Welcome to this training resource.

It has been designed for all healthcare workers involved in coordinating SSI surveillance, SSI surveillance data collection, assessment and management of surgical wounds and the diagnosis and/or treatment of SSIs.

This resource is not intended to provide you with in depth knowledge of SSI surveillance but it will provide you with some basic facts which may be new to you or which can refresh your memory. It also contains links to useful resources which you may find helpful.

This resource can be used locally for one to one learning or for use by local trainers for small group sessions. It contains

• Learning outcomes
• A brief overview of SSI surveillance and its importance
• Agreed definitions of SSIs
• Guidance on taking microbiology samples from a wound
LEARNING OUTCOMES

- **apply** national definitions to identify an SSI
- **use** definitions to accurately record an SSI
- **define** how data can be used for improvement

On completion of this presentation you should be able to meet the learning outcomes.
A **surgical site** is the incision or cut in the skin made by a **surgeon** to carry out a **surgical** procedure, and the tissue handled or manipulated during the procedure.

Surgical site infection (SSI) is one of the most common types of healthcare associated infection (HAI), estimated to account for 16.5% of inpatient HAI within NHSScotland.

A surgical site is the incision or cut in the skin made by a surgeon to carry out a surgical procedure, and the tissue handled or manipulated during the procedure.

SSI can have serious consequences for patients as they may double the length of hospital stay, result in pain and suffering and also possible further surgery. These consequences can further cause unexpected social disruption for the patients and their families.

SSIs can also cause increase costs in the community settings for GPs, Practice and District Nurses and patient treatments.
SSIs

Causes?

▪ **Intrinsic factors** (patients own risk factors)
▪ **Extrinsic factors** (environment or equipment)

When do they develop?

▪ from two or three days after surgery
  or
▪ until the wound has healed (usually two to three weeks after the operation)

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**Causes**

Health Protection Scotland (HPS) have produced a Preventing SSIs Cause and Effect (CE) chart, also sometimes called a 'fishbone' diagram. It is a tool used to discover the possible causes for a particular effect e.g. intrinsic and extrinsic SSIs. It can also be used to highlight areas for improvement.

Note: View the [Preventing SSI Cause and Effect Chart](http://www.hps.scot.nhs.uk/haiic/ic/resourcedetail.aspx?id=663) and discuss if working in small group sessions or view for one to one learning.

**When do SSIs develop?**

Most surgical wounds heal up quickly without any complications but some patients may develop an infection. Most SSIs will occur with 30 days of surgery and the patient will likely be at home.

Very occasionally, an infection can occur up to 90 days after an operation especially if there is an implant (orthopaedic or vascular). These infections are normally deep/organ space and require readmission to hospital. The infection may not be visible at the surgical wound site as it affects internal tissues or organs.
How can you help to prevent SSIs?

Follow nationally agreed:

- Standard Infection Control Precautions
- SSI Care bundles (theatres and wards)
- Evidence based SSI key recommendations

www.hps.scot.nhs.uk

All healthcare workers involved in SSI surveillance play an important role in helping NHS Boards meet the national requirements for surveillance.

As part of the continuing work to reduce SSIs, Health Protection Scotland has produced quality improvement tools with supporting evidence which you can use to help you improve practice. These include Key Recommendations and an SSI Care Bundle for ward and theatre areas.

Health Protection Scotland provides advice, support and information to frontline healthcare professionals, national and local government, the general public and a number of other bodies that play a part in protecting health. They coordinate, facilitate and support the implementation of SSI surveillance, analyse data, publish reports and provide timely feedback of local SSI rates to assist healthcare providers to minimise the occurrence of SSI.


Note

For one to one learning it would be useful to find out who is responsible for coordinating SSI surveillance within your NHS Board.
For small group sessions it might be useful to highlight who is responsible for coordinating SSI surveillance within your NHS Board.

Surveillance involves the multidisciplinary team and local ownership is crucial if SSIs are to be reduced. Feedback to clinicians can contribute to reducing SSIs if the data are complete and accurate.

These data are then applied to infection prevention and control improvements.

**Note**

**If you are undertaking this resource on a one to one basis think about what SSI surveillance procedures are being carried out in your area, how you collect data, how you feedback data (how often and to whom).**

**If you are carrying out small group sessions discuss what SSI surveillance procedures are being carried out in your area, how you collect data, how you feedback data (how often and to whom)**

Contact your manager, colleagues or Infection Prevention and Control or Surveillance Team to help you.
If your Board does not perform any of these procedures then you should substitute 2 procedures from the chosen voluntary list. *Scottish Surveillance of Healthcare Associated Infection Programme (SSHAIP) surgical site infection surveillance protocol*

- Abdominal Hysterectomy
- Breast Surgery
- Caesarean Section
- Cardiac Surgery
- Coronary Artery Bypass Graft (CABG)
- Hip arthroplasty
- Knee arthroplasty
- Large bowel
- Major Vascular
- Reduction of long bone fracture
- Repair of neck of femur
- Small bowel
The Scottish Surveillance of HAI Programme (SSHAIP) team in Health Protection Scotland (HPS) coordinates the mandatory national SSI Surveillance programme in NHSScotland.

The results from the programme are used to calculate SSI rates for local, national and international comparison.

Accurate local data collection using a common set of national definitions helps NHS Boards to:

• review their data to improve clinical practice
• improve performance
• improve patient outcomes.
APPLYING NATIONAL SSI DEFINITIONS

- ensures that data are valid, reliable and comparable
- monitors trends of SSI both locally and nationally
- develops, implements and evaluates improved practices
- evaluates impact of interventions
- monitors outbreaks of infection
- acts as an early warning signal for further investigation

If agreed definitions are not applied there may be an over estimation of local or national SSI rates and the potential for inappropriate antibiotic prescribing.

Note

Applying national definitions to everyday practice is essential to improve patient outcomes. Ask yourself...am I doing what I should be doing? Could I do better?
Most surgical wound infections are limited to the skin, but can occasionally spread to deeper tissues.

This slide shows how SSIs are clearly defined depending on the depth of the wound and the layers of tissue and/or organ space involved.

These 3 depths of SSIs will be discussed in the next few slides but first it is important to refresh your knowledge of the normal stages of wound healing.

Move to next slide.
The wound healing process can be divided into four main phases which do not occur in isolation. This means it is difficult to place a definite timescale on the healing process and approximate timescales are given in Table 1.

<table>
<thead>
<tr>
<th>STAGE OR PHASE OF HEALING</th>
<th>TIMESCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemostasis (blood clotting)</td>
<td>Within a few seconds of tissue injury</td>
</tr>
<tr>
<td>Inflammation</td>
<td>1 - 5 days</td>
</tr>
<tr>
<td>Proliferation or reconstructive</td>
<td>3 - 24 days</td>
</tr>
<tr>
<td>Maturation or remodelling</td>
<td>21 days onwards but may take over 1 year</td>
</tr>
</tbody>
</table>

Some surgical incisional wounds leak fluid but **this alone** does not mean that there is an infection present.

It is now important for you to understand the different national definitions and how to recognise an SSI.

**Move to next slide.**
The next few slides will outline the definitions for superficial incisional, deep incisional and organ/space SSI definitions.

This is perhaps the most important part of the presentation for you to understand an apply to practice.
Infection occurs within 30 days after the operation and involves only skin and subcutaneous tissue of the incision and at least one of the criteria on the slide.

Most SSIs that you are likely to see are superficial incisional.

A superficial incisional SSI involves only Infection occurring within 30 days is taken from the Centre for Disease Control’s work on hospital acquired SSIs which states that majority (99.8%) occurred within this timeframe.

Purulent discharge should be easily recognisable however people can get confused between this and ‘yellow’ lymph drainage, which can also occur naturally following surgery and serous fluid which is clearer.

We will discuss common organisms causing SSIs later and also the methods used to take a sample to ensure what is cultured is accurate.

The opening of an incision by a surgeon may or may not be common in your area. However, following these definitions if there are any signs/symptoms they can only be classified as infection if the surgeon opens the incision.

Therefore in the last criteria if it is felt that infection is present but does not fit under any of the other criteria it can still be included on the surveillance form as SSI.
present.
This slide shows a superficial SSI on the leg of a male patient. You can see the localised area of redness and swelling around the stitch line. Remember the Depth of SSIs slide earlier? The infection involves only the skin and subcutaneous tissue of the incision.

**Note**

You may wish to insert a photograph of another patient relevant to your specialty with a superficial incisional SSI.
NOT REPORTED AS SUPERFICIAL INCISIONAL SSIs

- Stitch or staple abscess (minimal inflammation and discharge confined to the points of suture penetration) haematoma
- Infected burn wound e.g. diathermy
- Incisional SSI that extends into the fascial or muscle layers (deep incisional SSI)

Remember the importance of accurately recording SSIs and that if agreed definitions are not applied there may be an over estimation of local or national SSI rates and the potential for inappropriate antibiotic prescribing.
DEEP INCISIONAL SSI

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

A deep incisional infection is considered present if it appears to be related to the operation and infection involves deep soft tissue (e.g. fascia, muscle) of the incision and at last one of the criteria on the slide.

Following the 30 day period, infections that occur will be deep rather than superficial.

Most patients with deep infections will be readmitted to hospital and may be identified through post discharge surveillance or from hospital readmission/reoperation data.

Those operations that include an implant for example orthopaedic prosthesis, heart valves could present with an infection up to 1 year following surgery. Joint failure could also be due to infection.
The picture below shows an example of a deep incisional SSI. You can see the wound is dehisced (split open) and there are areas of pus and black necrotic (dead) tissue.

Remember the Depth of SSIs slide earlier? The infection involves the deep soft tissue (fascia and muscle).

This slide shows a deep incisional SSI on the lower leg of a male patient. You can see the wound is dehisced and there are areas pus and black necrotic (dead) tissue.

Note

You may wish to insert a photograph of another patient relevant to your specialty with a deep incisional SSI.
ORGAN/SPACE SSI

Related to the operation and the infection involves organs or spaces other than the surgical incision site which was opened or handled during the operation and at least one of the criteria opposite:

- **Purulent drainage** from a drain that is placed through a stab wound into the organ/space
- **Organisms isolated** from an aseptically obtained culture of fluid or tissue in the organ/space
- An **abscess or other evidence of infection** involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination
- **Diagnosis** of organ/space SSI made by a surgeon or attending physician.

Organ/space SSIs can occur up to 30 days after the operation if no implant is left in place or within 90 days if an implant is in place (orthopaedic or vascular). The infection may not be visible at the surgical wound site as it affects internal tissues or organs.

Most patients with deep infections will be readmitted to hospital and may be identified through post discharge surveillance or from hospital readmission/reoperation data.

**Note**

There are a range of nationally agreed definitions for specific organ/space infections (see next slide)
# Specific Organ/Space Infection Definitions

<table>
<thead>
<tr>
<th>Vascular:</th>
<th>Abdominal Hysterectomy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Arterial or venous infection</td>
<td>▪ Intra-abdominal</td>
</tr>
<tr>
<td><strong>Breast:</strong></td>
<td>▪ Endometritis</td>
</tr>
<tr>
<td>▪ Breast abscess</td>
<td>▪ Vaginal Cuff</td>
</tr>
<tr>
<td>▪ Mastitis</td>
<td>▪ Ovaries, uterus, pelvic cavity</td>
</tr>
<tr>
<td><strong>Orthopaedic:</strong></td>
<td><strong>C-Section:</strong></td>
</tr>
<tr>
<td>▪ Joint or bursa</td>
<td>▪ Endometritis</td>
</tr>
<tr>
<td>▪ Osteomyelitis</td>
<td>▪ Ovaries, uterus, pelvic cavity</td>
</tr>
<tr>
<td><strong>Large and Small Bowel:</strong></td>
<td><strong>C-Section:</strong></td>
</tr>
<tr>
<td>▪ Gastrointestinal tract infection</td>
<td>▪ Endometritis</td>
</tr>
<tr>
<td>▪ Intra abdominal infection</td>
<td>▪ Ovaries, uterus, pelvic cavity</td>
</tr>
</tbody>
</table>

These have been produced by Health Protection Scotland as an Appendix to the Surgical Site Infection Surveillance Protocol.

**Note**

If you are undertaking this resource on a one to one basis have a look at the organ/space definitions relevant to your specialty.

If you are carrying out small group sessions discuss the organ/space definitions relevant to your specialty.
ORGAN/SPACE SSI

This picture shows an example of an orthopaedic organ space SSI. You can see the wound is open and area of bone is exposed.

Remember the Depth of SSIs slide earlier? The infection involves the organ/space.

This slide shows an organ/space infection in the lower leg of a male patient who had been involved in a road traffic accident. You can see a white area of bone and the deep tissues. Infection can lead to osteomyelitis (bone infection) which commonly affects the long bones of the legs after injury and is treated with a 4-6 week course of antibiotics and possibly further surgery.

Note

You may wish to insert a photograph of another patient relevant to your specialty with an organ/space SSI.
ORGAN/SPACE SSI

An organ/space infection following a surgical procedure:

- may not be visible at the wound site as the infection develops within the internal tissues or organs
- develops in specific areas related to specific procedures
- has signs and symptoms related to each procedure

These procedures can be seen in the SSI Surveillance Protocol and Resource Pack Appendix 2

POST DISCHARGE SURVEILLANCE (PDS)

It is recommended that PDS is carried out, in particular for, those procedures that have an expected short length of hospital stay.

PDS is mandatory until day 10 for all caesarean sections post procedure.

- Community midwife follows up mother and baby
- Most SSIs will be identified in the home setting
- Ask mother about any concerns
- Observe wound (follow local protocol)
- Record signs/symptoms of SSIs in mother’s care record and surveillance data collection form
The signs and symptoms of an SSI should always be accurately recorded in the patient’s care record and any surveillance data form. This is important at a later date if an SSI is being investigated.

If you are taking part in an SSI surveillance programme in your Board you will need to record specific information relating to the surgery. The way that this is done may vary between Boards but should be in line with the National Surveillance Programme.

**Note**

*If you are undertaking this resource on a one to one basis find out what the process is for SSI data collection in your Board and what the local escalation procedure is in your place of work if you detect an SSI or if you think that there is an increase in SSIs.*

*If you are carrying out small group sessions discuss what the process is for SSI data collection in your Board and what the local escalation procedure is in your place of work if you detect an SSI or if you think that there is an increase in SSIs.*
If an SSI is suspected then it may be appropriate to collect specimens. Interpreting the results will assist you in correctly diagnosing an infection.

Cultures of fluid, tissue, bone or blood are the only reliable ways of identifying the bacteria responsible for causing an SSI. They also provide antibiotic sensitivities to guide the best patient management.

If pus or exudate is present always take a sample for culture. A wound swab should only be taken if a sample of pus or exudate is not possible.

Pus or exudate may be collected during surgery or from the wound site.

Specimens should be taken before wound cleansing as the maximum number of bacteria will be present. However, any dressing residue should be removed first.

When collecting pus or exudate use an aseptic technique, aspirate the pus or exudate using a sterile syringe and discharge syringe into a sterile universal container.
Laboratory investigation provides clinicians with information about the bacteria present in a wound and the antibiotic resistance patterns, which can inform decisions about patient management.

It helps the microbiology laboratories if you give them as much relevant clinical information on the request form as possible as it helps them to decide what types of bacteria they should look for.

It also provides vital information which is useful when looking at trends and new cases by population at risk over a given period of time.
It is important that you understand what the microbiology results mean. You may have to discuss this with the Consultant Microbiologist or Infection Prevention and Control Team.

Health Protection Scotland has an A-Z subject index that you can access to read more about these and other microorganisms.

Remember

A positive culture result alone does not necessarily indicate an SSI. Signs and symptoms of infection must also be considered. Before prescribing antibiotics consider the culture result and clinical indications.
In this presentation we have discussed the prevention and definitions of SSIs. It is important to remember that SSIs should not be considered a likely consequence of surgery.

You should understand locally how and when SSIs are reported using an Incident Reporting System such as Datix and how they are investigated using a Root Cause Analysis method of problem solving.

**Consider if the SSI could have been prevented.** This can be discussed with the Infection Prevention and Control and/or Surveillance Team.

Health Protection Scotland has developed a range of SSI prevention care bundles and quality improvement tools and supporting evidence which you might find useful. These act as a first step in identifying possible and major causes of the problem and remedial actions.

You can read more about the tools in the Useful Resources section of this presentation.

**If you think that you could make improvements in your SSI rates then contact your line manager, clinicians or Infection Prevention and Control and/or Surveillance Team who will be able to help you.**
USEFUL RESOURCES

- Acute Adult Safety Programme (Point of Care) 2013
- Health Protection Scotland [www.hps.scot.nhs.uk](http://www.hps.scot.nhs.uk)
- NHSScotland Quality Improvement Hub [www.qihub.scot.nhs.uk](http://www.qihub.scot.nhs.uk)
- Scottish Executive (2009). Revised framework for National Surveillance of HAI and the introduction of Healthcare associated infection and the introduction of a new health efficiency and access to treatment (HEAT) target for Clostridium difficile associated disease (CDAD) for NHSScotland.
RECOGNISING SURGICAL SITE INFECTIONS (SSIs)

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