal.

This person will act as the main point of contact with the SSISS across all categories of procedure that are included in the hospital's surveillance programme.

This person will be responsible for:

- receiving and disseminating all correspondence related to the surveillance, submitting the intention to participate and reconcile data (see section 2.9 Data reconciliation)
- acting as the point of contact for SSISS for queries arising from the data and changes in hospital contact details
- ensuring an adequate supply of data sheets are available to any other staff responsible for collecting data, and that all data are collected and submitted to the co-ordinating centre at the appropriate time and within deadline dates
- receiving post-discharge patient wound surveillance questionnaires (PDQ), co-ordinating:
    - the follow-up of non-responders
    - confirmation of SSI reported by patients
- acting as a point of contact for patients with concerns about their wounds
- being an active member of the surveillance committee.
- ensuring reports are generated from the data as required and the results are disseminated to the relevant people in the hospital

4.3.2 Monitoring the reliability and accuracy of the data

The surveillance co-ordinator or administrator should contact the SSI Surveillance Service before submitting data that they consider may be unreliable, or if unreliable data have already been submitted.

Departures from the standard methodology described in this protocol may render comparison with national benchmark rates of SSI invalid.

4.4 Report contact

4.4.1 Responsibility of report contact

Each hospital should also identify one person as a report contact. This person will be responsible for:

- receiving reports from the coordinating centre by email
- generating reports from the data as required
- ensuring reports are distributed to key staff members (remember to feedback results to ward and theatre staff)
- liaising with key staff members in interpreting results and ensuring the results are acted on as appropriate
- being an active member of the surveillance committee

Please update contact details on the web portal when there are changes in staff, in order to maintain an up-to-date contact list.

4.5 Staff designated to collect and submit data

4.5.1 Other staff involved in surveillance data collection

If staff other than the surveillance co-ordinator are involved in data collection, for example, surveillance nurses, ward staff, theatre staff, it is essential that:

- they have received training in the surveillance methodology and applying the definitions of SSI by attendance at the SSISS training day
- they are fully conversant with how the surveillance is organised in the hospital
- they have designated time to collect the data
- they work closely with the Surveillance Co-ordinator/Administrator and infection control team
- one or more of these staff should be members of the surveillance committee
- arrangements have been made to cover absence of these staff

4.5.2 Submission of data by more than one person

More than one person can submit data via the web link but contact between SSISS and the hospital should be via one person (the Surveillance Administrator) who has responsibility for co-ordinating surveillance activity across different surgical departments.

4.6 Surveillance committee or coordination group

4.6.1 Complying with standardised methodology

It is the responsibility of participating hospitals to comply with the standardised methodology set out in this protocol.
This is most likely to be achieved by planning and co-ordinating the data collection and ensuring that governance systems are in place. This can be managed by forming a Surveillance Committee to support and direct the surveillance and to establish systems for collecting the data that conform to the methodology described in this protocol.

Main responsibilities of this committee are:

- developing a planned programme of surveillance
- ensuring adequate resources have been identified to implement the planned programme of surveillance
- promoting the surveillance within the Trust
- planning and overseeing the collection and submission of data, including that required for post-discharge surveillance, and ensure effective arrangements are made to cover absence due to annual leave or sickness
- identifying and addressing training needs
- monitoring the accuracy and completeness of data collected
- reviewing, interpreting and distributing reports and results of the surveillance
- contributing to the development and monitoring of action plans for improving practice when the results of the surveillance suggest this is required

4.6.2 Membership of the surveillance committee

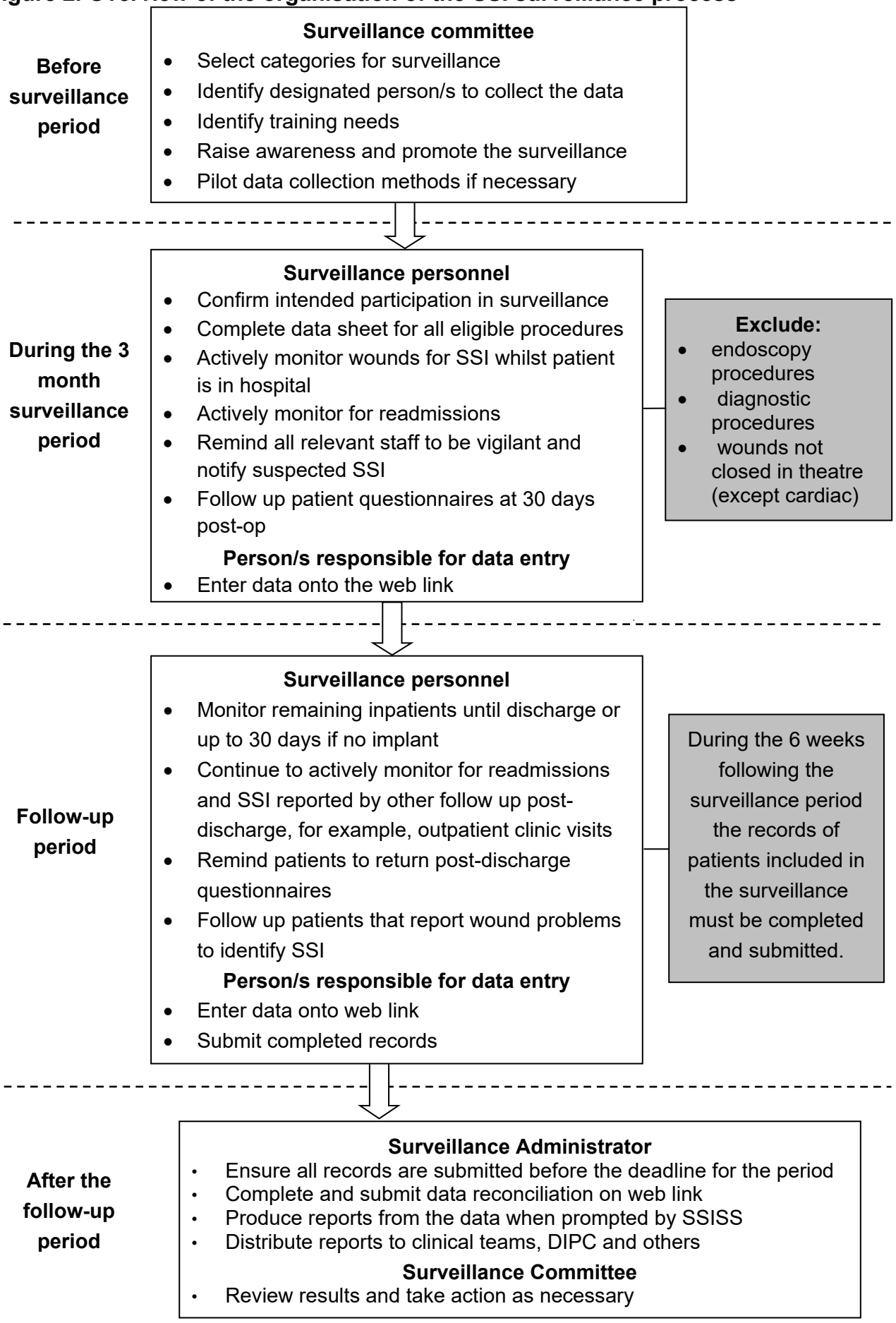
Membership of the surveillance committee should include representatives of the following main stakeholders:

- surveillance coordinator or administrator
- infection control department
- microbiologists
- clinical governance
- surgical teams (surgeons and anaesthetists)
- theatre staff (theatre manager)
- relevant hospital directorates
- Director of Infection Prevention and Control

4.6.3 Main systems and activities

The main systems and activities that need to be in place to enable the surveillance to run effectively are summarised in Figure 2.

Figure 2. Overview of the organisation of the SSI surveillance process



Accessible text equivalent of Figure 2. Overview of the organisation of the SSI surveillance process

Step 1. Before surveillance period

The surveillance committee should:

- select categories for surveillance
- identify designated person/s to collect the data
- identify training needs
- raise awareness and promote the surveillance
- pilot data collection methods if necessary

Step 2. During the 3 month surveillance period

Surveillance personnel should:

- confirm intended participation in surveillance
- complete data sheet for all eligible procedures
- actively monitor wounds for SSI whilst patient is in hospital
- actively monitor for readmissions
- remind all relevant staff to be vigilant and notify suspected SSI
- follow up patient questionnaires at 30 days post-op

Person/s responsible for data entry should:

- enter data onto the web link

Exclude:

- endoscopy procedures
- diagnostic procedures
- wounds not closed in theatre (except cardiac)

Step 3. Follow-up period

Surveillance personnel should:

- monitor remaining inpatients until discharge or up to 30 days if no implant
- continue to actively monitor for readmissions and SSI reported by other follow up post-discharge, for example, outpatient clinic visits
- remind patients to return post-discharge questionnaires
- follow up patients that report wound problems to identify SSI

Person/s responsible for data entry should:

- enter data onto web link
- submit completed records

During the 6 weeks following the surveillance period the records of patients included in the surveillance must be completed and submitted.

Step 4. After the follow-up period

Surveillance administrator should

- ensure all records are submitted before the deadline for the period
- complete and submit data reconciliation on web link
- produce reports from the data when prompted by SSISS
- distribute reports to clinical teams, DIPC and others

Surveillance committee should:

- review results and take action as necessary

If a hospital carries out surveillance in consecutive periods or continuously, these stages will overlap.

Section 5. Definition of data items

5.1 Introduction

5.1.1 Definition of questions in the surveillance dataset

This section defines each question in the surveillance dataset. Most data items are required for all categories of surgical procedures, but some only form part of the hip and knee replacement dataset and cardiac dataset.

5.1.2 Demographic and surgical data

The demographic and surgical data should be completed for all patients included in the surveillance. The infection data are only required for those patients that develop an SSI that meets the case definitions described in Section 3.

Every effort should be made to ensure all data are accurate and complete to enable inter-hospital comparisons and facilitate interpretation of results.

5.2 Demographic and surgical data

5.2.1 Patient Administration System (PAS)

These data can be obtained from the patient administration system (PAS), patients' clinical records, and theatre records. Some of the demographic data required for this surveillance also forms part of the National Joint Registry (NJR) dataset (31).

While it is not feasible to undertake SSI surveillance using the NJR dataset because this does not include data collected prospectively whilst the patient is in hospital, every effort has been made to ensure that the denominator data are compatible.

Hospitals participating in the NJR may therefore be able to explore mechanisms of sharing data.

5.2.2 Risk Index Data

A Risk Index comprising data obtained from 3 factors:

- ASA score
- wound classification
- duration of operation

is used to assign a risk score of between 0 and 3 to each operation.

Operations with a risk index score of 3 have a higher risk of developing SSI than those with a score of 0.

This score is calculated automatically on the basis of data entered and is used to stratify operations and enable rates of SSI to be adjusted by these risk factors (see Section 6).

5.2.3 Hospital code

This is a unique number that is allocated to each hospital registered with SSISS.

5.2.4 Surveillance year and period

This indicates the year and surveillance period in which the surgical procedure was performed.

5.2.5 Categories of surgical procedures

Each set of clinically similar surgical procedures has been assigned to a category. The list of categories included in the surveillance, together with a description of the category, is given in Table 1.

The incidence of surgical site infection will be primarily reported by these categories.

5.2.6 Gender

This is required to calculate the incidence of surgical site infection according to the gender of the patient.

5.2.7 Date of birth (required field)

The patient's date of birth is used to calculate age and to help identify duplicate records.

5.2.8 NHS Number

This is used by SSISS for linkage to other NHS databases. Only specific UKHSA individuals have special permission to see and use this information. NHS number is not seen by other members of the team (see section 7.1.4).

5.2.9 Date of hospital admission (required field)

This refers to the admission during which the patient had the operation, and it is required to calculate the length of pre-operative hospital stay. If the patient is re-admitted within 24 hours of discharge this will be regarded as a continuation of the previous admission.

5.2.10 Date of operation (required field)

This is required to allocate the patient to the correct surveillance period, to calculate the number of days from admission to operation, and from operation to detection of a surgical site infection.

5.2.11 Weight and height (optional fields)

If possible, the patient's weight in kilograms and the height in centimetres should be recorded.

These data will be used to determine the body mass index (BMI), defined as follows:

$$\text{BMI} = \frac{\text{Weight in kg}}{(\text{Height in m})^2}$$

That is, the body mass index is the weight in kilograms divided by the height in metres squared.

Note: although this is an optional field, we encourage its completion as it is strongly associated with risk of SSI.

5.2.12 ASA score (required field – this is used to calculate the risk index group)

The pre-operative ASA score is an assessment by the anaesthetist of the patient's pre-operative physical condition according to the American Society of Anesthesiologists' classification of physical status.

The patient's pre-operative physical condition will be scored by the anaesthetist, as indicated below. It is important that relevant anaesthetists understand the importance of clear documentation of the ASA score.

Class of condition	Description of patient's condition
Class 1	Normal healthy patient
Class 2	Patient with mild systemic disease caused either by the condition to be treated surgically or by other pathophysiological processes
Class 3	Patient with severe systemic disease that is not incapacitating
Class 4	Patient with an incapacitating systemic disease that is already life-threatening, and not always correctable by operation
Class 5	Moribund patient who has little chance of survival
Unknown	Patient whose ASA score is not available, for example, emergency operation

If a patient requires re-operation within 72 hours of the first operation due to an early complication such as bleeding, the ASA score should be re-assessed in case it has changed (see section on Early re-operation).

5.2.13 OPCS code

Each category comprises of a specific set of surgical procedures that can be included in the surveillance. These are detailed in SSI Protocol OPCS Codes Supplement with corresponding OPCS operative procedure codes. Select and enter the relevant 4 digit OPCS codes.

Only codes for procedures within the chosen category of surgical procedures need to be recorded but OPCS codes for a maximum of 3 surgical procedures can be entered.

If coding is routinely carried out by theatre staff, check that the corresponding procedure appears in SSI Protocol OPCS Code Supplement before including the patient in the surveillance.

If OPCS codes are not routinely available at your hospital, select the code that most closely matches the procedure carried out.

If a partial knee replacement has been conducted, please use a code that reflects a partial knee replacement, do not use a code for total knee replacement.

5.2.14 Primary indication for surgery (hip and knee replacements only)

Indicate the primary reason for the replacement procedure from the list provided.

Reason	Replacement procedure
Osteoarthritis	Impaired function of joint due to disease of joint cartilage
Inflammatory joint disease	Degenerative disease of joint caused by inflammatory processes
Avascular necrosis	Degradation of the joint as a result of impaired blood supply
Trauma/fracture	Replacement required because of a fracture at or close to the joint
Revision due to infection	Previous prosthetic joint replaced because of infection
Revision for fracture	Previous prosthetic joint replaced because of a fracture
Revision for other reason	Previous prosthetic joint replaced for other reasons, for example, aseptic loosening, misalignment
Other	Primary reason for procedure has been stated, however it is not in above list
Unknown	Primary reason for procedure unknown

Note: If the OPCS code to be entered is a revision code then Primary Indication for Surgery must include ‘Revision….’

5.2.15 Duration of operation (required field – this is used to generate the risk index)

The duration of operation is a measure of the length of exposure to potential contamination. It is defined as the time in minutes from skin incision to skin closure.

Whilst it should be as precise as possible, it may be estimated from the time in and out of the operating theatre.

For cardiac procedures involving a delayed closure of the incision, a suitable proxy may be used to define the end of the operation (such as occlusive dressing). This allows the duration of operation itself to be estimated and to be included in the Risk Index (provided the ASA score and wound class are also reported).

If more than one surgical procedure is performed through the same incision during the same operation, record the **total** duration of operation, regardless of whether the procedures belong to different surgical categories. See also section 5.2.27.

For example, if your chosen categories are gastric and large bowel surgery and a patient undergoes total gastrectomy and total colectomy through the same incision, and the time from skin incision to closure is 240 minutes, record the duration of the operation as 240 minutes for both the gastrectomy (on one Data Collection Form) and the total colectomy (on a separate Data Collection Form).

For surgical procedures performed through different incisions during the same operation, record the duration of operation for each incision individually on separate data collection forms according to whether each set of procedures is under surveillance. The exceptions to this are for procedures involving grafts from donor sites such as breast surgery or coronary artery bypass grafts where the total duration of operation for both incisions is recorded on a single data collection form.

For example, if your chosen categories are gastric surgery and open reduction of long bone fracture, and a trauma patient undergoes total gastrectomy (which lasts for 95 minutes from skin incision to closure) and open reduction of a fractured femur (which lasts for 85 minutes), record the duration of the gastrectomy as 95 minutes on one data collection form, and the duration of the open reduction of fractured femur as 85 minutes on a separate data collection form.

If a patient requires re-operation within 72 hours of the first operation due to an early complication such as bleeding, the duration of each operation should be re-calculated adding together the times of both operations (see section on Early re-operation).

Where bilateral operations are performed, such as for hip or knee replacements or breast surgery, the times from incision to closure for each incision should be recorded on separate data sheets.

5.2.16 Wound class (required field – this is used to generate the risk index)

The degree of wound contamination at the time of operation is an important predictor of infection. Surgical wounds can be classified according to the likelihood and degree of wound contamination at the time of operation. The wound classification used for this surveillance is based on that developed by the National Research Council in the US (32).

The classification of the wound contamination at the time of surgery should be made by the surgeon. If this information is not available, SSI Protocol OPCS Codes Supplement gives the **minimum** wound class for each surgical procedure.

The minimum wound class is only indicative and may vary according to certain pre-operative events (for example, emergency operations, trauma) and intra-operative events (for example, major break in aseptic technique, pre-existing infection or acute inflammation). Thus, the final classification of wound contamination must be confirmed by consultation with the surgeon, or by checking the patient's records using the definitions given below.

Clean wounds

Uninfected operative wounds in which inflammation is not encountered, and the respiratory, gastro-intestinal, genital, urinary tracts or the oropharynx are not entered, and there is no break in aseptic technique. In addition, clean wounds must be primarily closed and, if there is drainage, this must be closed. Operative wounds that follow non-penetrating trauma, for example, fractured neck of femur, should be included in this category providing they meet these criteria.

Clean-contaminated wounds

Operative wounds in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination, providing that there is no evidence of infection or a major break in aseptic technique. Note: procedures that do not enter one of these body tracts cannot be clean contaminated for example, orthopaedic procedures.

Contaminated wounds

Operations on fresh, open traumatic wounds; or operations where there is a major break in aseptic technique; or operations in which there is gross spillage from the gastrointestinal tract; or acute inflammation without pus is encountered.

Dirty or infected wounds

Operations in which acute inflammation with pus is encountered, or in which perforated viscera are found; operations on traumatic wounds which have retained devitalised tissue, foreign bodies or faecal contamination, or where the operation on the traumatic wound has been delayed. Operations included in this class are those in which the organisms causing post-operative infection are likely to have been present in the operative field before surgery.

Notes on wound class

Large bowel surgery

For emergency operations on unprepared bowel, or obstructed bowel, the minimum wound class is contaminated.

Limb amputations

Amputations where the limb is ischaemic, or where dry gangrene is present should be classified as clean. Amputations through, or adjacent to, an area of acute inflammation (without pus or ulceration) should be classified as contaminated. Amputations adjacent to, or through necrotic ulcers and/or purulent areas should be classified as dirty.

Open reduction of long bone fractures

If the fracture is open and the operation is performed within the first 10 hours, the minimum wound class is contaminated. If the operation is performed after 10 hours, the minimum wound class is dirty.

More than one surgical procedure through the same incision during the same operation

Record the wound class that reflects the highest degree of contamination of the wound, that is, the 'dirtier' class.

Re-operation within 72 hours

Due to an early complication such as bleeding, the wound class should be re-assessed in case it has changed (see ‘Early re-operation’ below).

5.2.17 Re-operation

Re-operation is defined as a new operation through an incision used for a previous operation during the same admission. For the purposes of this surveillance, re-operations will be classified as either ‘early’ or ‘late’.

Early re-operation (includes patients who were discharged and readmitted within the 72 hours)

This is when a re-operation (through the same incision) is performed within 72 hours of the first operation because attention to the surgical site is required, for example, for complications such as bleeding. An early re-operation will be regarded as a continuation of the first operation.

Therefore, add together the times of both operations, and assess whether the wound class and ASA score have changed. If so, record the higher ASA score, and the higher degree of wound contamination.

Late re-operation

This is when a re-operation (through the same incision) is performed more than 72 hours after the first operation because of complications that require another procedure, or because the operation is part of a 2-stage surgical procedure.

A late re-operation will not be regarded as a continuation of the first operation. Therefore, surveillance should be discontinued the day before the re-operation, and no further follow-up for the first operation carried out. However, if an infection is diagnosed during the period up to and including the day of the re-operation where the date of onset is up to the day before the re-operation then the SSI must be assigned to the preceding procedure.

If the late re-operation involves a procedure that is in one of your chosen categories, and is listed in SSI Protocol OPCS Codes Supplement, a *new* Surveillance Data Sheet should be completed for the new procedure.

5.2.18 Grade of surgeon

This indicates the grade of lead operating surgeon from the following options. This information will be used to calculate rates of SSI by grade of operating surgeon.

- Consultant
- Staff grade
- Associate specialist
- Specialist registrar (SpR)
- Specialist trainee (SpT)
- Foundation year 2 trainee (FY2)
- Foundation year 1 trainee (FY1)
- Other
- Unknown

5.2.19 Surgeon codes 1 and 2 (optional)

Information about the surgeon who performed the principal operative procedure is optional and for local use only.

Hospitals that choose to provide this information should create their own unique codes up to 8 digits long, so they can identify the surgeon who performed the surgical procedure, while maintaining confidentiality.

To ensure that surveillance records and hospital reports correctly identify surgeons, the surgeon codes used must be formatted consistently (including preceding a zero if applicable) between records, ensuring that operations undertaken by the same surgeon are correctly grouped together.

Record the code corresponding to the ‘Lead Operating Surgeon’ as surgeon code 1 and the ‘First Assistant Surgeon’ as surgeon code 2. If supplied, this information can be used to calculate surgeon-specific surgical site infection rates by surgeon code for Lead Operating and First Assistant surgeons.

5.2.20 Revision of total hip replacement (revision total hip replacement only)

Where a previous total hip replacement is being revised indicate which component(s) of the joint is/are being replaced.

5.2.21 Type of knee replacement (knee replacement only)

For partial knee replacements, where both tibial and femoral condyles are not replaced then mark the box for ‘knee replacement’, but in addition select the type of partial replacement procedure:

- Unicondylar: the replacement of one tibial and one femoral condyle, with or without resurfacing of the patella
- Patellofemoral: the replacement of both femoral condyles with resurfacing of the patella

5.2.22 Type of surgery

Information will be used to calculate the incidence of surgical site infection for elective and emergency operations.

The intention is to distinguish emergency procedures that are not accompanied by the usual pre-operative preparation and could therefore be expected to be associated with a higher risk of SSI.

The surgical procedure should be classified as either ‘elective’ or ‘emergency’ according to the following definitions:

Elective

This includes operations that have been planned at a time to suit both patient and surgeon (for example elective hip or knee replacements), and early operations on more serious cases arranged around theatre time.

For example, open reduction of fracture or fractured hip repair on patients admitted following trauma and classified as ‘emergency admission’ but where there is time to carry out pre-operative preparation.

Emergency

This should be applied to unplanned, 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 for example bowel obstruction or perforation, CABG following myocardial infarction and arrest or leaking aneurism.

Note: Emergency operations do not include patients who are admitted as an emergency but went on to have an operation which was not life saving. For example, an elderly patient who has had an emergency admission following a fractured neck of femur.

5.2.23 Operation due to trauma (not hip, knee or neck of femur)

This is defined as an operation that was performed because of blunt or penetrating traumatic injury to the patient.

Note: This does not include pathological fractures where there is no associated traumatic injury. This information will be used to calculate the incidence of surgical site infection for operations due to trauma.

5.2.24 Prosthetic implant (not hip, knee or neck of femur)

This is defined as a non-human foreign body that is placed permanently in the patient during an operation and is not routinely manipulated for diagnostic or therapeutic purposes.

Examples are joint prostheses, prosthetic heart valves, screws, wires, or meshes that are left permanently **in situ**.

Homologous grafts, such as heart, kidney, and liver, are defined as organ transplants and not as implants.

The presence of an implant

The presence of an implant extends the period of time in which an SSI may occur (see Section 3) and may affect the risk of developing SSI. This information will be used to calculate the incidence of surgical site infection for operations involving the insertion of an implant.

5.2.25 Antibiotic-loaded cement (hip or knee replacements and repair of neck of femur only)

Indicate if cement impregnated with an antimicrobial agent was used for this surgical procedure. Note: the OPCS code **must** also indicate a cemented joint replacement.

5.2.26 Antimicrobial prophylaxis

This is defined as the administration of one or more antimicrobial agents during the peri-operative period for prophylaxis.

This also includes antimicrobial agents that are given during the peri-operative period to treat a pre-existing infection at the operative site.

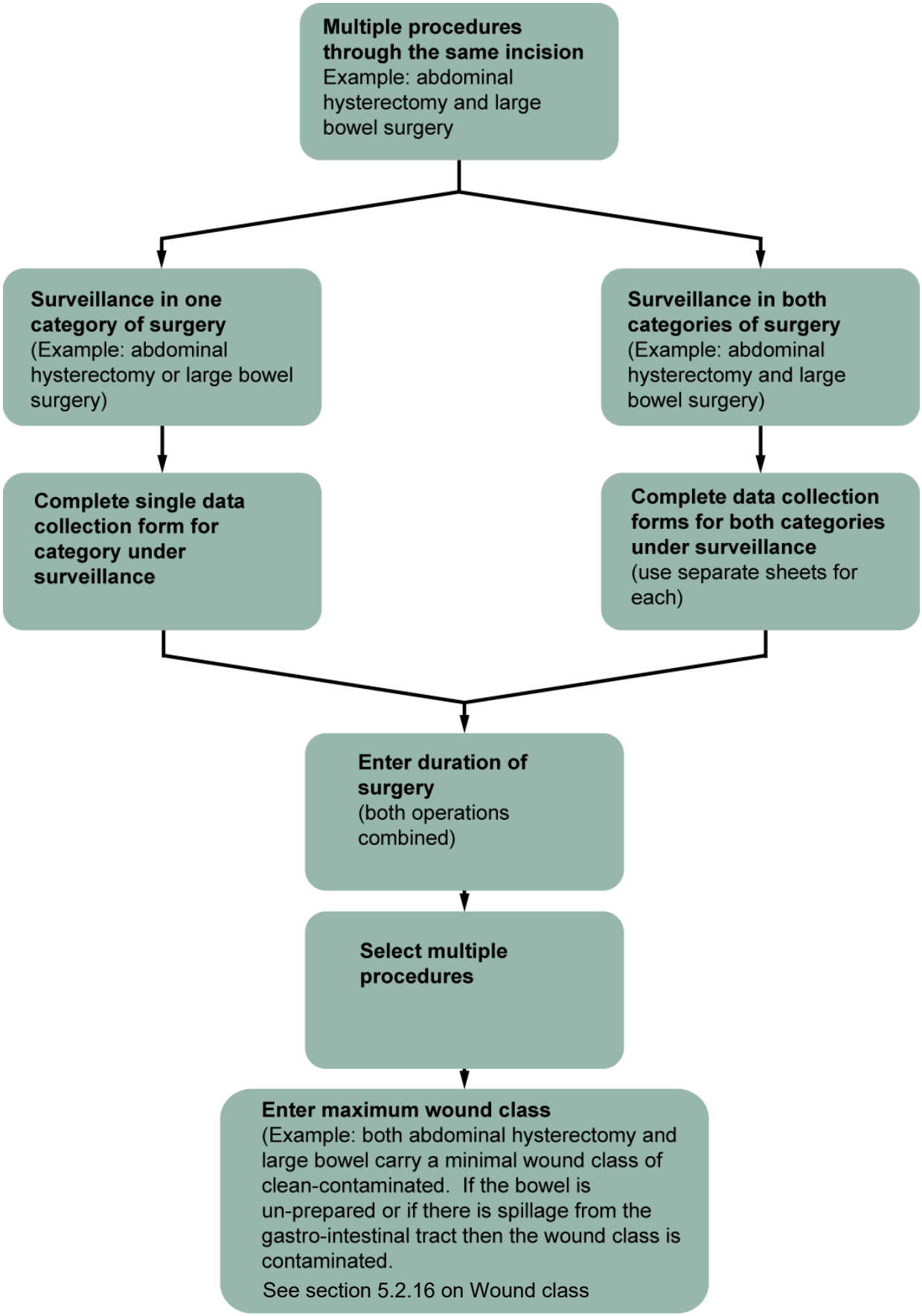
5.2.27 Multiple surgical procedures through the same incision (not hip, knee or neck of femur)

Multiple procedure does not mean several OPCS codes from the same category for example, spinal. Multiple procedures should be recorded when more than one surgical procedure from different surgical categories is performed through the same incision during the same operation (see example below).

This applies even if some of the surgical procedures are not included in any of your chosen categories for surveillance, or do not appear in the list of surgical procedures given in SSI OPCS code supplement. This is because the duration of the surgery is likely to be longer and more tissue is handled, both of which increase the risk of surgical site infection.

This question is not included in the hip and knee replacement dataset as it is rarely performed during these procedures and is therefore not an important risk factor for SSI.

Figure 3. Multiple surgical procedures through the same incision (not hip, knee or neck of femur)



Accessible text equivalent of Figure 3. Multiple surgical procedures through the same incision (not hip, knee or neck of femur)

Multiple procedures through the same incision
Example: abdominal hysterectomy and large bowel surgery

This proceeds through one of 2 routes:

Route 1

- Surveillance in one category of surgery (Example: abdominal hysterectomy or large bowel surgery)
- Complete single data collection form for category under surveillance

Route 2

- Surveillance in both categories of surgery (Example: abdominal hysterectomy and large bowel surgery)
- Complete data collection forms for both categories under surveillance (use separate sheets for each)

At this point the 2 routes reunite to form one sequence of steps:

1. Enter duration of surgery (both operations combined).
2. Select multiple procedures.
3. Enter maximum wound class. (Example: both abdominal hysterectomy and large bowel carry a minimal cound class of clean-contiminated. If the bowel is unprepared or if there is spillage from the gastro-intestinal tract then the wound class is contaminated. See section 5.2.16 Wound class for further guidance.)

5.3 Discontinuation of surveillance

5.3.1 Insertion of implant

The period of surveillance depends on whether the operation involves the insertion of an implant. If no implant is inserted, surveillance for SSI does not continue beyond the 30th day after the operation (since an infection that develops after the 30th day would not meet the definition of SSI, see Section 3). If an implant is inserted and left in the surgical site then an infection may meet the definition of SSI for up to one year after the operation.

5.3.2 Calculating rates of infection

In calculating rates of infection, SSI that are detected during the inpatient stay or re-admission are distinguished from those detected by post-discharge surveillance because the latter are more likely to be associated with variation in the intensity of case finding.

5.3.3 30 day limit

Unless the 30 day limit for non-implant operations is reached, surveillance should be continued for the duration of the patient's post-operative stay. If post-discharge patient questionnaires are in place these should be returned 30 days after the operation.

5.3.4 Date inpatient surveillance discontinued (required field)

Insert the date that surveillance was discontinued for the admission in which the operation was performed. This will usually be when the patient has been discharged from hospital.
This information is required to calculate the length of post-operative hospital stay. If a patient is re-admitted for any reason within 24 hours of discharge, this will be regarded as continuation of the previous admission.

If surveillance is discontinued when a patient is discharged but he/she is subsequently re-admitted with an SSI, or an SSI is identified by post-discharge follow-up, the 'date inpatient surveillance is discontinued' should remain as the original date of discharge.

5.3.5 Reason inpatient surveillance discontinued

In-patient surveillance can be discontinued for the following reasons.

a. discharged home or to another hospital or care facility: patient leaves the hospital on completion of the hospital episode, and is not on temporary leave from hospital
b. died during the follow-up period
c. late re-operation: patient has a new operation through the same incision more than 72 hours after the first operation

Note: This requires that surveillance on the first procedure is discontinued, see section 5.2.17.

d. 30th day post-operative stay: patient has completed 30 days of post-operative hospitalisation and the procedure did not involve an implant

Note: Infections that occur after this time do not meet the case definitions of SSI. This option does not apply for hip and knee replacements since all these procedures involve implants.

e. follow-up completed – patient still in hospital. The patient had an implant and is still in hospital more than 60 days after the end of the surveillance period.

Note: Data must be submitted to ensure that the record is included in the results for the relevant surveillance period.

5.4 Patient post-discharge questionnaire (PDQ)

5.4.1 Participation in PDQ surveillance

If participating in PDQ surveillance, all patients discharged less than thirty days after their surgery should be given a PDQ as described in Box 1.

5.4.2 Post-Discharge Questionnaire given or patient contacted by phoned to administer PDQ

Indicate whether the patient was given a questionnaire to return at 30 days post-operation or if a patient was phoned to administer the PDQ (see Table 3 for details on how to complete this field).

This data is necessary to indicate whether data on patient-reported SSI is being captured and to calculate the response rate. This information will be used to interpret rates of SSI.

5.4.3 Patient questionnaire completed

Indicate whether the patient questionnaire has been completed, either as a postal return or follow up telephone call (please see table below for details on how to complete this field). This information is required to estimate the proportion of patient wound questionnaires returned.

5.4.4 Date PDQ completed (required field if patient questionnaire completed is ‘Yes’)

If the patient failed to write the completion date on the completed PDQ form then enter the date of the postal frank or date received.

5.4.5 Patient unable to complete questionnaire

If the patient is a child or does not have the mental capability to complete the questionnaire a parent or carer can complete the PDQ as proxy for the patient.

Table 3 Completion of PDQ fields on SSI web application

Data Item on web application	Situation	Select
Patient Given PDQ or Patient Contacted by Phone	Patient not given PDQ	No
	Patient not contacted by phone	No
	Patient given PDQ	Yes
	Patient successfully contacted by phone	Yes
PDQ Completed (post/phone)	PDQ not returned (post or email)	No
	Patient declines to answer PDQ over phone	No
	Completed PDQ returned (post/e-mail)	Yes
	Patient answers PDQ over phone	Yes

5.5 Systematic post-discharge surveillance by healthcare professionals

5.5.1 Proportion of patient being actively monitored

This information is required to estimate the proportion of patients actively monitored for SSI following discharge from hospital and used to interpret rates of SSI that include SSI detected by post-discharge surveillance.

5.5.2 Patient reviewed for SSI post discharge

Indicate ‘yes’ if the patient has been systematically and actively followed up by a healthcare professional for SSI post discharge, regardless of whether an SSI was identified, using one of the methods described in Section 2, Box 1, Part 3.

Method A: Patient returns to hospital if they have a problem with their wound (only record if patient actually reviewed in hospital).

Method B: Patient reviewed at outpatient clinic (OPC)

Method C: Systematic review by community-based trained healthcare professional trained to apply SSI definitions (not GP visits)

SSI can be reported by hospital or trained community-based healthcare professionals in an ad hoc way, as Other Post-Discharge, provided the SSI can be confirmed as meeting case definitions. However, this would not qualify as systematic and active surveillance.

This information is required to estimate the proportion of patients actively monitored for SSI following discharge from hospital and used to interpret rates of SSI that include SSI detected by post-discharge surveillance.

5.5.3 Date of post-discharge surveillance review

If the patient has been followed-up post-discharge by a healthcare professional indicate the date of the last review, if within the review period.

This information is required to estimate the period of active follow-up for SSI following discharge from hospital and used to interpret rates of SSI that include SSI detected by post-discharge surveillance.

5.6 Surgical site infection data

5.6.1 Patient case definitions

If a patient develops an SSI that meets the case definitions (see Section 3) then data on the SSI must be completed. If the patient does not develop an SSI, the dataset is complete and the form can be submitted to the co-ordinating centre.

If an SSI is detected after data have been submitted it can still be reported by contacting SSISS. The data required to complete this section can be obtained from the patient's clinical records and microbiology reports.

5.6.2 Detection of surgical site infection (required field)

The surgical site infection may be detected:

- during the admission in which the operation was performed
- on re-admission to hospital
- by post-discharge follow-up, for example, outpatient clinic, specialist nurse visit, review on ward
- patient reported in the patient post-discharge questionnaire

If a patient reports problems with the wound and the surveillance coordinator has confirmed that the symptoms meet the criteria for patient reported SSI then the SSI should be reported as Patient reported only.

This applies whether or not the GP practice has confirmed the symptoms.

If an SSI has been reported (and confirmed) by more than one method then only one SSI should be recorded on the SSISS web-link. An SSI identified during admission or at readmission should be reported in preference to other post-discharge methods.

If an SSI has been detected by a post discharge surveillance system as well as in a patient PDQ, then report as 'other post discharge follow-up', rather than 'Patient Reported'.

SSI identified during the post-operative stay in hospital or in patients readmitted to hospital will be combined in calculating rates of inpatient SSI.

Rates of SSI detected by 'other post-discharge surveillance' and 'patient reported' (via the Patient Post-Discharge Questionnaire) will be calculated separately as the intensity of case finding and application of the definitions may vary between hospitals.

5.6.3 Date of onset of surgical site infection (required field)

This is the date of the first signs or symptoms of SSI. If this information is not available or is unclear, the following alternate dates can be accepted:

- a microbiological sample was taken to confirm the diagnosis
- patient was re-admitted with SSI
- patient presented at outpatient clinic or other hospital department with clinical symptoms of SSI
- patient reported in post-discharge questionnaire

If a positive microbiological surgical site specimen is taken before the patient's discharge or death but reported after discharge, the medical and nursing records should be reviewed in order to establish whether the patient had a SSI that met the criteria.
This information will be used to calculate the number of days from operation to detection of surgical site infection.

Note: Superficial SSI must occur within 30 days of the operation in order to meet the case definitions, deep and organ/space SSI may occur up to one year after the operation if the procedure involves an implant.

5.6.4 Type of surgical site infection (required field, except for patient-reported SSI)

A surgical site infection is defined as incisional (superficial or deep) or organ/space according to the criteria for infection given in the definition of SSI (see Section 3).

For patients who have undergone abdominal surgery involving multiple procedures through the same incision, assign the infection to the category under surveillance that was most likely to be related to the infection. If this is not clear, select the procedure that falls into the category with

the highest infection risk, according to the following list (which is arranged in descending order of risk):

- colon surgery
- bile duct, liver, or pancreatic surgery
- gastric surgery
- cholecystectomy
- small bowel surgery
- abdominal hysterectomy
- vascular surgery

If further advice is required for assigning infections to procedures, contact a member of the SSISS.

5.6.5 Incisional type (breast surgery and CABG)

For patients undergoing a procedure where 2 incisions may be made, both need to be monitored for infection.

For example, patients who have undergone coronary artery bypass graft with both sternal and donor site incisions and develop a superficial or deep incisional infection, the location of the infection (chest or donor site) must be specified.

If the patient develops surgical site infection at 2 sites (both sternal and donor site) both should be reported.

Record the second SSI on another Data Collection Form and staple the 2 forms together to ensure all of the information is entered onto the web link correctly. Both SSIs should be entered on the same serial number. The same principle applies to breast surgery where graft tissue is taken from a different site such as the buttock or abdomen.

5.6.6 Type of closure – cardiac (non-CABG)

If the surgery did conclude with primary closure, defined as closure of the sternum and incisional wound site with a primary intention to heal, please report this by selecting the ‘Primary’ option in this field. If the surgery did not conclude with primary closure of the sternum or incisional wound site, please report this by selecting the ‘Delayed’ primary closure option.

Collecting this data is important as they will allow separate analyses to be undertaken for a meaningful interpretation and comparison of data collected.

5.6.7 Allocation of the organ/space surgical site infection to a specific site

Organ/space infections should be allocated to one of the specific sites listed in the 'Definition of specific sites of organ space surgical site infection' (see Section 3).

5.6.8 Causative micro-organisms

Record only micro-organisms considered to be the cause of the surgical site infection, rather than those colonising the surgical site, using the codes given in Appendix 6. If in doubt as to the likely causative micro-organisms, discuss with the Medical Microbiologist. A maximum of 3 micro-organisms can be entered on the form. When more than 3 micro-organisms are identified, enter the 3 considered most important.

5.6.9 Criteria for surgical site infection

Record the clinical signs and symptoms and microbiological criteria that were present at the time the patient was identified as having an SSI. This information is required to confirm that the infection fulfils the definitions given in Section 3.

The criteria selected should be appropriate to both the 'Detection' and the 'Type' of Surgical Site Infection.

If a patient develops more than one infection from the same surgical procedure, from which micro-organisms that are unrelated to the previous infection are cultured, this may be considered as another infection. Record details of the second SSI on the SSI section of another data collection form and staple the forms together to ensure all of the information is entered onto the web link correctly. Two SSIs should be entered on the same serial number.

If a superficial SSI deteriorates to a deep incisional or organ/space SSI with the same causative organism, report only the more serious of the 2 SSI as this is likely to be a worsening of an infection rather than a subsequent infection.

5.7 Warning messages and flags

5.7.1 Web link error messages

The SSISS web link has been set up with different error messages:

1. Red warning messages: these indicate fields which have been completed incorrectly.
2. Yellow information messages: these indicate data which are outside expected parameters.

5.7.2 Warning message procedure

For red warning messages the data within the field must be corrected before the record can be submitted.

For yellow information flags the data entered within that field should be checked and a message should be entered in the comments box at the bottom of the web page for each yellow triangle which appears.

This message should confirm that the data entered is correct by restating the value together with units for that value for example, ‘Height of 220cm is correct’.

Section 6. Analysis and feedback of data

6.1 Introduction

6.1.1 The analysis and dissemination of results to relevant staff

The analysis and dissemination of results to relevant clinical and other staff is essential if surveillance is to be part of an effective infection prevention and control tool (5, 6, 7) At the end of a surveillance period hospitals participating in the SSI surveillance will be able to generate from the web link an individual summary report of the results of surveillance for each of their chosen category of surgical procedures.

This report will contain their own data together with aggregated data from other hospitals contributing data in the same surgical category. In addition, hospitals will also be able to create user-defined reports from their data for a time interval and surgical category of their choice from the web link.

6.1.2 Strategy for participating hospitals

Participating hospitals should develop a clear strategy for actively disseminating the SSI surveillance reports and acting on the results. Where the rates indicate a potential cause for concern, local practice should be reviewed to ensure that it complies with best practice.[32,33]

6.2 Process for report production

6.2.1 60 days for follow-up patients

At the end of each surveillance period, a period of 60 days is permitted to follow-up patients still in hospital and complete post-discharge follow-up. Reminders of the deadlines for submission and reconciliation of data (see section 2.9 Data reconciliation, table 2) will be displayed on the login page of the web link.

6.2.2 Data release for report generation

Once all the data for a period has been submitted and reconciled, the data for the period will be released for report generation. A message will appear on the login page of the web link indicating that the reports are available. Although data may change slightly following further validation by SSISS, reports are released at this stage to allow feedback of infection rates at the earliest opportunity.

6.3 Report options

6.3.1 Reports from SSI web application

The following reports are available to hospitals from the report section of the SSI web application:

Summary report

This contains data (total number of operations, total number of SSIs and the SSI incidence per 100 operations) for the selected surveillance period and the last 4 periods combined (including the period selected). A benchmark based on data submitted by all participating hospitals in the same category is also provided using data from the most recent 5 years. The report also presents data by key risk factors, SSI type and causative micro-organisms. This report can be generated for any category and surveillance period in which the hospital has undertaken surveillance.

User-defined reports

A list of report options is available and users can run each of these reports for a selected category and time span of their choice:

- rate of SSI
- trend in rate of SSI
- type of SSI
- rate of SSI by the Risk Index
- rate of SSI by risk factor (full list including ASA score, wound class, duration of operation, age group, body mass index, gender, type of surgery (admission type) and so on)
- causative micro-organisms
- operations or SSI by surgeon code
- a line list of key data items in each record SSI detection method
- data completeness

A data completeness report has been added to provide feedback of your hospital's completion rate for specific key data items (for example, ASA score, OPCS code 1, wound class and reason inpatient surveillance stopped) within a selected surveillance time period in comparison to other hospitals.

6.3.2 CSV data export

The CSV data export function enables data for a selected period to be exported to an Excel spreadsheet.

6.4 Incidence of surgical site infection

6.4.1 Cumulative incidence of infection

The cumulative incidence of infection is the number of new infections that occur in a defined population during a given period of time. This is most accurately described as the risk of SSI but this term tends to be used interchangeably with rate.

This measure is reported as the number of SSIs per 100 operations. It takes account of the fact that the same patient can develop more than one SSI related to the same procedure.

It is calculated as the number of SSIs in a specific category divided by the number of operations in a specific category, multiplied by 100.

$$\frac{\text{No. SSIs in a specific category}}{\text{No. operations in the specific category}} \times 100$$

6.4.2 Reporting rates of SSI

Since SSIs reported by patients cannot be verified in the same way as those detected by active surveillance in hospital, rates based on patient reported SSI will be calculated separately to those based on SSI detected in inpatients. Thus, 2 rates of SSI will be reported:

1. Cumulative incidence of SSIs detected during the inpatient stay and in patients readmitted with SSI.
2. Cumulative incidence of SSI based on all SSIs detected by inpatient and post-discharge surveillance including those reported by the patient at 30 days post-operation.

6.4.3 Comparison of SSI incidences

When comparing SSI incidence based on patient reported SSI or other post-discharge methods, it is important to take into account the proportion of patients who have been followed up post-discharge as this will affect the number of SSI reported.

6.4.4 ‘All hospital’ rate of SSI

The ‘All hospital’ rate of SSI that includes data on operations where a patient received a post-discharge wound surveillance questionnaire or was followed up post-discharge at OPC are provided to enable any hospital that has used patient questionnaires to make a fair comparison of rates of SSI.

6.4.5 Main outcome measure for national surveillance

Although post-discharge data can be collected using various follow-up methods, the main outcome measure for national surveillance purposes will be the SSI rate based on inpatient and readmission SSI.

6.5 Accumulation of data

6.5.1 Combined data over several periods

The number of surgical procedures undertaken by an individual hospital in one surveillance period may be small and the reported incidence of SSI for a single period may therefore be imprecise.

To address this problem it is recommended that data are combined over several periods to calculate the incidence of SSI. For the user-defined reports the periods over which to combine data can be selected by the user. In the summary report, data are reported as follows:

Last 4 periods

Data collected by a hospital in the current period combined with the 3 most recent periods for which data were collected regardless of whether surveillance was undertaken on a continuous basis or not. This data is presented to increase the precision of the estimate.

All hospitals

Data collected by all hospitals participating in a specific category is aggregated using data from the last 5 years.

6.6 Box and whisker plots to aid interpretation of the local SSI incidence

6.6.1 The box and whisker plot graph

The box and whisker plot (Figure 4) provides a simple graphical guide to the interpretation of the local SSI rate.

This plot is included in the summary report and shows the inter-hospital variation in the SSI incidence by surgical category based on the most recent 5 year data. Each dot on the plot represents one hospital's SSI rate. Each box plot shows 5 key national percentiles (10th, 25th, 50th, 75th and 90th) derived from the national distribution of observed hospital rates for a surgical category.

The 50th percentile (horizontal line intersecting the box) is the median and indicates that 50% of the observed values are at or below this value.

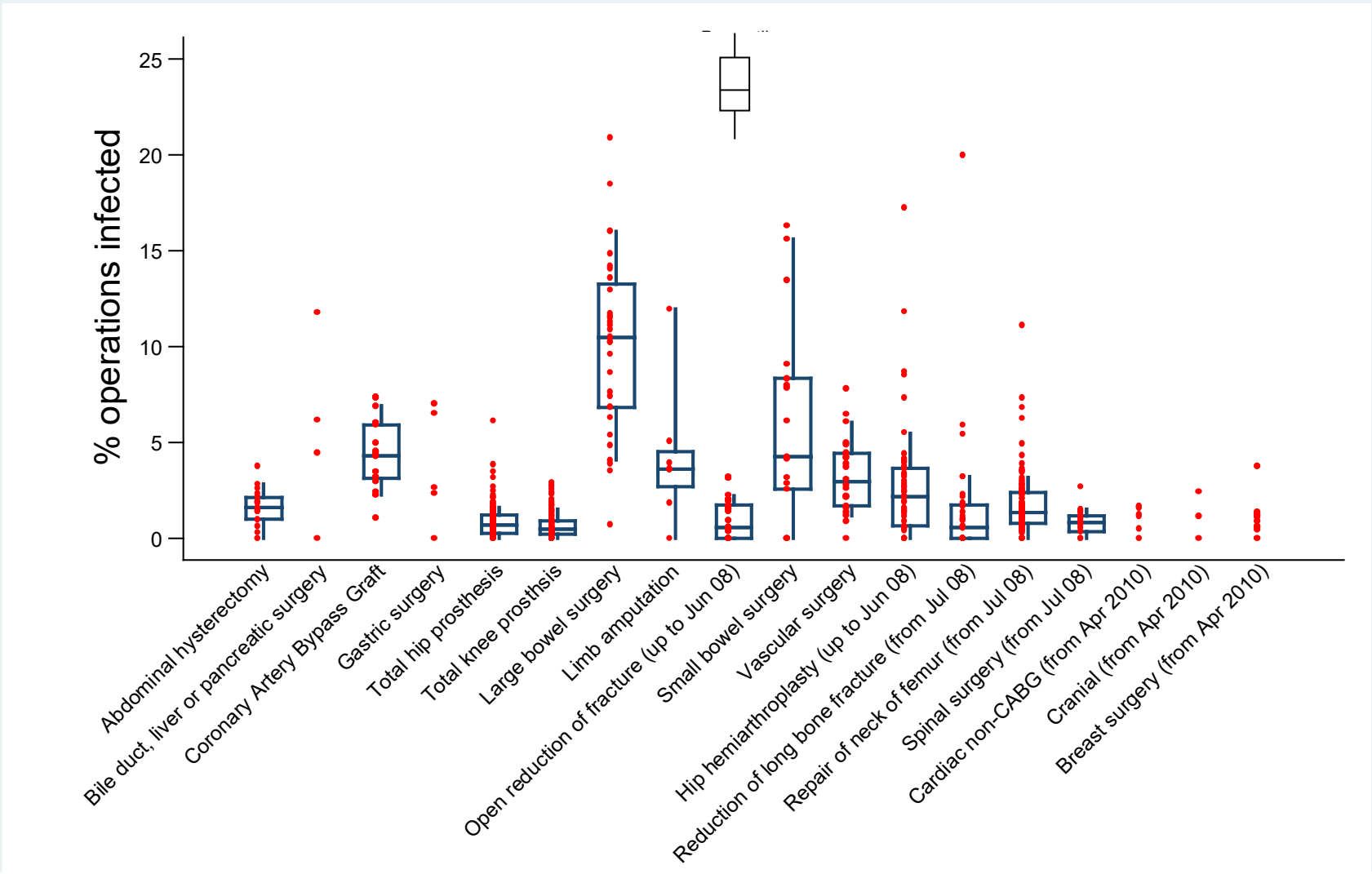
The box in the diagram represents the inter-quartile range (25th to 75th percentiles). Two whiskers extend from the inter-quartile range: one extending upwards to the 90th percentile and the other extending downwards to the 10th percentile.

The 90th and 10th percentiles serve as a guide and are used to visualise unusual values. If a local rate falls above the 90th percentile or below 10th percentile, hospitals should anticipate the need for further investigation.

6.6.2 Volume of surgery or differences in risk factors

The box plots do not take into account volume of surgery or differences in risk factors. They should therefore be considered in conjunction with the results on risk factor data. In addition, the precision of the estimated rate must be considered; rates based on small numbers of operations may reflect chance variation. In the national annual reports adjustment for variation in numbers of operations is made using funnel plots (34).

Figure 4. Variation in the incidence of inpatient and readmission SSI* (%) between hospitals by surgical category, England April 2007 to March 2012



*Excludes hospitals with <100 for hip, knee or abdominal hysterectomy; <50 all other procedures.

6.7 Identification of hospitals with unusually high or low rates of SSI (outliers)

6.7.1 Review of results at end of surveillance

After the end of each surveillance period, SSISS will review the results and apply the national percentile method to identify high and low outliers whilst taking into account some of the uncertainties arising from the data due to small numbers.

A hospital with an SSI incidence above the national 90th percentile or below the national 10th percentile in a specified category will be designated as a ‘high outlier’ or ‘low outlier’ respectively.

6.7.2 Hospitals identified at outliers

All hospitals identified as outliers are notified of their outlier status and asked to investigate possible reasons. Hospitals identified as low outliers are asked to investigate their surveillance methodology since poor compliance with the standard definitions may lead to a lower sensitivity of case-finding. A hospital that is not identified as an outlier but whose SSI rate is nevertheless higher than the benchmark and close to the 90th percentile is expected to investigate possible reasons so that problems are addressed at the earliest opportunity.

6.7.3 Outliers (hospitals) identified in the specific period

SSISS will also inform health protection staff based in local Public Health England Centres of all hospitals identified as outliers in the specified period. Whilst SSISS can identify these hospitals, local health protection staff are better placed to interact directly with affected hospitals by supporting and monitoring investigations, providing advice and encouraging continued surveillance where indicated.

6.7.4 Surgical categories in the national SSI scheme

It is important for all local health protection staff to be aware that there are 17 surgical categories available in the national SSI scheme.

Surveillance of SSI is mandatory in 4 orthopaedic modules (hip prosthesis, knee prosthesis, repair of neck of femur and reduction of long bone fracture).

6.7.5 Data confidentiality

When handling outlier data, local health protection staff are advised to observe data confidentiality. Data must not be distributed to anyone who is not involved in health protection functions without the hospital’s prior consent unless there is justification for concern, for example, the hospital is a persistent outlier.

Although mandatory orthopaedic data are eventually published for public reporting purposes, this is specifically at Trust level.

Mandatory data at hospital-level and data submitted under voluntary surveillance must be treated as confidential since these are not routinely published.

6.8 Data sharing with health protection staff

6.8.1 Reports for epidemiologists and other health protection staff

Every quarter the SSISS produces reports for epidemiologists and other health protection staff (scientists or health protection nurses) operating at UKHSA's 15 Public Health England Centres.

These reports provide details on the number of operations, surgical site infections, an estimate of the SSI incidence with 95% confidence intervals and whether the hospital was an outlier for the relevant UKHSA Centre population. These data are presented by hospital and surgical category.

6.9 Stratification by the NNIS risk index

6.9.1 Classification of surgical wounds

Until the mid-1980s, classification of surgical wounds as clean, clean-contaminated, contaminated, and dirty was considered to be the most important factor in predicting the risk of surgical site infection.

However, the risk of surgical site infection is also associated with the susceptibility of the patient to infection, and with pre-operative and intra-operative events (35).

The SENIC project therefore developed a risk index to take account of these factors, which was subsequently modified by the National Nosocomial Infections Surveillance (NNIS) System (now called National Healthcare Safety Network), based at the Centers for Disease Control and Prevention (CDC), US (35, 36).

6.9.2 NNIS risk index

In the NNIS risk index, each operation is scored by the presence or absence of 3 risk factors at the time of surgery:

1. an American Society of Anesthesiologists' (ASA) pre-operative assessment score of 3, 4 or 5 (the 5 category classification system) (33, 37)
2. an operation classified as contaminated or dirty (35)

3. an operation lasting for more than a specific period of time ('T hours'), where T is the 75th percentile of the duration of surgery and depends on the surgical procedure being performed (see Table 3) (36, 38)

6.9.3 Risk factors contribution to risk index

Each of the risk factors described above contributes one point to the risk index, which ranges from 0 (none of the risk factors present), to 3 (all of the risk factors present) (39).

Table 3. T Times for the duration of operations by category of surgical procedures

Category of surgical procedures	T Time (hours)*	Category of surgical procedures	T Time (hours)
Abdominal hysterectomy	2	Knee replacement	2
Bile duct, liver, pancreatic surgery	5	Large bowel surgery	3
Breast surgery	3	Limb amputation	1
Cholecystectomy	2	Reduction of long bone fracture	2
Cardiac (non-CABG)	5	Repair of neck of femur	2*
Coronary artery by-pass graft	5	Small bowel surgery	3
Craniotomy	4	Spinal surgery	3
Gastric surgery	3	Vascular surgery	3
Hip replacement	2		

* T time derived from SSISS data.

6.9.4 Application of Risk Index System

At present, the NNIS risk index is a universally used method for stratifying surgical site infection rates according to the degree of risk. The Risk Index system is applied across all surgical categories These data help to identify how the incidence of SSI may be affected by differences in case-mix and form the basis for making valid comparisons within and between hospitals, between surgeons, and over time.

Thus, the surveillance system described in this protocol has been designed to obtain additional risk factor information to calculate the NNIS risk index, and to estimate the effect of the individual risk factors that contributed to this index (39, 40).

6.9.5 Figures in the reports

Figures included in the reports should be interpreted with caution because apparently high rates of SSI in a particular risk index group may be based on very small numbers of operations and therefore represent an unreliable estimate. This is illustrated by the data in risk index group 2 in Table 4.

6.9.6 The summary report

The summary report contains data on other key risk factors for SSI such as ASA score, duration of operation, age group, and primary indication for surgery in prosthetic joint replacement procedures. In the user-defined reports any risk factor can be selected for reporting of rate of SSI.

6.9.7 number of operations and number of SSIs

The number of operations and number of SSIs for each surgeon is reported by surgeon code where this has been provided. Small numbers of operations will give imprecise estimates of the incidence of SSI, so these data should be interpreted with caution.

Table 4. Extract from a typical hospital report showing the incidence of SSI by risk index

Table 4: Number of operations and rate of SSI by Risk Index at your hospital compared to all participating hospitals (last 5 years)

Risk Index	Operations & surgical site infections		Your hospital		All hospitals*
			Current period	Last 4 periods	
0	Operations	Total no.	18	114	65518
	Surgical site infection	No. inpatient/readmission	2	4	475
		% infected	11.1	3.5	0.7
		No. SSI (all)	2	4	No data
		% infected	11.1	3.5	No data
1	Operations	Total no.	12	64	28876
	Surgical site infection	No. inpatient/readmission	0	1	413
		% infected	0.0	1.6	1.4
		No. SSI (all)	0	1	No data
		% infected	0.0	1.6	No data
2	Operations	Total no.	1	11	4779
	Surgical site infection	No. inpatient/readmission	0	1	141
		% infected	0.0	9.1	3.0
		No. SSI (all)	0	1	No data
		% infected	0.0	9.1	No data
3	Operations	Total no.	0	0	67
	Surgical site infection	No. inpatient/readmission	0	0	6
		% infected	0.0	0.0	9.0
		No. SSI (all)	0	0	No data
		% infected	0.0	0.0	No data
U/K	Operations	Total no.	36	125	23341
	Surgical site infection	No. inpatient/readmission	1	10	244
		% infected	2.8	8.0	1.0
		No. SSI (all)	1	11	No data
		% infected	2.8	8.8	No data

U/K = unknown risk index group
All SSIs = Inpatient & readmission, post-discharge confirmed and patient reported
*All hospital data for all SSIs will not be reported until sufficient patient reported data is available from most hospitals in order to calculate a national benchmark.

Section 7. Ethical and confidentiality issues

7.1 Security of patient information

7.1.1 Caldicott principles

The 6 Caldicott principles are upheld across UKHSA. These are:

1. Justify the purpose(s) of using confidential information.
2. Don't use patient-identifiable information unless it is absolutely necessary.
3. Use the minimum necessary patient-identifiable information.
4. Access to patient-identifiable information should be on a need to know basis.
5. Everyone must understand his or her responsibilities.
6. Understand and comply with the law.

7.1.2 Collection of patient data for SSI surveillance

Collection of patient data for SSI surveillance falls within PHE's approval under Section 251 of the NHS Act 2006 to process patient identifiable information for the purposes of infectious disease surveillance.

This allows organisations to disclose identifiable patient information to UKHSA without the explicit consent of the patient concerned while remaining within the confines of the Data Protection Act.

From April 2013, applications to access patient information without explicit consent will be processed by the Health Research Authority (HRA) Confidentiality Advisory Group (for research applications) and the Secretary of State for Health (for non-research applications), replacing the former National Information Governance Board process.

For more information, including the Register of approved applications under Section 251 visit The HRA Confidentiality Advisory Group (CAG).

7.1.3 The SSI surveillance web link

The web application is located on an UKHSA server and set up with Secure Sockets Layer (SSL) encryption.

Authentication and verification procedures ensure that all information exchanged is secure during transmission (irrespective of the encryption capabilities of browsers used locally).

User names and passwords are assigned to participating hospitals and it is not possible for other hospitals or web users to enter or retrieve data relating to another hospital.
SSISS do not hold records of individual hospital passwords.

If a password has to be reissued, this will be generated automatically by the database system and given to the main contact for that hospital by SSISS.

7.1.4 Patient-identifiable information (PII)

Hospitals are able to record the name and NHS number of patients included in the surveillance in the SSI dataset. However, this data cannot be accessed by the majority of SSISS staff. The only patient-specific data accessible to SSISS is the date of birth which alone is not sufficient to lead to disclosure of the patient's identity.

Participating hospitals are allocated a unique identifier (3-digit number) and each data collection form bears this number and a unique serial number for administrative purposes but no access to information about the individual patient exists outside the hospital of admission.

A limited number of staff have special permission granted by the former National Information Governance Board for Health and Social Care (NIGB) on behalf of the Secretary of State to access PII for linkage to other health databases. Any PII data used for such purposes are stored securely and not shared with others.

7.1.5 Hospital-specific infection rates

Individual hospital reports that describe the number and rates of infection, together with comparative data, are available via the web link by entering the username and password that is unique to the participating hospital. Each hospital only has access to its own data.
Data from hospitals within a specific UKHSA Centre boundary will be shared with the local health protection staff in order to monitor and support further investigation of outlying rates of SSI.

7.1.6 Surgeon-specific infection rates

Surgeon specific codes are included in the dataset as an optional item. If they wish to collect these data, individual hospitals allocate surgeon codes but the identity of individual surgeons is not known to SSISS.

7.2 Freedom of Information

7.2.1 The Freedom of Information Act

The Freedom of Information Act 2000 gives the following rights of access:

- the right to be told whether the information exists
- the right to receive the information

7.2.2 National reports on surgical site infection surveillance

These are available on GOV.UK.

Participation in SSISS will be regarded as in the public domain. However, no information about infection rates for individual hospitals or Trusts will be disclosed by UKHSA apart from that published under the Department of Health mandatory surveillance scheme.

Enquiries will be referred to the organisation concerned.

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Appendix 1

Surgical Site Infection Surveillance Service

Surveillance data sheet hip and knee replacements and neck of femur repair

Note: in the case of bilateral operations, 2 sheets should be completed.

Reconciliation Box Use to match with web entry	
Serial No. (enter Serial number from web submission):	
SSI: ☐Yes ☐No	**Detected:** ☐ Inpatient ☐ Readmission ☐ Post discharge ☐ Patient reported

Patient Name:	**Surveillance year:**	
Ward:	**Surveillance period:**	
NHS Number:	**Date of Hospital Admission:**	
Date of Birth:	**Date of Operation:**	
Gender: Male/Female/Unknown	**Height** [cm]:	**Weight** [kg]:
Primary Indication for surgery ☐ Avascular necrosis ☐ Inflammatory joint disease ☐ Osteoarthritis ☐ Other ☐ Revision - due to fracture ☐ Revision - due to infection ☐ Revision for other reason ☐ Revision: unknown ☐ Trauma/fracture ☐ Unknown	**Category of surgical procedure** ☐ Hip replacement ☐ Knee replacement ☐ Repair of neck of femur **Type of partial knee** ☐ Patellofemoral ☐ Unicondylar **Revision of hip replacement** ☐ Acetabulum ☐ Both ☐ Stem	**Description of procedure** OPCS Code 1: OPCS Code 2: OPCS Code 3:
ASA Score ☐ Class 1 ☐ Class 2 ☐ Class 3 ☐ Class 4 ☐ Class 5 ☐ Unknown	**Type of Surgery** ☐ Elective ☐ Emergency	**Wound Class** ☐ 1 Clean ☐ 2 Clean contaminated ☐ 3 Contaminated ☐ 4 Dirty ☐ 5 Unknown

<table>
<tr><td colspan="2">Lead Surgeon Grade
□ FY1
□ Specialist trainee
□ Associate specialist
□ Consultant
□ FY2 (SHO)
□ Other
□ Specialist registrar
□ Staff grade
□ Unknown</td><td>Surgeon Code:

Surgeon Code 2:</td></tr>
<tr><td>Antibiotic Cement
□ No
□ Yes
□ Unknown</td><td>Operation Duration
Time of incision:
Time of closure:
Minutes:</td><td>Antimicrobial Prophylaxis
□ No
□ Yes
□ Unknown</td></tr>
<tr><td>Ward visits for case review
Date:</td><td>Signs/symptoms:</td><td>Other criteria for infection:</td></tr>
<tr><td>Date Inpatient Survey Stopped:</td><td colspan="2">Reason Survey Stopped
□ 30th day of post-operative stay (if no implant)
□ Died
□ Discharged home/to another care facility
□ Follow-up completed - patient still in hospital
□ Late re-operation (after 72 hours)</td></tr>
<tr><td>PDQ given\Patient Contacted by Phone
□ No
□ Yes</td><td>PDQ Completed
(post or phone)
□ No
□ Yes
Date PDQ completed:</td><td>Patient Reviewed Post Discharge
(PD) e.g. OP clinic, ward visit, home visit by HCW
□ No
□ Yes
Date reviewed:</td></tr>
<tr><td>Surgical Site Infection
□ Yes
□ No</td><td colspan="2">Detection of SSI
□ At re- admission
□ During admission
□ Other post-discharge follow-up
□ Post discharge patient reported only</td><td>Date of onset of SSI:</td></tr>
<tr><td colspan="3">SSI Type
□ Deep incisional □ Organ/ space □ Superficial incisional</td></tr>
<tr><td colspan="3">Specific site of organ/space SSI</td></tr>
</table>

□	Arterial or venous	□	Joint or bursa
□	Bone (osteomyelitis)	□	Mediastinum
□	Breast abscess/mastitis	□	Meningitis
□	Endocardium	□	Myocardium or pericardium
□	Gastrointestinal tract	□	Vaginal cuff
□	Intra- abdominal	□	Vertebral disc space
□	Intracranial		

Criteria for SSI (indicate all that apply)

□ Abscess or other evidence of infection found during a re-operation, by radiology or histopath examination

□ Antibiotics prescribed by GP for SSI (patient reported only)

□ Aspirated fluid/swab of surgical site yields organisms and pus cells are present

□ Clinician's diagnosis

□ Fever (temperature 38ºC or more)

□ Heat

□ Incision spontaneously dehisces or opened by surgeon/dehisces

□ Localised pain or tenderness

□ Localised swelling

□ Purulent drainage

□ Redness

SSI Causative micro-organisms (only report those considered to be causing infection)

Organism 1 Code:	Organism 2 Code:	Organism 3 Code:

Second SSI: If the patient develops another SSI related to this surgical procedure, complete the SSI data on another data sheet with the patient identifier details attach the sheets and submit both SSI under the same record.

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Appendix 2. Surveillance data sheet main categories

Surgical Site Infection Surveillance Service

Surveillance data sheet main categories

Note: in the case of bilateral operations, 2 sheets should be completed.

Reconciliation Box Use to match with web entry	
Serial No. (enter Serial number from web submission):	
SSI: ☐Yes ☐No	**Detected:** ☐ Inpatient ☐ Readmission ☐ Post discharge ☐ Patient reported

Patient Name:	**Surveillance year:**	
Ward:	**Surveillance period:**	
NHS Number:	**Date of Hospital Admission:**	
Date of Birth:	**Date of Operation:**	
Gender: Male/Female/Unknown	**Height** [cm]:	**Weight** [kg]:

Category of surgical procedure ☐ Abdominal hysterectomy ☐ Bile duct, liver or pancreatic surgery ☐ Breast surgery ☐ Cardiac (non-CABG) ☐ Cranial surgery ☐ Cholecystectomy ☐ Coronary artery bypass graft ☐ Gastric surgery ☐ Large bowel surgery ☐ Limb amputation ☐ Reduction of long bone fracture ☐ Small bowel surgery ☐ Vascular surgery ☐ Spinal surgery	**ASA score** ☐ Class 1 ☐ Class 2 ☐ Class 3 ☐ Class 4 ☐ Class 5 ☐ Unknown	**Description of procedure** OPCS Code 1: OPCS Code 2: OPCS Code 3: (CABG only)

Operation Duration Time **of** incision: Time of closure: Minutes:	**Wound Class** ☐ 1 Clean ☐ 2 Clean contaminated ☐ 3 Contaminated

	□ 4 Dirty □ 5 Unknown

Lead Surgeon Grade		**Surgeon Code**
□ FY1 □ Specialist trainee □ Associate specialist □ Consultant	□ FY2 (SHO) □ Other □ Specialist registrar □ Staff grade □ Unknown	Lead surgeon: Second surgeon:

Type of surgery	**Trauma**	**Antimicrobial Prophylaxis**
□ Elective □ Emergency	□ No □ Yes	□ No □ Yes □ Unknown

Prosthetic Implant	**Multiple surgical procedures through the same incision**
□ No □ Yes	□ No □ Yes

Ward visits for case review		
Date:	Signs/symptoms:	Other criteria for infection:

Date Inpatient Survey Stopped:	**Reason Survey Stopped**
	□ 30th day of post-operative stay (if no implant) □ Died □ Discharged home/to another care facility □ Follow-up completed - patient still in hospital □ Late re-operation (after 72 hours)

PDQ given\Patient Contacted by Phone	**PDQ Completed**	**Patient Reviewed Post Discharge**
□ No □ Yes	(post or phone) □ No □ Yes Date PDQ completed:	(PD) e.g. OP clinic, ward visit, home visit by HCW □ No □ Yes Date reviewed:

Surgical Site Infection	**Detection of SSI**	**Date of onset of SSI:**
□ Yes □ No	□ At re- admission □ During admission	

	□ Other post-discharge follow-up □ Post discharge patient reported only	

SSI Type

□ Deep incisional □ Organ/ space □ Superficial incisional

Incisional Type (Coronary artery bypass graft or breast surgery only)

□ Chest/ breast site

□ Donor site

Criteria for SSI (indicate all that apply)

□ Abscess or other evidence of infection found during a re-operation, by radiology or histopath examination

□ Antibiotics prescribed by GP for SSI (patient reported only)

□ Aspirated fluid/swab of surgical site yields organisms and pus cells are present

□ Clinician's diagnosis

□ Fever (temperature 38ºC or more)

□ Heat

□ Incision spontaneously dehisces or opened by surgeon/dehisces

□ Localised pain or tenderness

□ Localised swelling

□ Purulent drainage

□ Redness

Specific site of organ/space SSI

□ Arterial or venous	□ Joint or bursa
□ Bone (osteomyelitis)	□ Mediastinum
□ Breast abscess/mastitis	□ Meningitis
□ Endocardium	□ Myocardium or pericardium
□ Gastrointestinal tract	□ Vaginal cuff
□ Intra- abdominal	□ Vertebral disc space
□ Intracranial	

SSI Causative micro-organisms (only report those considered to be causing infection)

Organism 1 Code:	Organism 2 Code:	Organism 3 Code:

Second SSI: If the patient develops another SSI related to this surgical procedure, complete the SSI data on another data sheet with the patient identifier details attach the sheets and submit both SSI under the same record.

Appendix 3

Site Infection Surveillance Service

Surveillance data sheet cardiac (non-CABG) surgical site infection

Reconciliation Box Use to match with web entry	
Serial No. (enter Serial number from web submission):	
SSI: ☐Yes ☐No	**Detected:** ☐ Inpatient ☐ Readmission ☐ Post discharge ☐ Patient reported

Patient Name:	**Surveillance year:**	
Ward:	**Surveillance period:**	
NHS Number:	**Date of Hospital Admission:**	
Date of Birth:	**Date of Operation:**	
Gender Male/Female/Unknown	**Height** [cm]	**Weight** [kg]
Operation Duration Minutes:	**ASA Score** ☐ Class 1 ☐ Class 2 ☐ Class 3 ☐ Class 4 ☐ Class 5 ☐ Unknown	**Description of procedure** OPCS Code 1: OPCS Code 2: OPCS Code 3:
Type of Closure ☐ Primary ☐ Delayed	**Wound Class** ☐ 1 Clean ☐ 2 Clean contaminated ☐ 3 Contaminated ☐ 4 Dirty ☐ 5 Unknown	
Lead Surgeon Grade ☐ FY1 ☐ Other ☐ Specialist trainee ☐ Specialist registrar ☐ Associate specialist ☐ Staff grade ☐ FY2 (SHO) ☐ Other ☐ Unknown	**Surgeon Code** Lead surgeon: Second surgeon:	

Type of Surgery □ Elective □ Emergency	**Operation due to trauma** □ No □ Yes	**Antimicrobial Prophylaxis** □ No □ Yes □ Unknown
Prosthetic Implant □ No □ Yes	**Multiple surgical procedures through the same incision** □ No □ Yes	
Ward visits for case review Date:	Signs/symptoms:	Other criteria for infection:

Date Inpatient Survey Stopped:	**Reason Survey Stopped** □ 30th day of post-operative stay (if no implant) □ Died □ Discharged home/to another care facility □ Follow-up completed - patient still in hospital □ Late re-operation (after 72 hours)

Surgical Site Infection □ Yes □ No	**Detection of SSI** □ At re- admission □ During admission □ Other post-discharge follow-up □ Post discharge patient reported only	**Date of onset of SSI:**

SSI Type

□ Deep incisional □ Organ / space □ Superficial incisional

Criteria for SSI (indicate all that apply)

- □ Abscess or other evidence of infection found during a re-operation, by radiology or histopath examination
- □ Antibiotics prescribed by GP for SSI (patient reported only)
- □ Aspirated fluid/swab of surgical site yields organisms and pus cells are present
- □ Clinician's diagnosis
- □ Fever (temperature 38ºC or more)
- □ Heat
- □ Incision spontaneously dehisces or opened by surgeon/dehisces
- □ Localised pain or tenderness
- □ Localised swelling
- □ Purulent drainage
- □ Redness

<table>
<tr><td colspan="2">Specific site of organ/space SSI
□ Arterial or venous
□ Bone (osteomyelitis)
□ Breast abscess/mastitis
□ Endocardium
□ Gastrointestinal tract
□ Intra- abdominal
□ Intracranial
□ Joint of bursa</td><td>
□ Mediastinum
□ Meningitis
□ Myocardium or pericardium
□ Other female reproductive tract
□ Spinal abscess (without meningitis)
□ Vaginal cuff
□ Vertebral disc space</td></tr>
<tr><td colspan="3">SSI Causative micro-organisms (only report those considered to be causing infection)</td></tr>
<tr><td>Organism 1
Code:</td><td>Organism 2
Code:</td><td>Organism 3
Code:</td></tr>
<tr><td colspan="3">Second SSI: If the patient develops another SSI related to this surgical procedure, complete the SSI data on another data sheet with the patient identifier details attach the sheets and submit both SSI under the same record.</td></tr>
</table>

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Appendix 4

Surgical Site Infection Surveillance Service

Post discharge surveillance data sheet

Surgical category:			
Serial No. (enter Serial number from web submission):			
Patient Name:		**Surveillance year:**	
NHS Number:		**Surveillance period:**	
Hospital Record No.:		**Date of Hospital Admission:**	
Date of Birth:		**Date of Operation:**	
30th day post-op:	**Date reviewed:**	**Review location:**	
SSI: ☐Yes ☐No	**Type of SSI** ☐ Superficial ☐ Deep ☐ Organ/space	**Date of onset SSI**	**For CABG indicate site of SSI** ☐ Chest incision ☐ Donor site incision
For organ/space SSI indicate specific site ☐ Arterial or venous ☐ Bone (osteomyelitis) ☐ Breast abscess/mastitis ☐ Endocardium ☐ Gastrointestinal tract ☐ Intra- abdominal ☐ Intracranial ☐ Joint of bursa		☐ Mediastinum ☐ Meningitis ☐ Myocardium or pericardium ☐ Other female reproductive tract ☐ Spinal abscess (without meningitis) ☐ Vaginal cuff ☐ Vertebral disc space	
Symptoms/Comments:			
Criteria for SSI (indicate all that apply) ☐ Abscess or other evidence of infection found during a re-operation, by radiology or histopath examination ☐ Antibiotics prescribed by GP for SSI (patient reported only) ☐ Aspirated fluid/swab of surgical site yields organisms and pus cells are present ☐ Clinician's diagnosis ☐ Fever (temperature 38ºC or more) ☐ Heat			

□ Incision spontaneously dehisces or opened by surgeon/dehisces □ Localised pain or tenderness □ Localised swelling □ Purulent drainage □ Redness			
Your role	**Staff name**	**Phone number**	**Ward/Hospital/Practice**

Definitions for SSI

Superficial Incisional Infection

SSI that occurs within 30 days of surgery, involves only the skin or subcutaneous tissue of the incision and meets at least one of the following criteria:

1. Purulent drainage from superficial incision.
2. Culture of organisms and pus cells present:
    a. fluid or tissue from superficial incision
    b. wound swab from superficial incision
3. At least 2 symptoms of inflammation: pain, tenderness, localised swelling, redness, heat, and either:
    a. incision deliberately opened to manage infection, or
    b. clinicians' diagnosis of superficial SSI

Note: An infection involving both superficial and deep incisional = deep incisional.

Deep Incisional Infection

SSI involving the deep tissues (that is, fascial and muscle layers) within 30 days of surgery (or one year if an implant is in place) and the infection appears to be related to the surgical procedure and meets at least one of the following criteria:

1. Purulent drainage from deep incision (not organ space).
2. Organisms from culture and pus cells present in:
    a. fluid / tissue from deep incision or
    b. wound swab from deep incision
3. deep incision dehisces or deliberately opened, and patient has at least one symptom of: fever or localised pain or tenderness
4. Abscess or other evidence of infection in deep incision:
    a. re-operation
    b. histopathology
    c. radiology
5. Clinicians diagnosis of deep incisional SSI.

Note: An infection involving both superficial and deep incisional = deep incisional

Organ/space Infection

SSI involving the organ/space (other than the incision) opened or manipulated during the surgical procedure, that occurs within 30 days of surgery (or 1 year if an implant is in place) and the infection appears to be related to the surgical procedure and meets at least one of the following criteria:

1. Purulent drainage from drain (through stab wound) into organ space.
2. Organisms from culture and pus cells present:
    a. Fluid or tissue from organ/space or
    b. Swab from organ/space
3. Abscess or other evidence of infection in organ/space: re-operation / histopathology / radiology
4. Clinicians diagnosis of organ/space infection.

If the SSI meets the organ/space definition, then identify the specific site.

Note**:** If infection drains through incision = deep incisional

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Appendix 5

Surgical Site Infection Surveillance Service

Surgical wound healing post discharge questionnaire

Hospital number	
Full name	
Date of birth	

*To be completed by hospital staff or place addressograph

Staff use only (Please enter your hospital name, address and the name of the person responsible for collecting the questionnaire at the hospital in this box).	

Category of procedure			
Serial Number		**Date of birth**	
Date of operation		**Date form to be completed** (30 days after operation)	

Dear Patient,

We are monitoring all patients with surgical wounds, to detect patients who develop wound infection after surgery.

Please complete the following questionnaire and return it in the envelope provided on the 30th day after your operation (See above for this date) or as soon as possible after that day.

Please enter the date you completed this questionnaire ___/___/___

Have you had any problems with the healing of your wound?
□ YES □ NO

If you have answered NO, you do not need to continue with the rest of the form, but it is very important that you return it to the hospital in the envelope provided. Thank you for taking the time to do this. If you have answered YES, please read the following carefully and complete the rest of the form.

Since you were discharged from hospital after your operation have you noticed any of the following symptoms?

Was there any discharge or leakage of fluid from any part of the wound? ❒ Yes ❒ No

If yes, was it either; ❒ Clear or blood stained ❒ Yellow/green (pus) ❒ Other-please specify:

Please tick any of the following additional symptoms that applied to your wound:
❒ Pain or soreness in addition to the discomfort experienced following the operation
❒ Redness or inflammation spreading from the edges of the wound
❒ The area around the wound felt warmer/hotter than the surrounding skin
❒ The area around the wound became swollen
❒ The edges of any part of the wound separated or gaped open

Did any health care worker take a sample from your wound to send to the laboratory?
❒ Yes ❒ No

If you saw a health care worker because of these symptoms, please indicate who you saw from the list below:
❒ GP
❒ District nurse
❒ Midwife
❒ Doctor or nurse at the hospital
❒ Other – please specify
❒ Did not see one about my wound

Please tell us the date you noticed these symptoms.
If you cannot remember the exact date, please give an approximate date ___/___/___

Have you been prescribed antibiotics for an infection in the wound?

❒ Yes ❒ No If yes, who prescribed them? _____

Have you been re-admitted to hospital with an infection of the surgical wound?

To the hospital at which the operation was carried out? ❒ Yes ❒ No

To another hospital? ❒ Yes ❒ No
If yes, which one? _____

Other comments

For Office Use Only: (To be completed by surveillance co-ordinator only)

Patient reported SSI meets definition ❒Yes ❒ No
If yes enter criteria for SSI:

❒ Criterion 1 Discharge pus + antibiotics prescribed
❒ Criterion 2 Clinical signs* + dehiscence
❒Criterion 3 Clinical signs* + antibiotics prescribed

*Clinical signs- at least 2 of pain, heat, redness or swelling.

Enter criteria selected into weblink record for this patient.

Note: Do not report stitch abscess (discharge confined to points of suture penetration, minimal inflammation).

Appendix 6. Standard codes for micro-organisms in alphabetical order

I. Bacteria

010 Acinetobacter spp
012 Acinetobacter baumannii (anitratus)
014 Acinetobacter lwoffii
030 Aeromonas spp.
050 Alcaligenes spp
071 Anaerobic cocci (unspecified)
090 Bacillus spp.

110 Bacteroides spp.
113 Bacteroides fragilis group
130 Burkholderia (Pseudomonas) spp.
132 Burkholderia cepacia
160 Chryseomonas spp.
180 Citrobacter spp.
182 Citrobacter diversus (koserii)
184 Citrobacter freundii

200 Clostridium spp.
202 Clostridium difficile
204 Clostridium perfringens
206 Clostridium septicum
221 Coliforms (unspecified)
240 Corynebacterium spp.
242 Corynebacterium jeikeium
251 Diphtheroids (unspecified)
270 Enterobacter spp.
272 Enterobacter aerogenes
274 Enterobacter agglomerans
276 Enterobacter cloacae
290 Enterococcus spp*.
291 Enterococcus spp (vancomycin - resistant)
292 Enterococcus faecalis*
293 Enterococcus faecalis (vancomycin - resistant)
294 Enterococcus faecium*
295 Enterococcus faecium (vancomycin - resistant)
311 Escherichia coli
330 Flavobacterium spp.

350 Fusobacterium spp.
380 Haemophilus spp.
382 Haemophilus influenzae
384 Haemophilus parainfluenzae

400 Hafnia spp.
420 Klebsiella spp.
422 Klebsiella pneumoniae (aerogenes)
424 Klebsiella oxytoca
450 Legionella spp.
452 Legionella pneumophila
470 Listeria spp.
472 Listeria monocytogenes
490 Micrococcus spp.

510 Moraxella spp.
512 Moraxella (Branhamella) catarrhalis
531 Morganella morganii
552 Mycobacterium avium
554 Mycobacterium chelonae
556 Mycobacterium fortuitum
558 Mycobacterium tuberculosis
559 Mycobacterium - other spp.
570 Neisseria spp.
572 Neisseria meningitidis
590 Nocardia spp.
592 Nocardia asteroides

620 Peptococcus spp.
630 Peptostreptococcus spp.
640 Prevotella spp.
650 Propionibacterium spp.
670 Proteus spp.
672 Proteus mirabilis
674 Proteus vulgaris
690 Providencia spp.
692 Providencia alcalifaciens
694 Providencia rettgeri
696 Providencia stuartii

710 Pseudomonas spp.
712 Pseudomonas aeruginosa
732 Salmonella enteritidis
733 Salmonella paratyphi

734 Salmonella typhi
739 *Salmonella* - other spp.
750 *Serratia* spp.
752 *Serratia liquefaciens*
754 *Serratia marcescens*
770 *S. aureus,* meticillin-resistant (MRSA)*
771 MRSA, vancomycin-intermediate (VISA/GISA)
772 *S. aureus,* meticillin-sensitive (MSSA)
780 *Staphylococcus,* coagulase-negative (CNS)
782 *Staphylococcus epidermidis*
783 *Staphylococcus haemolyticus*
784 *Staphylococcus hominis*
785 *Staphylococcus lugdunensis*
786 *Staphylococcus saprophyticus*
787 *Staphylococcus schleiferi*

801 *Stenotrophomonas (Xanthomonas) maltophilia*
821 *Streptococcus agalactiae* (group B)
822 *Streptococcus bovis*
823 *Streptococcus pneumoniae*
824 *Streptococcus pyogenes* (group A)
825 *Streptococcus* 'viridans group'
826 *Streptococcus milleri*
829 *Streptococcus* - other aerobic spp.
840 *Yersinia* spp.
842 *Yersinia enterocolitica*
860 Other Gram-negative bacteria
870 Other Gram-positive bacteria
880 Other anaerobes
890 Other bacteria

II. Fungi and Yeasts

910 Aspergillus spp.
920 Candida spp.
922 Candida albicans
924 Candida tropicalis
940 Other fungi/yeasts

* Vancomycin sensitive or not tested.

About the UK Health Security Agency

The UK Health Security Agency is an executive agency, sponsored by the Department of Health and Social Care.

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