



*National Institute for
Health and Clinical Excellence*

Quick reference guide

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Surgical site infection

Prevention and treatment of surgical site infection

About this booklet

This is a quick reference guide that summarises the recommendations NICE has made to the NHS in Surgical site infection: prevention and treatment of surgical site infection (NICE clinical guideline 74). The guideline updates and replaces NICE technology appraisal guidance 24 (2001).

Who should read this booklet?

This quick reference guide is for all healthcare professionals who are involved in the care of patients before, during and after surgery, including GPs, surgeons, nurses, tissue viability specialists and other staff who care for patients who are at risk of, or have, surgical site infections.

Who wrote the guideline?

The guideline was developed by the National Collaborating Centre for Women's and Children's Health, which is linked with the Royal College of Obstetricians and Gynaecologists. The Collaborating Centre worked with a group of healthcare professionals (including consultants, GPs and nurses), patients and carers, and technical staff, who reviewed the evidence and drafted the recommendations. The recommendations were finalised after public consultation.

For more information on how NICE clinical guidelines are developed, go to www.nice.org.uk

Where can I get more information about the guideline?

The NICE website has the recommendations in full, reviews of the evidence they are based on, a summary of the guideline for patients and carers, and tools to support implementation (see pages 10 and 11 for more details).

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NICE clinical guidelines are recommendations about the treatment and care of people with specific diseases and conditions in the NHS in England and Wales.

This guidance represents the view of NICE, which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer, and informed by the summary of product characteristics of any drugs they are considering.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

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Introduction

- Surgical site infections compose up to 20% of all healthcare-associated infections. At least 5% of patients undergoing surgery develop a surgical site infection.
- Surgical site infections can have a significant effect on quality of life for the patient. They are associated with considerable morbidity and extended hospital stay.
- Surgical site infections result in a considerable financial burden to healthcare providers.
- Advances in surgery and anaesthesia have resulted in patients who are at greater risk of surgical site infections being considered for surgery.
- The majority of surgical site infections are preventable and measures can be taken in the pre-, intra- and postoperative phases of care to reduce risk of infection.
- It is important that healthcare professionals adhere to best practice to prevent and manage surgical site infections.

Patient-centred care

Treatment and care should take into account patients' individual needs and preferences. Good communication is essential, supported by evidence-based information, to allow patients to reach informed decisions about their care. Follow Department of Health advice on seeking consent if needed. If the patient agrees, families and carers should have the opportunity to be involved in decisions about treatment and care. If caring for young people in transition between paediatric and adult services refer to 'Transition: getting it right for young people' (available from www.dh.gov.uk).

Key priorities for implementation

Information for patients and carers

- Offer patients and carers clear, consistent information and advice throughout all stages of their care. This should include the risks of surgical site infections, what is being done to reduce them and how they are managed.

Preoperative phase

- Do not use hair removal routinely to reduce the risk of surgical site infection.
- 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.
- Give antibiotic prophylaxis to patients before:
 - clean surgery involving the placement of a prosthesis or implant
 - clean-contaminated surgery
 - contaminated surgery.
- Do not use antibiotic prophylaxis routinely for clean non-prosthetic uncomplicated surgery.
- Use the local antibiotic formulary and always consider potential adverse effects when choosing specific antibiotics for prophylaxis.
- Consider giving a single dose of antibiotic prophylaxis intravenously on starting anaesthesia. However, give prophylaxis earlier for operations in which a tourniquet is used.

Intraoperative phase

- Prepare the skin at the surgical site immediately before incision using an antiseptic (aqueous or alcohol-based) preparation: povidone-iodine or chlorhexidine are most suitable.
- Cover surgical incisions with an appropriate interactive dressing at the end of the operation.

Postoperative phase

- Refer to 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.

Information for patients and carers

- Give patients and carers clear, consistent information and advice throughout their care including:
 - the risks of surgical site infections
 - what is being done to reduce risks
 - how to care for their wound after the patient is discharged
 - how to recognise a surgical site infection
 - who to contact if they are concerned about possible surgical site infection
 - how surgical site infections are managed.
- Use an integrated care pathway for healthcare-associated infections to help communicate information.

Preoperative phase

Patient preparation

- 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.
- Give patients specific theatre wear, appropriate for the procedure and clinical setting, with easy access to the operative site and for placement of devices. Consider also the patient's comfort and dignity.

Do not use the following routinely to reduce the risk of surgical site infections:

- hair removal
- nasal decontamination with topical antimicrobial agents targeting *Staphylococcus aureus*
- mechanical bowel preparation.

Hair removal

- If hair has to be removed, use electric clippers with a single-use disposable head on the day of surgery.
- Do not use razors for hair removal, because they increase the risk of surgical site infection.

Antibiotic prophylaxis

- Give antibiotic prophylaxis to patients before:
 - clean surgery involving placing a prosthesis or implant
 - clean-contaminated surgery
 - contaminated surgery.
- Do not give antibiotic prophylaxis routinely for clean non-prosthetic uncomplicated surgery.
- Use the local antibiotic formulary and consider potential adverse effects when choosing antibiotics.
- Consider the timing and pharmacokinetics of the antibiotic.
- Consider giving a single dose of antibiotic prophylaxis intravenously on starting anaesthesia or earlier if a tourniquet is used.
- Give a repeat dose when the operation is longer than the half-life of the antibiotic.
- Give additional antibiotic treatment to patients having surgery on a dirty or infected wound.
- Whenever possible, inform patients before their operation if they will need antibiotic prophylaxis, and afterwards if they have been given antibiotics.

Staff preparation

- All staff should wear specific non-sterile theatre wear in areas where operations are carried out.
- Movement of staff in and out of these areas should be kept to a minimum.
- Operating team staff should remove hand jewellery, artificial nails and nail polish before operations.

Intraoperative phase

Operating team preparation

- The operating team should:
 - wear sterile gowns in the operating theatre during the operation
 - consider wearing two pairs of sterile gloves if there is a high risk of glove perforation and contamination may have serious consequences
 - wash their hands using an antiseptic surgical solution and use a single-use brush or pick to clean the nails, so that hands and nails are visibly clean, prior to the first operation on the list
 - wash their hands before subsequent operations, using an alcoholic hand rub or gel, or an antiseptic surgical solution
 - wash their hands again if they are soiled, using an antiseptic surgical solution.

Patient skin preparation

- Use an antiseptic preparation, such as povidone-iodine or chlorhexidine, to prepare the skin at the surgical site immediately before incision.
- If diathermy is to be used, dry antiseptic skin preparations by evaporation and avoid pooling of alcohol-based solutions.

Maintaining patient homeostasis

- During operations maintain:
 - patient temperature (see the NICE guideline on inadvertent perioperative hypothermia, available at www.nice.org.uk/CG065)
 - optimal oxygenation, in particular give oxygen during major surgery and in the recovery period to ensure haemoglobin saturation of above 95%, and
 - adequate perfusion.

Wound dressings

- Cover surgical incisions with an appropriate interactive dressing at the end of the operation.

Do not use the following to reduce the risk of surgical site infections:

- non-iodophor-impregnated incise drapes. If an incise drape is required, use an iodophor-impregnated drape unless the patient has an iodine allergy
- insulin routinely to optimise postoperative blood glucose levels in patients who do not have diabetes
- diathermy for surgical incision
- wound irrigation
- intracavity lavage
- intraoperative skin re-disinfection or topical cefotaxime in abdominal surgery.

Postoperative phase

Dressing and cleansing the wound

- Use an aseptic non-touch technique for changing or removing dressings.
- Use sterile saline for wound cleansing up to 48 hours after surgery.
- Advise patients that they may shower safely 48 hours after surgery.
- Use tap water for wound cleansing after 48 hours if the wound has separated or has been surgically opened to drain pus.
- Use an interactive dressing for surgical wounds that are healing by secondary intention.
- Refer to a tissue viability nurse (or another healthcare professional with tissue viability expertise) for advice on appropriate dressings for surgical wounds that are healing by secondary intention.

Do not use the following to reduce the risk of surgical site infections:

- topical antimicrobial agents for surgical wounds that are healing by primary intention
- Eusol and gauze, or moist cotton gauze or mercuric antiseptic solutions for surgical wounds that are healing by secondary intention.

Antibiotic treatment

- If a surgical site infection is suspected (i.e. cellulitis), either de novo or because of treatment failure, give the patient an antibiotic.
- Choose an antibiotic that covers the most likely causative organisms. Consider local resistance patterns and the results of microbiological tests.

Debridement

- Do not use Eusol and gauze, or dextranomer or enzymatic treatments for debridement of surgical site infections.

Specialist wound care services

- To improve the management of surgical wounds:
 - use a structured approach to care (including preoperative assessment to identify patients with potential wound healing problems)
 - provide enhanced education to healthcare professionals, patients and carers, and share clinical expertise.

Glossary

Debridement The excision or wide removal of all dead (necrotic) and damaged tissue, that may develop in a surgical wound.

Healing by primary intention Occurs when a wound has been sutured after an operation and heals to leave a minimal, cosmetically acceptable scar.

Healing by secondary intention Occurs when a wound is deliberately left open at the end of an operation because of excessive bacterial contamination, particularly by anaerobes or when there is a risk of devitalised tissue, which leads to infection and delayed healing. It may be sutured within a few days (delayed primary closure), or much later when the wound is clean and granulating (secondary closure), or left to complete healing naturally without the intervention of suturing.

Homeostasis The maintenance of normal physiological function.

Interactive dressing Modern (post-1980) dressing materials. Designed to promote the wound healing process through the creation and maintenance of a local, warm, moist environment underneath the chosen dressing, when left in place for a period indicated through a continuous assessment process.

Perfusion Blood flow through tissues or organs. If not optimal, it can increase the risk of infectious complications (particularly surgical site infections).

Surgical site (wound) infection This occurs when pathogenic organisms multiply in a surgical wound giving rise to local signs and symptoms, for example, heat, redness, pain and swelling, and (in more serious cases) with systemic signs of fever or a raised white blood cell count. Infection in the surgical wound may prevent healing taking place so that the wound edges separate or it may cause an abscess to form in the deeper tissues.

Surgical wound classification

- **Clean:** an incision in which no inflammation is encountered in a surgical procedure, without a break in sterile technique, and during which the respiratory tract, alimentary or genitourinary tracts are not entered.
- **Clean-contaminated:** an incision through which the respiratory, alimentary, or genitourinary tract is entered under controlled conditions but with no contamination encountered.
- **Contaminated:** an incision undertaken during an operation in which there is a major break in sterile technique or gross spillage from the gastrointestinal tract, or an incision in which acute, non-purulent inflammation is encountered. Open traumatic wounds that are more than 12–24 hours old also fall into this category.
- **Dirty or infected:** an incision undertaken during an operation in which the viscera are perforated or when acute inflammation with pus is encountered (for example, emergency surgery for faecal peritonitis), and for traumatic wounds where treatment is delayed, there is faecal contamination, or devitalised tissue is present.

Implementation tools

NICE has developed tools to help organisations implement this guidance (listed below).

These are available on our website (www.nice.org.uk/CG074).

- Slides highlighting key messages for local discussion.
- Audit support for monitoring local practice.
- A costing statement to help estimate the costs and savings involved in implementing this guideline.

Further information

Ordering information

You can download the following documents from www.nice.org.uk/CG074

- A quick reference guide (this document) – a summary of the recommendations for healthcare professionals.
- The NICE guideline – all the recommendations.
- ‘Understanding NICE guidance’ – information for patients and carers.
- The full guideline – all the recommendations, details of how they were developed, and reviews of the evidence they were based on.

For printed copies of the quick reference guide or ‘Understanding NICE guidance’, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk and quote:

- N1701 (quick reference guide)
- N1702 (‘Understanding NICE guidance’).

Related NICE guidance

For information about NICE guidance that has been issued or is in development, see the website (www.nice.org.uk).

Published

- Inadvertant perioperative hypothermia: The management of inadvertant perioperative hypothermia in adults. NICE clinical guideline 65 (2008). Available from www.nice.org.uk/CG065
- Infection control: Prevention of healthcare-associated infection in primary and community care. NICE clinical guideline 2 (2003). Available from www.nice.org.uk/CG002

Updating the guideline

This guideline will be updated as needed, and information about the progress of any update will be posted on the NICE website (www.nice.org.uk/CG074).

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