



Good Practice Recommendations for Surgical and Procedural Antibiotic Prophylaxis in Adults in NHS Scotland

Aim:

This document aims to provide NHS boards with recommendations for local surgical and procedural prophylaxis guidance based on recommendations of SIGN 104 [1].

Antibiotic prophylaxis is defined as the use of antibiotics before, during, or after a diagnostic, therapeutic, or surgical procedure to prevent infectious complications.

Each NHS board, through its Antimicrobial Management Team (AMT), is responsible for maintaining guidelines including the following key components:

SUMMARY OF GOOD PRACTICE RECOMMENDATIONS	
1	Guidance should be readily accessible to prescribers and should give recommendations for interventional procedures requiring antibiotic prophylaxis
2	Guidance should include recommendations on choice and mode administration of antibiotics including timing, route and duration
3	Guidance should highlight need for careful assessment of pre-operative penicillin allergy and should include alternatives for those with true penicillin allergy
4	Guidance should provide recommendations for prophylaxis in patients who are colonized with MRSA and CPE
5	Guidance should incorporate specific local dose recommendations for the prophylactic use of gentamicin and glycopeptides
6	Guidance should be subject to regular review by the Antimicrobial Management Team and formal update every 2 or 3 years (following local process) in conjunction with the relevant specialties
7	Compliance with guidance should be monitored
8	Selected unintended consequences of guidance should be monitored
9	Guidance should be supported by training on use of guidance for all medical and where appropriate non-medical prescribers and other associated clinical/theatre staff
10	AMTs should have systems in place to respond to poor compliance with guidance and/or the development of unintended consequences of antibiotic prophylaxis

Detailed Recommendations:

1. **Surgical/Procedural Prophylaxis Guidelines should be readily accessible to prescribers at the point of care (via NHS board intranet, therapeutic handbook, posters in clinical areas, app) and include interventional procedures requiring antibiotic prophylaxis within the following clinical areas:**
Breast surgery; Cardiology; Cardiothoracic; Ear, nose & throat, Maxillofacial and oral surgery; Endoscopy; General, including upper and lower gastrointestinal; Gynaecology; Interventional radiology; Neurosurgery; Obstetrics; Ophthalmic surgery; Orthopaedics; Plastic surgery; Transplant surgery; Urology; Vascular.
2. **Surgical/Procedural Prophylaxis Guidelines should include guidance on administration of antibiotics:**
 - a. **Timing**
 - Optimum timing is within 60 minutes prior to the start of the procedure/skin incision, usually at induction of anaesthesia.
 - In Caesarean section, antibiotic prophylaxis to reduce maternal infectious complications should be given pre-incision within 60 minutes prior to the start of the procedure/skin incision.
 - b. **Route**
 - Intravenous route of administration preferred except for some specific procedures.
 - Antibiotics should be administered in Theatre and given as a bolus injection where possible.
 - c. **Documentation**
 - The “once only” section of drug Kardex or electronic prescription chart is recommended for prescribing prophylaxis to avoid multiple dosing and facilitate collection of audit data.
 - In addition the antibiotic used, dose and time of administration may also be recorded on the Anaesthetic Record Sheet.
 - d. **Duration/ repeat doses**
 - A single dose of antibiotic with a long enough half-life to achieve activity throughout the procedure is recommended. Exceptions to single dose are in orthopaedic arthroplasty when up to 24 hours of prophylaxis is acceptable and cardiothoracic surgery where up to 48 hours is acceptable.
 - Repeat dosing may be required if the procedure lasts more than 4 hours or intra-operative blood loss >1.5 litre (re-dose following fluid replacement). [2]
3. **Surgical/ Procedural Prophylaxis Guidelines should provide details of antibiotic choice considering the following key points:**
 - Choice and dose of antibiotic to be agreed by relevant specialties and the AMT, taking into account risk factors for surgical site infection and unintended consequences. The use of larger doses in obese patients should be considered. [3]
 - Use of narrow spectrum agent(s) with activity against likely organisms causing surgical site infections when possible.
 - Restrict use of agents with increased capacity for promoting *C. difficile* infection and protected antibiotics (cephalosporins, clindamycin, co-amoxiclav, piperacillin-tazobactam, quinolones and carbapenems) where possible and consider benefits and risks of use.
 - Avoid gentamicin in orthopaedic implant surgery and caution also advised with high dose flucloxacillin (2g dose) due to potential for impairment of renal function
 - Alternative agents for patients with penicillin or beta-lactam allergy with choice of agent based on the surgical procedure and the patient’s risk factors. It is important to assess patients labelled as penicillin allergic appropriately and consider de-labelling where indicated.
 - Patients with complex issues including multi-drug resistance carriage to be discussed with a Consultant Microbiologist pre-operatively.

- Use of antibiotics indicated for treatment of specific serious infections should be minimised in surgical prophylaxis regimens to avoid local development of resistance.
4. **Surgical/ Procedural Prophylaxis Guidelines should provide recommendations for prophylaxis in patients who are colonized with methicillin resistant *Staph aureus* (MRSA) and carbapenemase producing enterobacteriaceae (CPE)**
 For patients colonised with MRSA decolonisation therapy following local policy should be used prior to surgery when possible and antimicrobial prophylaxis should include cover for MRSA.
 For patients colonised with CPE consult local microbiologist for advice on prophylaxis.
5. **Specific local guidance on use of gentamicin and glycopeptides in surgical prophylaxis:**
- a. **Gentamicin**
- Dosage recommendations - weight based dose (usual range 2mg/kg to 5mg/kg) with patients who are overweight dosed according to ideal body weight.
 - Advice on administration - doses of up to 300mg can be given as a bolus injection over 3-5 minutes but it is recommended that higher doses are administered as a short infusion.
 - Advice on repeat dosing [2] – a single dose of gentamicin will provide cover for 8 hours in patients with normal renal function and is very unlikely to result in renal toxicity even in patients with impaired renal function. A second dose of gentamicin may be given in situations of high blood loss or a prolonged procedure (>8 hours) if eGFR > 60.
- b. **Glycopeptides**
- Indications for use – prophylaxis in patients with or at high risk of MRSA or in penicillin allergic patients undergoing major implant surgery or when flucloxacillin is recommended first line.
 - Advice on administration - teicoplanin can be administered as a bolus injection and can be prepared and given in theatre. Vancomycin is a suitable alternative but requires to be administered as an infusion therefore needs to be prepared and administration started by ward staff approximately 2 hours prior to the planned operating time.
 - Local policies should highlight the potential for allergic reactions to teicoplanin. Risk is low (16.4 per 100,000) but reactions are severe. [4]
6. **Surgical/Procedural prophylaxis guidelines should be subject to regular review by the AMT in collaboration with the Infection Prevention and Control Team and relevant specialties. Guideline review should take into account:**
- Emergence/recognition of unintended consequences of guidance
 - Local and national emerging antimicrobial resistance
 - National and local surveillance of antimicrobial use
 - Local surgical site infection rates
 - Local qualitative data on prescribing (e.g. point prevalence surveys)
 - Local rates of unintended consequences (e.g. *Clostridium difficile*, acute kidney injury)
 - Emerging evidence around surgical prophylaxis for established and new procedures
7. **Compliance with Surgical/Procedural prophylaxis guidelines should be monitored:**
 AMTs should support clinical specialties in assessing and reviewing compliance with prophylaxis. Formal surveillance of prophylaxis by the AMT should be undertaken in conjunction with IPC teams if there is evidence of increasing SSI or when there is other emergent evidence of sub optimal practice. AMTs should discuss and review proposed actions with clinical teams.
8. **Selected unintended consequences of surgical/procedural prophylaxis guidelines should be considered and reviewed formally as required. Examples may include renal toxicity, surgical site infections and *Clostridium difficile*.**

9. Surgical/Procedural prophylaxis guidelines should be supported by training on use of antibiotics for all medical and where appropriate non-medical prescribers and other clinical/theatre staff.
10. AMTs should have systems in place to respond to poor compliance with guidance and/or the development of unintended consequences of antimicrobials.

References/links:

1. Antibiotic prophylaxis in surgery, Scottish Intercollegiate Guideline Network 104, Updated 2014
<http://www.sign.ac.uk/sign-104-antibiotic-prophylaxis-in-surgery.html>
2. Recommendations for re-dosing of antibiotics for Surgical Prophylaxis. SAPG June 2018
<https://www.sapg.scot/media/4105/good-practice-recommendations-for-re-dosing-antibiotics-for-surgical-prophylaxis.pdf>
3. How should antibiotics be dosed in obesity? Specialist Pharmacy Service. Accessed via
https://www.sapg.scot/media/2918/howshouldantibioticsbedosedinobesity_2016_update.pdf
4. Anaesthesia, Surgery and Life-Threatening Allergic Reactions, Report and findings of the Royal College of Anaesthetists' 6th National Audit Project 2018
<http://www.nationalauditprojects.org.uk/NAP6Report>