

# ANTIBIOTIC PROPHYLAXIS IN NEUROSURGERY PROCEDURES

The aim of surgical prophylaxis is to reduce rates of surgical site and healthcare-associated infections and so reduce surgical morbidity and mortality. There is however growing evidence that aspects of prescribing practice may themselves be associated with health-care associated infections and antimicrobial resistance. The [Scottish Antimicrobial Prescribing Group \(SAPG\)](#), along with the Scottish Government, monitors antimicrobial prescribing including surgical prophylaxis in order to reduce the rates of *C.difficile* and resistance. SIGN guideline 104 (published in 2008, updated 2014 and currently under review ) has outlined which surgical procedures require prophylactic antibiotics based on a review of the available evidence. Principles of prophylaxis have also been outlined, including timing and duration of antibiotic administration. In conjunction with the Neurosurgery specialty within NHS Tayside the Antimicrobial Management Group has undertaken to review local prophylaxis policy and to formulate a uniform policy.

## Principles of Antibiotic Prophylaxis Policy

1. **Indication for prophylaxis** should comply with SIGN 104 (*under review*) guideline i.e. when 'highly recommended', 'recommended' or 'considered' within guideline.
2. **Timing of antibiotic(s):**
  - Optimum timing is intravenous dose given or infusion completed  $\leq 60$  minutes prior to skin incision
  - Sub-optimal if  $>1$  hour prior to skin incision or post-skin incision
3. **Recording of antibiotic** prescription in 'once only' section of medicine chart to avoid multiple dosing
4. **Frequency of administration** should be single dose only unless:
  - $> 1.5$  litres intra-operative blood loss - re-dose following fluid replacement (see administration guidance table)
  - operation prolonged (see administration guidance table)
  - specifically stated in following guidelines
5. **Documentation in medical notes** of reason for antibiotic administration beyond single dose or state intention for antibiotic treatment course
6. **Choice of agent** should:
  - Avoid cephalosporins, clindamycin, quinolones, co-amoxiclav wherever possible
  - Use narrow spectrum agents when possible e.g. avoid carbapenems, piperacillin/tazobactam
  - Take into account local resistance patterns e.g.  $>95\%$  of MRSA isolated in Tayside are sensitive to gentamicin
  - Provision of alternatives for beta-lactam allergy
7. **De-colonisation therapy** prior to surgery when MRSA positive when recommended in Infection Control Policies
8. **Complex individual prophylaxis** issues should be discussed with Microbiology or Infectious Diseases pre-operatively and recorded in medical records
9. **Compliance with local policy** is required and monitored by NHS Tayside. Any deviation from policy must be recorded in the appropriate medical records

## IV Antibiotic Administration Guidance:

Antibiotic	Dose	Administration	Prolonged Surgery <sup>4</sup>	$>1.5L$ blood loss redose after fluid replacement <sup>4</sup>
Cefuroxime	1.5 g	Bolus over 3-5 minutes	Redose 1.5g after 4 hours	1.5g
Flucloxacillin	2g	Bolus over 3-5 minutes	Repeat 2g dose after 4 hours	2g
Teicoplanin	800mg (400mg if $<40kg$ )	Bolus over 3-5 minutes	Not required	Give half original dose if 1500ml or more blood loss within first hour of operation
Metronidazole	500mg	Infusion over 20 minutes	Redose 500mg after 8 hours	500mg

Neurosurgery Procedure	SIGN 104 or other guidance recommendation	Antibiotic(s)	Comments
<b>'Clean' neurosurgery</b> (Craniotomy, EVDs, aneurysm clipping)	Antibiotic prophylaxis is recommended <sup>1</sup>	IV flucloxacillin 2g  OR  IV cefuroxime 1.5g  If <b>known anaphylaxis</b> to penicillin or cephalosporin use IV teicoplanin	Single dose
<b>CSF Shunt or drain insertion</b>	Antibiotic prophylaxis is recommended <sup>1,3</sup>		Single dose
<b>Spinal Surgery without implant</b> (laminectomy, micro/discectomy, fusion, decompression, tumours, corpectomy)	Antibiotic prophylaxis is recommended <sup>1</sup>		Single dose
<b>Spinal Surgery with implant</b>	Antibiotic prophylaxis is recommended <sup>1</sup>		24 hours prophylaxis Flucloxacillin – 3 further doses 1g 6 hourly Cefuroxime – 2 further doses 1.5g 8 hourly Teicoplanin- no further doses required
<b>Special Implants (ACD/baclofen pumps)</b>	Local recommendation is to give antibiotic prophylaxis		Single dose
<b>'Clean, contaminated' i.e trans-sphenoidal</b> (e.g. pituitary resection, repair of CSF leak, tumour debulking)	Antibiotic prophylaxis is recommended <sup>1</sup>	IV cefuroxime 1.5g + IV metronidazole 500mg  If <b>known anaphylaxis</b> to penicillin or cephalosporin use IV vancomycin + IV metronidazole	Single dose
<b>Penetrating CNS Injury +/- foreign body in situ (or multiple penetrating injuries including CNS)</b>	Antibiotic prophylaxis is recommended <sup>2</sup>	<a href="#">See separate guidance document</a>	
<b>Open skull fracture from penetrating trauma</b>	Antibiotic prophylaxis is recommended	<a href="#">See separate guidance document</a>	
<b>Basal skull fracture, CSF leak, CSF fistula</b>	No prophylaxis recommended <sup>3</sup>	n/a	Give pneumococcal polysaccharide vaccine (PPV 23) <sup>5</sup>

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Approved by: AMG September 2018  
Updated: June 2023  
Review: June 2026

**References:**

1. SIGN 104 Antibiotic Prophylaxis in Surgery. 2014 (*under review*)
2. R Bayston et al. Use of antibiotics in penetrating craniocerebral injuries. Infection in Neurosurgery working party of British Society of Antimicrobial Chemotherapy. Lancet 2000;355:1813-17
3. A R Tunkel et al. 2017 Infectious Diseases Society of America's Clinical Practice Guidelines for Healthcare- Associated Ventriculitis and Meningitis. Clin Inf Dis 2017;64(6):e35-65
4. Scottish Antimicrobial Prescribing Group [Guidance on Recommendations for Re-dosing Antibiotics for Surgical Prophylaxis](#) 2022
5. Immunisation Against Infectious Disease: The Green Book. [Pneumococcal](#). Chapter 25.