DRAFT SURGICAL WOUNDS RECOMMENDATIONS (v10)

These recommendations are currently receiving the attention of a graphic designer which will change the appearance but not the content of this document)

V10 Surgical Wounds (Draft)

Current Situation

It is estimated that the annual cost to the NHS of managing patients with wounds is between £4.5 billion -£5.1 billion[1]. Of the 2.2 million people with a wound, 29% have an acute wound related to an abscess, burn, surgery or trauma [1]. Some chronic wounds, such as diabetic foot ulcers, pressure ulcers and some types of leg ulcer, will also require surgical procedures.

Only 79% of acute wounds heal within 12 months and for the 21% that fail to heal, there is considerable patient suffering and NHS cost. Most surgery occurs in secondary care, but this only incurs 52% of the total annual NHS cost for acute wounds, with the remaining 48% being incurred outside hospital in community services and primary care[1].

Delayed healing is commonly caused by surgical site infection (SSI). The clinical definition of SSI is an 'infectious process present at the site of surgery. Clinical signs and symptoms of infection include heat, redness, swelling, elevated body temperature and purulent exudate from the wound or the drain' usually within one week of surgery [2]. SSI can result in dehiscence (separation of the margins of a surgically closed wound when wound closure materials are removed) but surgical wound dehiscence (SWD) may also be caused by non-microbial aetiologies such as haematoma, seroma or mechanical stress, obesity or pre-existing chronic disease states. Misdiagnosis of SWD as SSI may lead to potentially severe follow-on consequences for the patient and clinical practice.

In 1997, the Public Health England SSI audits were established by the Public Health Laboratory Service (which preceded Publish Health England (PHE). This national surveillance programme aims to enhance the quality of patient care by encouraging hospitals to compare their SSI rates over time and against a national benchmark. At present, there are 17 surgical data categories that span general surgery, cardiothoracic, neurosurgery, gynaecology, vascular, gastroenterology, and orthopaedics. Since 2004, NHS Trusts that perform orthopaedic surgery have been mandated by the Department of Health to gather surveillance data. Surveillance for other surgical categories remains voluntary.

Following evidence of lack of awareness of SSI rates by frontline clinicians, the Get it Right First Time (GIRFT) SSI programme was established in 2017 to complement the Public Health England SSI audits. The GIRFT SSI audits seek to engage frontline clinicians in the data collection process and explore variation in surgical practice and outcomes for a wider range of procedures and specialties. There are plans for GIRFT to conduct annual SSI surveys to allow comparisons to be drawn over time for procedures and specialties. The GIRFT SSI programme will also include procedures not currently included in the PHE SSI surveillance programme.

Despite these initiatives, it is apparent that there is still considerable variation in practice and outcomes which increases care costs and extends healing times. The incidence of SSIs is also likely to be considerably higher than the rates reported by the PHE and GIRFT audits since these only report on hospital data. In addition, there are challenges around accurate diagnosis of SSI and although the clinical signs and symptoms of SSI usually present within one week of surgery, it is estimated that 50% of SSIs become evident following hospital discharge [2] so hospital audits will not include these. There is a dearth of literature on the prevalence and incidence of SWD, but since SWD most commonly occurs between 7-9 days post-surgery and thus post hospital discharge [3] it is unlikely to be captured in SSI audits.

The main reason for sub-optimal management of SSI and SWD is thought to be unwarranted variation of care with under-use of evidence-based care, over-use of therapies for which there is insufficient evidence [4] and insufficient surveillance systems for monitoring surgical site infection outside hospital care provision. The NWCSP has been tasked with developing a set of recommendations to improve care for patients with surgical wounds. The following recommendations have been developed using an evidence-based practice approach that incorporates research evidence alongside clinical expertise and consideration of healthcare costs and patient views.

The recommendations signpost to relevant clinical guidelines or outline evidence-informed care that will improve healing and optimise the use of healthcare resources. The recommendations provide a clinical navigation tool that aims to reduce the risk of wound healing complications with swift escalation of treatment or service provision for those who develop such complications. These recommendations offer a framework for the development of local delivery plans that includes consideration of:

- Relevant research evidence (where it exists) to inform care.
- Configuration of services, and deployment of workforce.
- Appropriate education for that workforce; and
- Relevant metrics to measure quality improvement.

These recommendations are not intended to replace existing evidence-informed clinical guidelines but to bring attention to such evidence, support planning for implementation into clinical practice and provide information to inform other condition-specific clinical guidance.

In addition to the recommendations that follow which are specific to the different stages of surgery and recovery, it is recommended that clinicians interested in establishing wound care services, should seek to manage wounds as a team. This process can begin at local level by identifying relevant local services and then seeking collaboration to develop:

- Referral mechanisms,
- Data systems with functionality to share patient data and outcome data across different clinical provider organisations. [2]

Identification, prevention, management and treatment of SSI should be underpinned by current antimicrobial stewardship guidance such as outlined in these publications:

- WHO Global Action Plan on Antimicrobial Resistance [5]
- Antimicrobial stewardship in wound care: a Position Paper from the British Society for Antimicrobial Chemotherapy and European Wound Management Association [6]
- Wounds UK Best Practice Statement: Antimicrobial stewardship strategies for wound management.[7]

Pre-Surgery Assessment and Information

A structured approach to care should be used to improve overall management of surgical wounds. For elective surgery, this should include preoperative assessments to identify people with potential wound healing problems. Enhanced education of healthcare workers, patients and carers, and sharing of clinical expertise is needed to support this. [8]

Delayed healing can be due to:

- Lifestyle factors
  - Smoking
  - Nutrition

- Pre-existing co-morbidities:
  - Diabetes
  - Obesity
  - Depression (and other mental health issues that impact on wound care)
  - Chronic obstructive pulmonary disease
  - Peripheral arterial disease
  - Immunodeficiency (side effect of immunosuppressant use) [3]

- Psychological and Social factors
  - Learning disabilities and/or autism
  - Homelessness

- Cultural and ethnicity factors [9]
  - Language
  - Health-related beliefs and practices
  - Privacy issues

Before surgery, patients should be encouraged to discuss:

- Lifestyle factors
- Recent travel history
- If know, current methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant Enterococcus (VRE) status, or if unknown, the need for screening.
- Current medical conditions (especially in relation to diabetes and cardiopulmonary conditions)

with their health professionals as part of a holistic assessment process, to address any modifiable issues in advance of planned surgery. [2]

Patients undergoing elective surgery should have a preoperative assessment to stratify risk of SSI/SWD which should be used to inform the consent process. Where possible, this should be done using a validated risk assessment tool relevant to the surgical speciality in conjunction with clinical judgement.

Patients should also be provided with written information specific to the type of surgery planned and post-operative recovery.

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Explanatory Notes

Preoperative assessment *to stratify risk of SSI /SWD is recommended to inform the consent process and reduce the risk of SSI /SWD However, the risk factors vary according to the type of surgery being planned and there is currently a lack of evidence as to which risk assessment tools are the most valid and reliable for different types of surgery. It is not possible to recommend specific tools for specific types of surgery, but a list of risk assessment tools that are currently in use can be found in Appendix A.*

Cultural/ethnic/ religious factors: *This may include physical factors such as increased risk of hypertrophic and keloid scarring as well as health-related beliefs in relation to medicine and surgical practices and cultural factors (e.g. language and communication, privacy issues) that may predispose towards delayed healing, access to services and follow up.*

Patient information *An example of appropriate patient resources are the Royal College of Anaesthetists' 'Fitter, Better, Sooner' resources*[10]

Pre-Operative Phase (24 hours before surgery)

Care should follow the recommendations of:

NICE Guideline: Surgical site infections: prevention and treatment (2020) [8]

NICE Pathway: Preventing and Treating Surgical Site Infection [11]

WHO: Global Guidelines for the Prevention of Surgical Site Infection [12]

The key recommendations for prevention of surgical site infections in the pre-operative phase are:

a. Discuss and address any cultural/ethnic/ religious factors that may impact on care during this phase and onwards.

b. Preoperative showering
   i. Advise patients to shower or have a bath (or help patients to shower, bath or bed bath) using soap, either the day before, or on the day of, surgery. [8]

c. Nasal decolonisation in line with the NICE Guideline on Surgical Site Infections[8]
   i. Consider nasal mupirocin in combination with a chlorhexidine body wash before procedures in which *Staphylococcus aureus* is a likely cause of a surgical site infection. This should be locally determined and take into account:
      - the type of procedure
      - individual patient risk factors
      - the increased risk of side effects in preterm infants
      - the potential impact of infection.[8]
   ii. Maintain surveillance on antimicrobial resistance associated with the use of mupirocin.[8, 13]

d. Hair removal
   i. Do not use hair removal routinely to reduce the risk of surgical site infection.
   ii. If hair has to be removed, use electric clippers with a single-use head on the day of surgery. Do not use razors for hair removal, because they increase the risk of surgical site infection. [8]

e. Mechanical bowel preparation
   Do not use mechanical bowel preparation routinely to reduce the risk of surgical site infection. [8]

f. Hand jewellery, artificial nails and nail polish
   i. The operating team should remove hand jewellery before operations.
   ii. The operating team should remove artificial nails and nail polish before operations. [8]

g. Antibiotic prophylaxis should be in line with the NICE Guideline on Surgical Site Infection [8]
   i. Give antibiotic prophylaxis to patients before:
      - clean surgery involving the placement of a prosthesis or implant
      - clean-contaminated surgery
      - contaminated surgery.
   ii. Do not use antibiotic prophylaxis routinely for clean non-prosthetic uncomplicated surgery.
   iii. Use the local antibiotic formulary and always take into account the potential adverse effects when choosing specific antibiotics for prophylaxis.
   iv. Consider giving a single dose of antibiotic prophylaxis intravenously on starting anaesthesia. However, give prophylaxis earlier for operations in which a tourniquet is used.
   v. Before giving antibiotic prophylaxis, take into account the timing and pharmacokinetics (for example, the serum half-life) and necessary infusion time of the antibiotic. Give a repeat dose of antibiotic prophylaxis when the operation is longer than the half-life of the antibiotic given.
   vi. Give antibiotic treatment (in addition to prophylaxis) to patients having surgery on a dirty or infected wound.
   vii. Inform patients before the operation, whenever possible, if they will need antibiotic prophylaxis, and afterwards if they have been given antibiotics during their operation. [8]

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Intra-operative Phase

Care should follow the recommendations of:

NICE Guideline: Surgical site infections: prevention and treatment (2019) [8]

NICE Pathway: Preventing and Treating Surgical Site Infection [11]

WHO: Global Guidelines for the Prevention of Surgical Site Infection [12]

WHO Surgical Safety Checklist [14]

The Association for Perioperative Practice: Infection Control[15]

The key recommendations for prevention of surgical site infections in the intra-operative phase are:

a. Patient theatre wear
Give patients specific theatre wear that is appropriate for the procedure and clinical setting, and that provides easy access to the operative site and areas for placing devices, such as intravenous cannulas. Take into account the patient's comfort and dignity.[8]

b. Staff theatre wear
All staff should wear specific non-sterile theatre wear in all areas where operations are undertaken. [8]

c. Hand decontamination
   i. The operating team should wash their hands prior to the first operation on the list using an aqueous antiseptic surgical solution, with a single-use brush or pick for the nails and ensure that hands and nails are visibly clean.
   ii. Before subsequent operations, hands should be washed using either an alcoholic hand rub or an antiseptic surgical solution. If hands are soiled, then they should be washed again with an antiseptic surgical solution. [8]

d. Incise drapes
   i. Do not use non-iodophor-impregnated incise drapes routinely for surgery as they may increase the risk of surgical site infection.
   ii. If an incise drape is required, use an iodophor-impregnated drape unless the patient has an iodine allergy. [8]

e. Sterile gowns
The operating team should wear sterile gowns in the operating theatre during the operation.[8]

f. Gloves
Consider wearing 2 pairs of sterile gloves when there is a high risk of glove perforation and the consequences of contamination may be serious. [8]

g. Staff leaving the operating area
Staff wearing non-sterile theatre wear should keep their movements in and out of the operating area to a minimum. [8]

h. Antiseptic skin preparation

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i. Prepare the skin at the surgical site immediately before incision using an antiseptic preparation.
ii. Be aware of the risks of using skin antiseptics in babies, in particular the risk of severe chemical injuries with the use of chlorhexidine (both alcohol-based and aqueous solutions) in preterm babies.
iii. When deciding which antiseptic skin preparation to use, consider the advice in the NICE Guideline (Table 1)
iv. If diathermy is to be carried out use evaporation to dry antiseptic skin preparations and avoid pooling of alcohol-based preparations. [8]

i. Diathermy
Do not use diathermy for surgical incision to reduce the risk of surgical site infection.[8]

j. Maintaining patient homeostasis
i. Maintain patient temperature in line with NICE's guideline on hypothermia: prevention and management in adults having surgery.

ii. Maintain optimal oxygenation during surgery. In particular, give patients sufficient oxygen during major surgery and in the recovery period to ensure that a haemoglobin saturation of more than 95% is maintained.

iii. Maintain adequate perfusion during surgery. See additional recommendations on intravenous fluids and cardiac monitoring for adults in NICE's guideline on perioperative care in adults.

iv. Do not give insulin routinely to patients who do not have diabetes to optimise blood glucose postoperatively as a means of reducing the risk of surgical site infection. See the additional recommendation on blood glucose control for adults in NICE's guideline on perioperative care in adults.

k. Wound irrigation and intracavity lavage
i. Do not use wound irrigation to reduce the risk of surgical site infection.
ii. Do not use intracavity lavage to reduce the risk of surgical site infection. [8]

l. Antiseptics and antibiotics before wound closure
i. Only apply an antiseptic or antibiotic to the wound before closure as part of a clinical research trial.
ii. Consider using gentamicin-collagen implants in cardiac surgery[8]

m. Closure methods
i. When deciding on closure methods, consider NICE guidance[16]
ii. When using sutures, consider using antimicrobial triclosan-coated sutures, especially for paediatric surgery, to reduce the risk of surgical site infection.
iii. Consider using sutures rather than staples to close the skin after caesarean section to reduce the risk of superficial wound dehiscence.[8]

n. Wound dressings
i. Before dressing the wound, consider capturing a digital image of the wound using NHS compliant digital technology and upload the image to the patient's clinical record.
ii. Cover surgical incisions with an appropriate interactive dressing at the end of the operation.[8] [11]

Explanatory Notes

Wound irrigation and intracavity lavage: Although the NICE Guideline for Surgical Site Infection advises against wound irrigation, the Cochrane Review of Intracavity lavage and wound irrigation for prevention of surgical site infection[17] suggests that further high quality research is needed to look at the potential for different types of intraoperative irrigation to reduce SSI in closed surgical wounds.

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Post-Operative Phase

Care should follow the recommendations of:

NICE Guideline: Surgical site infections: prevention and treatment (2019) [8]

NICE Pathway: Preventing and Treating Surgical Site Infection [11]

WHO: Global Guidelines for the Prevention of Surgical Site Infection [12]

NICE Guideline for Sepsis: Recognition, Diagnosis and Early Management [18]

The key recommendations for prevention of surgical site infections and treatment of infected wounds and those healing by secondary intention in the post-operative phase are:

a. Changing dressings
   i. Use an aseptic non-touch technique for changing or removing surgical wound dressings. [8]
   ii. Monitor pain and offer appropriate analgesia

b. Wound Assessment
   i. Wounds assessment should use the minimum data criteria [19] as the basis for wound assessment.
   ii. Care providers that undertake wound care should be able to capture a digital image of the wound using NHS compliant digital technology and upload the image to the patient's clinical record.

c. Postoperative wound cleansing
   i. Use sterile saline for wound cleansing up to 48 hours after surgery.
   ii. Advise patients that they may shower safely 48 hours after surgery.
   iii. Use potable tap water for wound cleansing after 48 hours if the surgical wound has separated or has been surgically opened to drain pus. [8]

d. Topical antimicrobial agents for wound healing by primary intention
   Do not use topical antimicrobial agents for surgical wounds that are healing by primary intention to reduce the risk of surgical site infection. [8]

e. Dressings for wound healing by secondary intention
   i. Do not use Eusol and gauze, or moist cotton gauze or mercuric antiseptic solutions to manage surgical wounds that are healing by secondary intention.
   ii. Use an appropriate interactive dressing to manage surgical wounds that are healing by secondary intention.[8]
   iii. Ask a tissue viability nurse (or another healthcare professional with tissue viability expertise) for advice on appropriate dressings for the management of surgical wounds that are healing by secondary intention. [8]

f. Treatment of surgical site infection (SSI) / surgical wound dehiscence (SWD)
   i. Monitor for signs of SSI (See Appendix B)
   ii. When surgical site infection is suspected by the presence of cellulitis, either by a new infection or an infection caused by treatment failure:
      i. Obtain relevant samples for culture and sensitivity testing.
      ii. Give the patient an antibiotic that covers the likely causative organisms.

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Consider local resistance patterns and the results of microbiological tests in choosing an antibiotic. [8, 13]

i. Do not use Eusol and gauze, or dextranomer or enzymatic treatments for debridement in the management of surgical site infection. [8, 11]
ii. Patients should be monitored for signs of sepsis.[18]

g. Specialist wound care services
Use a structured approach to care to improve overall management of surgical wounds. This should include preoperative assessments to identify people with potential wound healing problems. Enhanced education of healthcare workers, patients and carers, and sharing of clinical expertise is needed to support this. [8]

h. Patient Information and discharge planning
   i. Advise patients that they may shower safely 48 hours after surgery. [8]
   ii. Patients and the health care providers who will be responsible for ongoing care should be provided with written information[2] about:
      - The surgical intervention.
      - Details of any antibiotics administered
      - Material and type of any implant.
      - Closure materials and plans for removal.
      - Ongoing care, including pain management, proposed dressing regime and opportunities for shared care.
      - When to seek advice and specific information (including names and phone numbers) about who to contact from the surgical team.

      Written information should be sensitive to different cultural needs.

   iii. If a digital image of the wound has been captured, this image should be shared with the patient (if the patient wishes) and the health care provider responsible for ongoing care using NHS compliant digital technology.
   iv. Patients/carers should also be provided with comprehensible written information about:
      - Signs of infection
      - Hygiene (including hand hygiene)
      - Shared care of wound. This may include advice on dressing changes and taking a digital image of their own wound to monitor healing.

   v. Prior to transfer to another healthcare provider (which may involve shared care/ supported self-care), patients should be provided with enough dressings to care for their wound for one week.
   vi. Following transfer to another healthcare provider, patients should be informed of the name of the clinician in that organisation, responsible for overseeing their care.

i. Surveillance for Surgical Site Infection (SSI) and Surgical Wound Dehiscence (SWD)
   i. As a minimum, surveillance should be in line with the NICE Quality Standard [20] advice on surveillance.
   ii. Surveillance systems for monitoring SSI should be expanded to include SWD.
   iii. SSI surveillance should monitor patients for up to 30 days after surgery (or up to 90 days after surgery in patients receiving implants) [21]
   iv. SWD surveillance may need to monitor for more than 30 days[22]
   v. Surveillance should monitor post-surgical patients across acute, primary and community health care providers. [2]

Explanatory Notes

Post Operative Wound Cleansing
If tap water is to be used for wound cleansing, it should be at room temperature or warmed and potable (safe to drink).

The recommendations regarding showering are intended as guidance as some closure materials allow earlier showering and some wounds sites also benefit from earlier cleansing (e.g. open anal wounds after defaecation).

Wound Dressings and Management Systems: *There is no definitive evidence for the use of any particular type of modern interactive wound dressing to prevent SSI or to manage wounds healing by primary or secondary intention.*

Negative pressure wound therapy (NPWT), is currently used in closed wounds with high risk of infection to prevent surgical site infection, in open surgical wounds with the aim of managing exudate and promoting healing and in graft surgery to prepare graft sites to promote graft take and with the aim of healing of skin grafts by improving adherence.

The evidence base for NPWT is highly complex and developing rapidly.

- *Wounds healing by primary closure (closed wounds)*
  A recent update of a Cochrane systematic review for surgical wounds healing by primary closure [(23)] included 15 new trials and 3 new economic evaluations and identified a large number of ongoing trials. The evidence is currently dominated by studies in particular surgical indications (caesarean section, fracture surgery, knee and hip arthroplasties and abdominal surgery) so the findings are more directly relevant to some surgical interventions than others. Studies also vary as to the type of SSI (superficial vs deep/organ space) assessed. The review currently concludes that NPWT probably reduces the incidence of SSI in surgical wounds healing by primary intention, is probably cost-effective for caesarean section wounds in obese women and not cost-effective for fracture surgery wounds (and unclear for other types of surgery. However, it is like that the results of ongoing trials will affect these conclusions.

- *Open surgical wounds to promote healing*
  The Cochrane review of evidence for NPWT for open surgical sites[(24)] has not been updated since 2015. Trials have been published since then but the NWCSP lacks the resources to do an updated review of the evidence. Although the NWCSP has been unable to identify any robust evidence of effectiveness for promoting healing, NPWT is self-evidently effective for containing heavy exudate

- *Preparation of graft sites*
  The Cochrane review of evidence for NPWT in graft sites was included in the earlier 2014 version of the Cochrane systematic review for surgical wounds healing by primary closure [(19)] but subsequently excluded in later versions. It is possible that trials may have been published since.

In light of the complexity of the current evidence base, wound product selection should seek to match wound symptoms with the characteristics of wound dressings or management systems, while remaining mindful of patient comfort and dignity, clinician time and the cost of alternative products. Decisions about the use of negative pressure wound therapy selection should be informed by an organisational protocol or pathway of care.

Wound Assessment: *Accurate wound assessment is essential for monitoring wound healing. Wound size and wound bed status form the baseline against which all subsequent treatment effectiveness will be measured.*

Digital imaging that can be uploaded to the patient's clinical record should be incorporated into wound assessment and regarded as part of standard practice. NHS compliant mobile data technology with this functionality is now available and in use by health care providers.

Surveillance: *Sustained surveillance and feedback of data on rates of SSI has been associated with reductions in rates of infection. Accurate diagnosis of SSI can be challenging as the classic signs such as pain, swelling and inflammation are also present in normal wound healing, exudate can be mistaken for pus, and fever may not present except in advanced cases of infection. SWD can occur both in the presence of infection and without infection but in both cases, has a significant impact on both patient well-being and healthcare costs. Including both SSI and SWD in post-operative surveillance systems will increase the capture of clinically relevant information.*

Most SSI occur within 7 days of surgery and SWD within 9 days. The Center for Disease Control reporting definition for surgical site infection surveillance[21] defines SSI infections occurring up to 30 days after surgery (or within 90 days of surgery in patients receiving implants) and affecting either the incision or deep tissue at the operation site. As many patients are transferred from acute care to another care provider before 7 days after surgery, surveillance systems should include data collection from primary and community health care providers, up to 30 days after surgery, and for up to 90 days for implant surgery.

Any SSI or SWD that requires clinical input (e.g. surgical review, antibiotic therapy, or nursing care) should be reported.

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Ongoing Care after Transfer from Care of the Surgical Team

Care should follow the principles outlined for post-operative care above plus:

a. Red Flags

- Systemic signs of infection/sepsis
  Arrange for immediate review by the senior clinical decision maker and follow **NICE Guideline for Sepsis: Recognition, Diagnosis and Early Management** [18]

- Haemorrhage / Catastrophic dehiscence ('burst abdomen' with visible internal organs)
  Treat as an emergency situation

- Spreading cellulitis, or
- Dehiscence if:
  - Surgery involved implants (e.g. mesh, prosthesis)
  - Aesthetically or functionally important surgical site (e.g. face or joints)

  Seek review by surgical team within 24 hours

- Dehiscence exposing subcutaneous layers and fascia.
- Suspected sinus / fistula/ tunnelling
- Stoma within wound boundaries
  Seek review by surgical team within 72 hours.

b. Wound Healing

Monitoring of incision site healing

- If the incision site is healing by primary intention and:
  - Fails to heal (epithelialise) as normal; or
  - Dehisces with visible subcutaneous tissue.

  arrange review by health professional with surgical wound expertise[2] such as the general practitioner, tissue viability specialist nurse, stoma care nurse, or podiatrist who can escalate directly to surgical team as needed.

- If the incision site is healing by secondary intention:
  - Review progress weekly to monitor healing and evaluate effectiveness of treatment plan.
- If the wound deteriorates or fails to progress, arrange review by health professional with surgical wound expertise[2] such as general practitioner, tissue viability specialist nurse, stoma care nurse, or podiatrist who can escalate directly to surgical team as needed.

- If post-operative wound infection is suspected but there are no red flag symptoms:
  - Wound swab for microbiology
  - Bloods for full blood count and C-reactive protein (CRP)
  - Capture a digital image of the wound using NHS compliant digital technology and upload the image to the patient's clinical record.
  - If concerned, inform surgical team who should seek to review within 72 hours
  - Only commence antibiotic therapy following consultation with the surgical team

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c. Surveillance
   Report instances of surgical site infection and/or dehiscence through the local surveillance reporting system.

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Appendix A – Risk Assessment Tools for SSI and SWD

The risk of SSI is strongly influenced by endogenous factors such as the surgical site and type of surgery. and exogenous factors such as inadequate antiseptic preparation and lengthy surgical procedures. Intrinsic factors that affect the general immune response (e.g. diabetes, nutritional status) or impact on the local immune response (e.g. foreign bodies, haematoma) also have an impact on SSI risk.

A standard approach to classifying wounds according to the degree of microbial contamination likely to be present in the operative site is widely used to both predict the risk of SSI and enable comparisons in risk between different types of surgical procedure This approach classifies surgery as:

- Clean,
- Clean- contaminated,
- Contaminated,
- Dirty or infected.

and considers both the surgical site and events that occur before or during the operation that may affect the level of contamination (2).

This classification system offers a simple but important guide to assessing SSI risk but frameworks for specific surgical specialities seek to reliably compare the risk of SSI for the same procedures over time and between institutions. The following SSI risk assessment tools are known to be in use in the UK.

- National Healthcare Safety Network (CDC) Surgical Site Infection Risk Index (25)
- Public Health England: Protocol for surveillance of surgical site infection: June 2013
- American Society of Anaesthesiologists' (ASA) score [26]*
- The Surgical Site Infection Risk Score (SSIRS)[27]

Expert opinion suggests that speciality specific tools have little, if any, benefit over using the National Healthcare Safety Network (CDC) Surgical Site Infection Risk Index.

The Perth Surgical Wound Dehiscence Risk Assessment Tool (PSWDRAT) is currently undergoing validation [22].

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Appendix B: Signs of Surgical Site Infection

Several systems for classification of surgical site infection are currently in use in the UK. The following give some examples.

Public Health England **Protocol for the Surveillance of Surgical Site Infection, version 6 [June 2013] r1[28]**	
Section 3 Definitions of surgical site infections	
3.1	**Classification of surgical site infections**
3.1.1	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.
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 two 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 (i.e. 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 (>38oC) - 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.

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	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.
3.1.4	**Organ/space infection**: this is defined as a surgical site infection involving any part of the anatomy (i.e. 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 Note: 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

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CDC Surgical Site Infection Criteria[21]	
Criteria	**Surgical Site Infection**
	Superficial incisional SSI Must meet the following criteria: Date of event for infection occurs within 30 days after any NHSN operative procedure (where day 1 = the procedure date) AND involves only skin and subcutaneous tissue of the incision AND patient has at least one of the following: a. purulent drainage from the superficial incision. b. organisms identified from an aseptically-obtained specimen from the superficial incision or subcutaneous tissue by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST). c. superficial incision that is deliberately opened by a surgeon, attending physician** or other designee and culture or non-culture based testing is not performed. AND patient has at least one of the following signs or symptoms: pain or tenderness; localized swelling; erythema; or heat. d. diagnosis of a superficial incisional SSI by the surgeon or attending physician** or other designee. www.cdc.gov/nhsn/xls/icd10-pcs-pcm-nhsn-opc.xlsx www.cdc.gov/nhsn/xls/cpt-pcm-nhsn.xlsx ** The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency physician or physician's designee (nurse practitioner or physician's assistant).
Comments	There are two specific types of superficial incisional SSIs: 1. Superficial Incisional Primary (SIP) – a superficial incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB) 2. Superficial Incisional Secondary (SIS) – a superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site incision for CBGB)
Reporting Instructions for SSI	The following do not qualify as criteria for meeting the NHSN definition of superficial SSI: • Diagnosis/treatment of cellulitis (redness/warmth/swelling), by itself, does not meet criterion "d" for superficial incisional SSI. Conversely, an incision that is draining or that has organisms identified by culture or non-culture based testing is not considered a cellulitis. • A stitch abscess alone (minimal inflammation and discharge confined to the points of suture penetration).

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	• A localized stab wound or pin site infection- Such an infection might be considered either a skin (SKIN) or soft tissue (ST) infection, depending on its depth, but not an SSI. Note: A laparoscopic trocar site for an NHSN operative procedure is not considered a stab wound. • Circumcision is not an NHSN operative procedure. An infected circumcision site in newborns is classified as CIRC and is not an SSI • An infected burn wound is classified as BURN and is not an SSI.
	Deep incisional SSI Must meet the following criteria: The date of event for infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 AND involves deep soft tissues of the incision (e.g., fascial and muscle layers) AND patient has at least one of the following: a. purulent drainage from the deep incision. b. a deep incision that spontaneously dehisces, or is deliberately opened or aspirated by a surgeon, attending physician** or other designee and organism is identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST) or culture or non-culture based microbiologic testing method is not performed AND patient has at least one of the following signs or symptoms: fever (>38°C); localized pain or tenderness. A culture or non-culture based test that has a negative finding does not meet this criterion. c. an abscess or other evidence of infection involving the deep incision that is detected on gross anatomical or histopathologic exam, or imaging test ** The term attending physician for the purposes of application of the NHSN SSI criteria may be interpreted to mean the surgeon(s), infectious disease, other physician on the case, emergency
Comments	There are two specific types of deep incisional SSIs: 1. Deep Incisional Primary (DIP) – a deep incisional SSI that is identified in a primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB) 2. Deep Incisional Secondary (DIS) – a deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site incision for CBGB)

	Organ/Space SSI Must meet the following criteria: a. Date of event for infection occurs within 30 or 90 days after the NHSN operative procedure (where day 1 = the procedure date) according to the list in Table 2 AND infection involves any part of the body deeper than the fascial/muscle layers, that is opened or manipulated during the operative procedure AND patient has at least one of the following: i. purulent drainage from a drain that is placed into the organ/space (e.g., closed suction drainage system, open drain, T-tube drain, CT guided drainage) ii. organisms are identified from an aseptically-obtained fluid or tissue in the organ/space by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST). iii. an abscess or other evidence of infection involving the organ/space that is detected on gross anatomical or histopathologic exam, or imaging test evidence suggestive of infection. AND b. meets at least one criterion for a specific organ/space infection site listed in Table 3. These criteria are found in the Surveillance Definitions for Specific Types of Infections chapter.

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EWMA Surgical Site Infection: Clinical Signs and Symptoms [2]		
Superficial SSI symptoms	**Deep SSI symptoms**	**Organ/space SSI symptoms***
Increased pain and tenderness at the site of surgery	Increased pain at the site of surgery	
Localised swelling and induration	Spreading induration and swelling of the place of incision	
Localised heat and redness of the wound	Erythema and heat of the surgical site	
Purulent drainage	Purulent drainage from the incision	Purulent drainage from a drain placed through the skin into the organ or body space
Cellulitis limited to the wound and adjacent soft tissues	Spreading cellulitis at the site of surgery	
Evident superficial wound abscess	Evident deep wound abscess or fasciitis	Organ or body space abscess diagnosed by radiological or histopathological examination
	Separation of the edges of incision exposing the deeper tissues	Evidence of infection involving the organ or body space seen on direct examination during surgery
	Unexpected postoperative fever accompanied by increasing wound pain and/or wound dehiscence	Postoperative fever
	Pathological blood test findings (elevated CRP, WBC counts, erythrocyte sedimentation rates, pro-calcitonin)	Positive result of blood cultures, deep tissue biopsies, surgical sampling or pathological blood test findings (see deep SSI column)
*Involve any part of the anatomy other than the incision opened or manipulated during surgery; CRP— C-reactive protein; WBC—white blood count		

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