ANTIBIOTIC PROPHYLAXIS IN ORTHOPAEDIC SURGERY

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, notably *Clostridioides difficile* infection (CDI). The Scottish Antimicrobial Prescribing Group (SAPG), along with the Scottish Government, monitors antimicrobial prescribing including surgical prophylaxis in order to reduce the rates of CDI and resistance. SIGN guideline 104 (published in 2008 and updated 2014) 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 surgical specialties and the Bone and Joint MDT 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 and quinolones wherever possible
    - Use narrow spectrum agents when possible to minimise impact on resistance and CDI
    - Take into account local resistance patterns
    - Provision of alternatives for beta-lactam allergy
7. **De-colonisation therapy/MRSA patients**
   If a patient is identified as MRSA positive from screening swabs within 3 weeks of anticipated date of elective surgery then a decolonisation program should be started. See HPS Decolonisation Policy. The decolonisation regimen should also be restarted the day they come into hospital for 5 days to reduce the microbial load perioperatively. For surgical prophylaxis for primary operations vancomycin infusion should be added to the regime recommended in the table below (except for breast surgery where it would be used as a replacement). If they have an MRSA infection prior to elective surgery the approach is the same as for any other infection.
8. **Complex individual prophylaxis** issues should be discussed with Microbiology or Infectious Diseases pre-operatively and recorded in medical notes.
9. **Compliance with local policy** is required and monitored by NHS Tayside. Any deviation from policy must be recorded in the appropriate medical records.

For details of administration of antibiotics see last page.

Type of Surgery	Procedure	SIGN 104 Recommendation	Antibiotic(s)	Comments ***Previously MRSA positive – add teicoplanin to surgical prophylaxis regime – see dosing in table on last page*** ***Previous ESBL – ask Micro for advice on appropriate surgical prophylaxis***
Orthopaedic	Arthroplasty (including revisions where no infection is suspected)*	'Highly Recommended' Antibiotic loaded cement is recommended in addition to IV antibiotics	Cefuroxime 1.5g IV single dose	2 further doses of 750mg can be given 8 hrs apart up to a maximum of 24 hours total therapy In true penicillin/beta lactam allergy patients use co-trimoxazole 960mg IV infusion. A further dose may be given after 12 hours.
	Open surgery for closed fracture	'Highly Recommended'	Cefuroxime 1.5g IV single dose	
	Hip fracture	'Highly Recommended'	Cefuroxime 1.5g IV single dose	
	Open fracture (including open hand fractures)	'Highly Recommended'	Cefuroxime 1.5g IV every 8 hours + Metronidazole 500mg IV 8 hourly	In true penicillin/beta lactam allergy patients use co-trimoxazole 960mg IV infusion 12 hourly and metronidazole 500mg IV 8 hourly to ensure adequate cover. Prophylaxis should be started as soon as possible after injury and ideally within 1 hour of trauma, and continued until soft tissue closure or for a maximum of 72 hours, whichever is sooner. (Ref BOAST on open fractures 2017)
	Orthopaedic surgery without implant	'Not Recommended'		
	Lower limb amputation	See Vascular surgical prophylaxis guidance		
	Soft tissue surgery of the hand (not trauma surgery)	Locally not routinely recommended		
	Spinal surgery with/without implant	see Neurosurgery surgical prophylaxis guidance		

Type of Surgery	Procedure	SIGN 104 Recommendation	Antibiotic(s)	Comments ***Previous ESBL – ask Micro for advice on appropriate surgical prophylaxis***
Orthopaedic	Applies to procedures where infection is suspected: Revision arthroplasty (First stage of a two stage and single stage) DAIR procedure Removal of other implant	Locally recommended	**Antibiotic treatment to be given in theatre once samples are taken** Gentamicin IV treatment dose 7mg/kg as per gentamicin guidance or calculator – check level 6-14 hours after start of infusion given in theatre and determine dosing frequency as per nomogram on guidance + Vancomycin LOADING DOSE + MAINTENANCE dose 12-24 hours after loading dose calculated as per local vancomycin guidance or calculator If **NO** pathogenic growth at **48**hours, **STOP** gentamicin and continue vancomycin. Treatment can be extended to 72hours if over weekend. If growth found then micro will contact team and advise on further treatment plan	Choice of antimicrobial is based on a number of factors: • Locally increasing number of gram negative infections • *Pseudomonas* should be covered until microbiology results or indicators determine this is not required • **It is essential that dosing of vancomycin and gentamicin is sufficient to treat infection** Antibiotics should not be given until samples have been taken for culture and sensitivity. Aim for pre dose vancomycin level of 15-20mg/L
	Second stage revision for infection (re-implantation)	Agreed locally as per arthroplasty guidance	**Antibiotic treatment to be given in theatre once samples are taken** Selection of antibiotic(s) should be based upon the growth from the 1st stage (excision arthroplasty). In cases of culture negative PJI empirical vancomycin and gentamicin should be initiated dosing as per vancomycin calculator and gentamicin calculator. Advice from BJI MDT can be sought with regards to choice of antibiotic. Please contact prior to day of surgery	Duration: continue antibiotics for 72hours post implantation then review as per culture results or as per BJI MDT recommendations.

IV Antibiotic Administration Guidance:

Antibiotic	Dose	Administration	Prolonged surgery (time from administration of initial dose)	>1.5L blood loss redose after fluid replacement
Cefuroxime	1.5g	Bolus over 3-5 minutes	Redose 1.5g after 4 hours	1.5g
Co-trimoxazole	960mg	Infusion over 60 minutes Dilute each 480mg/5ml vial in 125ml sodium chloride 0.9%	Redose 480mg after 8 hours *	480mg
Metronidazole	500mg	Infusion over 20 minutes	Redose 500mg after 8 hours	500mg
Teicoplanin	800mg (400mg if patient <40kg)	Bolus over at least 5 minutes	Redose not required	Give half original dose if ≥1.5L blood loss within first hour of operation

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References:

• SAPG Good Practice Recommendations for Surgical and Procedural Antibiotic Prophylaxis in Adults in NHS Scotland https://www.sapg.scot/media/7302/20221128-gprs-for-surgical-antibiotic-prophylaxis-in-adults-in-nhs-scotland.pdf
• SAPG Recommendations for Re-dosing Antibiotics for Surgical Prophylaxis. https://www.sapg.scot/media/7247/20221121-gprs-for-redosing-antibiotics-for-surgical-prophylaxis.pdf
• British Orthopaedic Association & British Association of Plastic, Reconstructive & Aesthetic Surgeons Audit Standards for Trauma: Open fractures https://www.boa.ac.uk/static/3b91ad0a-9081-4253-92f7d90e8df0fb2c/29bf80f1-1cb6-46b7-afc761119341447f/open%20fractures.pdf