Clinical Guideline

Health
Hunter New England
Local Health District

Surgical Antibiotic Prophylaxis

Sites where Clinical Guideline applies	All facilities where surgery is carried out
This Clinical Guideline applies to:	
1. Adults	Yes
2. Children up to 16 years	Yes
3. Neonates – less than 29 days	No Approval gained from the Children Young People and Families Network on 16 December 2020
Target audience	Surgeons, anaesthetists, intensivists and pharmacists
Description	This document consists of expert recommendations for surgical antibiotic prophylaxis based on Version 16 Therapeutic Guidelines: Antibiotic Surgical antibiotic prophylaxis is almost always administered intravenously. Other routes are beyond the scope of this guideline. The use of antimicrobial-impregnated cement etc. is also beyond the scope of this guideline.

Hyperlink to Guideline

Keywords	Antibiotic, surgical, orthopaedic, prophylaxis, wound, infection, stewardship, patient safety, MRSA, MSSA, load reduction, *Staphylococcus aureus*, methicillin-resistant *S. aureus,* methicillin-susceptible *S. aureus.*
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Registration Numbers of Superseded Documents	HNELHD CG 14_35 Version One from 17 December 2014

Related Legislation, Australian Standard, NSW Ministry of Health Policy Directive or Guideline, National Safety and Quality Health Service Standard (NSQHSS) and/or other, HNE Health Document, Professional Guideline, Code of Practice or Ethics:

- National Safety & Quality Health Standard 3.14
- Therapeutic Guidelines: Antibiotic, Version 16. Therapeutic Guidelines®, Melbourne, Victoria 2019
- ACI Respiratory Network – Pleural Drains in Adults – A consensus guideline 2016

Position responsible for Clinical Guideline Governance	District Antimicrobial Stewardship Governance Pharmacist
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TABLE OF CONTENTS

Risk Statement	**Page 2**
Glossary	**Page 3**
Guideline Summary	**Page 4**
ANTIBIOTIC PROPHYLAXIS FOR PROCEDURES OTHER THAN ORTHOPAEDIC PROCEDURES	**Page 6**
ANTIBIOTIC PROPHYLAXIS FOR ORTHOPAEDIC PROCEDURES	**Page 8**
ANTIBIOTIC RECOMMENDATIONS BY ANTIBIOTIC TYPE	**Page 9**
Implementation Plan	**Page 10**
Monitoring and auditing plan, Consultation with key stakeholders, Feedback	**Page 10**
Appendix 1 – Recommended Surgical Antibiotic Prophylaxis table	**Page 12**

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RISK STATEMENT:

The risk of post-surgical infection is significantly decreased by the correct choice, dose & duration of antibiotic prophylaxis, and by the pre-emptive treatment of established but not yet overt infection, notably in trauma patients. The risk of avoidable antimicrobial resistance is also decreased by correct choice, dose & duration of antibiotics.

RISK CATEGORY: Clinical Care & Patient Safety

GLOSSARY

Acronym or Term	Definition
BV	Bacterial vaginosis
CTS	Cardiothoracic surgery
ENT	Ear, nose & throat
EVAR	Endovascular Aneurysm Repair
GIT	Gastrointestinal tract
HNE Health	Hunter New England Local Health District
HSM	Health Service Manager
IBW	Ideal body weight
IV	Intravenous
JMO	Junior Medical Officer
LSCS	Lower segment caesarean section
MRSA	Methicillin-resistant *Staphylococcus aureus*
MSSA	Methicillin-susceptible *Staphylococcus aureus*
QUMC	Quality Use of Medicines Committee
TAVI	Transcatheter aortic valve implantation

PRINCIPLES[1]

- Use surgical antibiotic prophylaxis only where there is a clear **indication** for use.
- Ensure clear documentation of peri-procedural antimicrobial active ingredient, dose, administration time and incision time in the patients' health care record.
- **Surgical antibiotic prophylaxis must be administered before surgical incision**. Short-acting antibiotics, such as cefazolin, should be administered no more than 60 minutes before incision. For antibiotics that are not short acting, the dose should be administered no more than 120 minutes before incision.
- **Doses administered with enough time (generally 15 to 30 minutes) before incision** may be optimal to achieve an effective plasma and tissue concentrations at time of incision.
- **A single perioperative dose of antibiotic(s) is sufficient for most procedures**. See Table 3 for dosing recommendations
- Important cefazolin changes:
    - Cefazolin dose should be increased to 3 g for adults who weigh >120 kg
    - If procedure lasts >4 hours, repeat cefazolin dose intraoperatively (unless patient has renal failure)
- For a minority of procedures, there are inadequate data to show that a single dose of prophylaxis is as effective as 24 hours of prophylaxis. For these procedures, post-operative doses can be considered but prophylaxis should not continue beyond 24 hours. See – Therapeutic Guidelines: Duration of surgical antibiotic prophylaxis
- **Antibiotic choice** may need to be modified according to patient factors, including the presence of infection, recent and current antimicrobial use (which may obviate the need for prophylaxis), colonisation with multidrug-resistant bacteria, prolonged hospitalisation or the presence of prostheses.
- **Cefazolin** is more effective than vancomycin in preventing post-operative infections caused by methicillin-susceptible *S. aureus* (MSSA).

1. ***Staphylcoccus aureus* carriage** (MSSA or methicillin-resistant *S. aureus* (MRSA)) increases the risk of post-operative infection; perioperative screening and targeted decolonisation is warranted for a range of procedures. See Preoperative procedures for the prevention of surgical site and implanted device infections HNE Health PD2017_013:PCP 33.
    - Do not extend the duration of antibiotic prophylaxis because the patient has a urinary or intravascular catheter, or surgical drain, *in situ*.

Preventing post-operative *S. aureus* infections

- *S. aureus* carriage increases the risk of post-operative surgical wound infection
- MSSA and MRSA preoperative screening is indicated[2] . If MSSA or MRSA colonisation is demonstrated, proceed with preoperative staphylococcal load reduction.
- If patient is confirmed to have MRSA carriage, ensure that teicoplanin IV[3] is included in the regimen.
- For patients already receiving regular doses of β-lactam antibiotics with activity against likely intraoperative pathogens, recommended prophylaxis may not be required—consult Infectious Diseases.

Surgical antibiotic prophylaxis for patients with a penicillin or cephalosporin allergy

- NB Many reported penicillin allergies are not true allergies; penicillin allergy often wanes over time. Refer to Penicillin allergy assessment guide for further information.
- Cefazolin is the mainstay of surgical antibiotic prophylaxis. As it shares no common side-chains with other β-lactams, it is usually tolerated in patients with a penicillin or other cephalosporin allergy.

[1] From Therapeutic Guidelines: Antibiotic, Version 16, 2019.

[2] For open cardiac and valve procedures, shoulder, hip or knee joint total arthroplasties: primary or revision procedures and vascular procedures—aortic surgery (stent and open), all lower limb open surgery for vascular reconstructions (bypass, endarterectomy) and iliac stents

[3] Teicoplanin instead of vancomycin is the glycopeptide of choice because of its simple dosing regimen (once only over 5 minutes) compared with vancomycin's (see Table 3).

- Hypersensitivity can be categorised by severity and timing and managed accordingly (see Figure 1):

  ***Non-severe* hypersensitivity to penicillins**

  - For patients with **immediate non-severe** or **delayed non-severe** hypersensitivity to penicillins, cefazolin can be used. Other cephalosporins may also be appropriate—seek expert advice.

  ***Severe* hypersensitivity to penicillins**

  - For patients with **immediate severe** or **delayed severe** hypersensitivity to penicillins, a non–β-lactam antibiotic must be used—for alternatives, see the relevant procedure.

Figure 1. Examples of penicillin allergy

Examples of penicillin allergy, classified by severity and timing

	Severe	Nonsevere
Immediate	anaphylaxis, compromised airway, angioedema, extensive urticaria, hypotension, collapse	mild urticaria or mild immediate rash
Delayed	severe cutaneous adverse drug reactions (eg DRESS, SJS/TEN), or significant internal organ involvement (eg acute interstitial nephritis)	benign childhood rash or maculopapular rash

DRESS = drug rash with eosinophilia and systemic symptoms; SJS/TEN = Stevens–Johnson syndrome / toxic epidermal necrolysis

From eTG/Antibiotic/Penicillin allergy assessment guide

TABLE 1 ANTIBIOTIC PROPHYLAXIS FOR NON-ORTHOPAEDIC PROCEDURES

(bodyweight < 120 kg)

Procedure	**First-line** *(including where there is a non-severe immediate/delayed penicillin allergy)* **MRSA: *ADD teicoplanin IV*** *where not otherwise specified*	**Second-line** *(Severe immediate/delayed penicillin allergy)*
Abdominal surgery (upper GIT/ biliary, including laparoscopic surgery)	Cefazolin 2 g IV (child 30 mg/kg up to 2 g)	Clindamycin 600 mg IV (child 15 mg/kg up to 600 mg) AND gentamicin 2 mg/kg IV
Abdominal surgery (appendicitis, hernia repair where entry into bowel lumen is expected, obstructed small intestine or colorectal surgery)	Cefazolin 2 g IV (child 30 mg/kg up to 2 g) AND metronidazole 500 mg (child 12.5 mg/kg up to 500 mg)	Metronidazole 500 mg IV (child 12.5 mg/kg up to 500 mg) AND gentamicin 2 mg/kg IV
Assisted vaginal delivery	Amox+Clav IV 1.2 g IV	metronidazole 500 mg IV (child 12.5 mg/kg up to 500 mg) AND gentamicin 2 mg/kg IV
Caesarean section	Cefazolin 2 g IV	Clindamycin 600 mg IV[3] AND gentamicin 2 mg/kg IV
Hysterectomy[4] (abdominal or vaginal) **gynaecological laparotomy and prolapse surgery**	Cefazolin 2 g IV AND metronidazole 500 mg IV	Clindamycin 600 mg IV AND gentamicin 2 mg/kg IV
Termination of pregnancy (Surgical antibiotic prophylaxis is not required if the patient has been investigated, and treated as indicated, for bacterial vaginosis and STIs before the procedure)	Doxycycline 100 mg orally, 60 minutes before the procedure, then 200 mg orally, 90 minutes after the procedure	
Cardiac catheter laboratory (defibrillator device/permanent pacemaker insertion, TAVI)	Cefazolin 2 g IV	Teicoplanin 800 mg IV AND gentamicin 2 mg/kg IV
Cardiothoracic surgery (CTS)[5]	Cefazolin 2 g IV THEN 8-hourly for 2 further doses AND **(*if valve re-do)*** teicoplanin 800 mg IV	Teicoplanin 800 mg IV AND ciprofloxacin 400 mg IV
CTS: Insertion of intercostal catheter for penetrating trauma[6]	Cefazolin 2 g IV (child 30 mg/kg up to 2 g)	Teicoplanin 800 mg IV (child 15 mg/kg up to 800 mg IV)

[4] Prior to hysterectomy, screening and treatment for bacterial vaginosis (BV) reduces BV-associated cuff infection. For termination of pregnancy, screening for *C. trachomatis* and BV with treatment prior to the procedure is indicated.

[5] Preoperative MSSA and MRSA nasal screening & decolonisation (load reduction) is indicated for: Open cardiac and valve procedures, vascular surgery—aortic surgery (stent and open), all lower limb open surgery for vascular reconstructions (bypass, endarterectomy) and iliac stents.

[6] Antibiotic prophylaxis is NOT recommended for non-trauma patients requiring a pleural drain (ACI, NSW 2016)

TABLE 1 ANTIBIOTIC PROPHYLAXIS FOR NON-ORTHOPAEDIC PROCEDURES CONTINUED

(bodyweight < 120 kg)

Procedure	**First-line** *(including where there is a non-severe immediate/delayed penicillin allergy)* **MRSA: *ADD teicoplanin IV*** *where not otherwise specified*	**Second-line** *(Severe immediate/delayed penicillin allergy)*
ENT: Major ear surgery, complex septorhinoplasty, revision sinus surgery, laryngectomy or tympanomastoid surgery	Cefazolin 2 g IV (child 30 mg/kg up to 2 g) AND metronidazole 500 mg IV[7] (child 7.5 mg/kg up to 500 mg IV)	Clindamycin 600 mg IV (child 15 mg/kg up to 600 mg) AND ***for laryngectomy or tympanomastoid surgery*** gentamicin 2 mg/kg IV
Head and neck[8]: Insertion of prosthetic material, clean-contaminated procedures , extensive neck dissection for malignancy, debulking or reconstructive surgery for malignancy	Cefazolin 2 g IV THEN 8-hourly for 2 further doses AND metronidazole 500 mg IV with one further dose at 12 hours	Clindamycin 600 mg IV AND **for *neck dissection, debulking or reconstructive surgery*** gentamicin 2 mg/kg IV
Neurosurgery: Prolonged procedure anticipated, re-explorations, microsurgery or insertion of prosthetic materials	Cefazolin 2 g IV (child 30 mg/kg up to 2 g)	Teicoplanin 800 mg IV prior to induction (child 15 mg/kg up to 800 mg)
Urological surgery	**See separate guideline**	
Vascular (1): Angiography including EVAR	Cefazolin 2 g IV (child 30 mg/kg up to 2 g)	Teicoplanin 800 mg) IV prior to induction (child 15 mg/kg up to 800 mg
Vascular (2): Fistula formation with prosthetic graft	Cefazolin 2 g IV (child 30 mg/kg up to 2 g) AND teicoplanin 800 mg IV prior to induction (child 15 mg/kg up to 800 mg)	Teicoplanin 800 mg IV prior to induction (child 15 mg/kg up to 800 mg)
Vascular (3)[5]: Aortic surgery (stent and open), all lower limb open surgery for vascular reconstructions (bypass, endarterectomy) and iliac stents	Cefazolin 2 g IV THEN 8-hourly for 2 further doses AND **(*if inguinal or more distal incision with insertion of graft)*** teicoplanin 800 mg IV	Teicoplanin 800 mg IV prior to induction AND gentamicin 2 mg/kg single dose IV[9]
Vascular (4): Amputation of ischaemic lower limb	Cefazolin 2 g IV AND metronidazole 500 mg IV	Teicoplanin 800 mg IV AND gentamicin 2 mg/kg IV AND metronidazole 500 mg IV

[7] A clean procedure with placement of prosthesis, other than a tympanostomy tube does not require metronidazole

[8] Clean-contaminated cancer surgery or other clean-contaminated procedures with the exception of tonsillectomy and functional endoscopic sinus procedures (where no antimicrobial prophylaxis is recommended). Prophylaxis NOT indicated for thyroidectomy, simple lymph node excision (including submandibular lymph node excision), parotidectomy, other clean procedures not listed above.

[9] Use gentamicin 5mg/kg if there is at least a moderate likelihood that the procedure will continue for longer than 6 hours

TABLE 2 ANTIBIOTIC PROPHYLAXIS FOR ORTHOPAEDIC PROCEDURES (bodyweight < 120 kg)[10]

Procedure	**First-line** (including where there is a non-severe immediate/delayed penicillin allergy)	**Second-line** *(Severe immediate/delayed penicillin allergy*
Orthopaedics: • Elective surgery **ONLY if prosthesis inserted**.[11] • Non-elective surgery (trauma)	Cefazolin 2 g IV single dose (child 30 mg/kg up to 2 g) AND ***(if MRSA colonised)*** teicoplanin 800 mg IV single dose (child 15 mg/kg up to 800 mg)	Teicoplanin 800 mg IV single dose (child 15 mg/kg up to 800 mg)
If a fracture is debrided, fixed and closed within 6 hours then **no additional prophylaxis is required.** Otherwise, presumptive therapy for early infection (not yet clinically overt) is indicated (see below). For this guideline, the presence of an external fixator is not considered to represent an 'open wound'.		
Gustilo grade	**Size of wound**	**Duration of antibiotics**
I	< 1 cm	24 hours after wound closure **OR** 2 days if wound still open
II	1–3 cm	24 hours after wound closure **OR** 3 days if wound still open
III	> 3 cm	24 hours after wound closure **OR** 5 days if wound still open
IIIA	Bone coverable.	24 hours after wound closure **OR** 5 days if wound still open
IIIB	Bone not coverable.	
IIIC	Arterial injury, bone not coverable	
Other multi-trauma cases including brain injury, base of skull fracture and CSF pressure monitored case	-	24 hours after procedure

[10] Prophylaxis NOT indicated for routine arthroscopy procedures unless involving insertion of prosthetic material or avascular tissue

[11] Where joint infection suspected prior to surgery and diagnostic specimens are required, delay administration in hip prostheses until after tissue samples taken. In knee operations, administer prophylaxis at the time of tourniquet removal.

TABLE 3 ANTIBIOTIC RECOMMENDATIONS

Antibiotic	Recommendations
Cefazolin	• Give within 60 minutes before incision • For adults weighing < 120 kg give 2 g IV • For adults weighing > 120 kg give 3 g IV (in the absence of renal failure- i.e. eGFR < 40mL/min) • For children give 30 mg/kg (maximum 2 g) IV • Post- and intraoperative redosing NOT indicated in patients with renal failure (eGFR < 40mL/min) Seek expert advice • See Therapeutic Guidelines – Antimicrobial dosages for adults with impaired renal function • Redosing interval – 4 hours • Drug half-life 1.2 to 2.2 hours
Cefotaxime, ceftriaxone & ceftazidime	There is no indication for any of these antibiotics for surgical prophylaxis because: • They may provide inferior coverage for Gram-positive microorganisms • Their broad Gram-negative coverage promotes unacceptable antimicrobial resistance • Their half-life would also require more frequent redosing
Clindamycin	• Give 600 mg IV infusion • Injection should be diluted in no less than 50 mL • Infuse over at least 20 minutes • Give within 120 minutes before incision • Redosing interval – 6 hours • Drug half-life 2 to 4 hours

Gentamicin	• Do not use aminoglycosides in patients with:
	  ○ a history of aminoglycoside-induced vestibular or auditory toxicity (including past history of Ménière's disease)
	  ○ a history of a severe hypersensitivity reaction to an aminoglycoside, but these reactions are rare
	  ○ myasthenia gravis
	Seek advice from infectious diseases service if required.
	• Give 2–5 mg/kg (adults and children).The appropriate dose depends on the duration of prophylaxis required.
	• A 2 mg/kg dose is recommended when a short duration (up to 6 hours) of prophylaxis is required because it provides an adequate tissue concentration for the duration of the procedure
	• A 5mg/kg dose is recommended when there is at least a moderate likelihood that the procedure will continue for longer than 6 hours,
	• Inject by slow IV injection over 3 to 5 minutes
	• Give within 120 minutes before incision
	• Redosing not required
	• Drug half-life 2 to 3 hours
	• For obese patients (BMI>30 kg/m^2) dose according to adjusted body weight up to maximum of 360 mg:
	Adjusted body weight = IBW + 0.4 x (actual bodyweight – IBW)
	Use ideal body weight (IBW) calculator for adults. A child's IBW can be estimated using the corresponding weight for the height percentile on the growth chart (eg www.cdc.gov/growthcharts) or, if the child's height cannot be determined, the average weight-for-age (50th centile) on the growth chart

Lincomycin	• An alternative to clindamycin (use same dosing as IV clindamycin) • Dilute to a maximum concentration of 10 mg/mL, and infuse at a maximum rate of 1 g/hour

	• Severe cardiopulmonary reactions have occurred when given faster than 1 g/hour or in concentrations of more than 1 g/100 mL
Antibiotic	**Recommendations**
Metronidazole	• 500 mg IV infusion over 15–30 minutes • End the infusion at the time of induction • Redosing interval – 12 hours • Drug half-life 6 to 8 hours
Teicoplanin	• **Teicoplanin is the preferred glycopeptide** as it can be given by slow injection over 5 minutes, 15–30 minutes before surgical incision • Vancomycin should be used only if teicoplanin is not available • Redosing not required • Drug half-life several days
Vancomycin	• NB Vancomycin should be used only if teicoplanin is not available • 25 mg/kg (based on actual body weight) up to 1.5 g infused at a maximum rate of 10 mg/minute to prevent “red man” syndrome • Due to its long infusion time, vancomycin should be commenced between 30 and 120 minutes before surgical incision, ending the infusion 15–30 minutes PRIOR to anaesthetic induction. If started late, allow for at least 15 minutes prior to surgical incision to allow for potential infusion-related toxicity to be recognised • To co-ordinate this, vancomycin infusion must begin when the patient is on the ward. If gentamicin is also indicated, this can be given 15–30 minutes before surgical incision • Redosing interval – 12 hours • Drug half-life 4 to 8 hours

IMPLEMENTATION PLAN

- The District Executive will ensure that all Health Service Managers (HSMs) receive this Guideline.
- The HNE LHD Quality Use of Medicines Committee (HNE LHD QUMC) will disseminate this Guideline to all Quality Use of Medicine Committees (QUMCs), Drugs & Therapeutics Committees (DTCs) or equivalent in the District.
- The QUMCs, DTCs etc. & the HSMs will disseminate this Guideline to the lead person for antimicrobial stewardship implementation designated by the HSM of each Health Service.
- The lead person for antimicrobial stewardship implementation at each site or the HSM (if the HSM has not designated a lead person) will disseminate this Guideline to all surgical, orthopaedic & anaesthetic practitioners & services.
- Intensive care rounds conducted at least weekly by clinical microbiology & infectious diseases at all District sites should assess all trauma and neurosurgical cases for duration of prophylaxis.
- Intensivists should apply this Guideline to truncate prolonged prophylaxis.
- Junior Medical Officer (JMOs), Specialists, Visiting Medical Officers (VMOs) and General Practitioners will receive education from Pharmacy, Infectious Diseases & Clinical Microbiology at orientation & other educational opportunities.
- HNE Health Antimicrobial Working Party is responsible for updating this Guideline.

MONITORING AND AUDITING PLAN

- Surgical Prophylaxis audits by Pharmacy will assess perioperative timeliness, correct agent and correct dose. Reports will be tabled at QUMCs, DTCs & equivalent meetings.
- Timeout procedure will include assessment of surgical prophylaxis completion
- The designated lead for antimicrobial stewardship at each health service or the HSM is responsible for co-ordinating these audits.

CONSULTATION WITH KEY STAKEHOLDERS

- Surgical Departments & District surgical services
- Orthopaedic Departments
- Anaesthetic services
- Paediatric Surgeons
- Infectious Diseases and Immunology
- Pathology North Microbiology
- District Antimicrobial Working Party
- Clinical Governance

REFERENCES

1. Antibiotic Expert Group. Therapeutic Guidelines: Antibiotic. Version 16, Melbourne. Therapeutic Guidelines Limited; 2019.
2. Australian Medicines Handbook. Children's Dosing Companion. July 2020
3. SHPA. Australian Injectable Drugs Handbook. 8th edition.
4. National Centre for Antimicrobial Stewardship. National Antimicrobial Prescribing Survey. Surgical NAPS. Timing and duration of surgical prophylaxis. Recommendations 2020
5. Australian Commission on Safety and Quality in Health Care. Antimicrobial Stewardship – Clinical Care Standard. November 2020

FEEDBACK

Any feedback on this document should be sent to the Contact Officer listed on the front page.

Appendix 1 - Recommended Surgical Antibiotic Prophylaxis

Procedure	First-line Antibiotic MRSA: ADD teicoplanin IV where not otherwise specified	Second-line Antibiotic (Severe immediate/delayed penicillin allergy)	Duration
Abdominal Surgery			
Upper GIT / biliary including laparoscopic surgery	Cefazolin	Clindamycin AND gentamicin	Single dose
Appendicitis, hernia repair where entry into bowel lumen is expected, obstructed small intestine or colorectal surgery	Cefazolin AND metronidazole	Metronidazole AND gentamicin	Single dose
Obstetrics & Gynaecological Surgery			
Assisted vaginal delivery	Amoxicillin + Clavulanic Acid	Metronidazole AND gentamicin	Single dose
Caesarean section	Cefazolin	Clindamycin AND gentamicin	Single dose
Hysterectomy (abdominal or vaginal), gynaecological laparotomy and prolapse surgery	Cefazolin AND metronidazole	Clindamycin AND gentamicin	Single dose
Termination of pregnancy (antibiotics may not be required, see guideline)	Doxycycline (oral)		2 doses required
Cardiac Surgery			
Cardiac catheter laboratory (defibrillator/PPI/TAVI)	Cefazolin	Teicoplanin AND gentamicin	Single dose
Cardiothoracic surgery (CTS)	Cefazolin (if valve re-do ADD teicoplanin single dose)	Teicoplanin AND ciprofloxacin (single dose)	24 hours (incl. peri-operative dose)
CTS : Insertion of intercostal catheter for penetrating trauma	Cefazolin	Teicoplanin	Single dose
Ear, Nose and Throat Surgery			
Clean procedure placement of prosthesis (excludes tympanostomy tube)	Cefazolin	Clindamycin	Single dose
Laryngectomy or tympanomastoid surgery	Cefazolin + metronidazole	Clindamycin AND gentamicin	Single dose
FESS/ Tonsillectomy	No antibiotics indicated	No antibiotics indicated	Not applicable
Head and Neck Surgery			
Insertion of prosthetic material, clean-contaminated procedures , extensive neck dissection for malignancy, debulking or reconstructive surgery for malignancy	Cefazolin AND metronidazole	Clindamycin AND for neck dissection, debulking or reconstructive surgery ADD gentamicin (single dose)	24 hours (incl. peri-operative dose)
Thyroidectomy or parotidectomy	No antibiotics indicated	No antibiotics indicated	Not applicable
Neurosurgery			
Prolonged procedure anticipated, re-explorations, microsurgery or insertion of prosthetic materials	Cefazolin	Teicoplanin	Single dose
Insertion of shunts, ventricular drains or pressure monitors	No antibiotics indicated	No antibiotics indicated	Not applicable
Vascular Surgery			
Angiography including EVAR	Cefazolin	Teicoplanin	Single dose
Fistula formation with prosthetic graft	Cefazolin AND teicoplanin	Teicoplanin	Single dose
Aortic surgery (stent and open), all lower limb open surgery for vascular reconstructions (bypass, endarterectomy) and iliac stents	Cefazolin AND if distal incision with insertion of graft ADD teicoplanin	Teicoplanin AND gentamicin	24 hours (incl. peri-operative dose)
Amputation of ischaemic lower limb	Cefazolin AND metronidazole	Teicoplanin AND gentamicin AND metronidazole	Single dose
Orthopaedic Surgery			
Routine arthroscopy not involving insertion of prosthesis	No antibiotics indicated	No antibiotics indicated	Not applicable
Non-elective (trauma) or elective surgery ONLY if prosthesis inserted	Cefazolin	Teicoplanin	24 hours (incl. peri-operative dose)
Note: If a fracture is debrided, fixed and closed within 6 hours then **no additional prophylaxis is indicated**			
Urological Surgery			
Diagnostic cystoscopy (including biopsy)	No antibiotics indicated	No antibiotics indicated	Not applicable
Other endoscopic procedures (including TURP)	Cefazolin	Gentamicin OR trimethoprim (oral)	Single dose
Open or laparoscopic procedures (not required if urine culture sterile)	**Cefazolin AND if ileal conduit or rectocele repair ADD** metronidazole	Gentamicin	Single dose
TRUS biopsy	Ciprofloxacin (oral) (Meropenem should be considered if rectal swab positive for ESBL producing organisms)	See relevant guideline	Single dose

Antibiotic	Adult dosing	Paediatric Dosing	Administration	Timing
Cefazolin	2 g IV (3 g if weight > 120 kg)	30 mg/kg up to 2g IV	Inject over 3 to 5 min	Within 60 minutes prior to incision
Ciprofloxacin IV	400 mg IV	Not applicable	Infusion over 60 minutes	Infusion end 15 minutes prior to incision
Ciprofloxacin oral	500 mg PO	Not applicable	Oral	60 to 120 minutes prior to procedure
Clindamycin	600 mg IV	15 mg/kg up to 600 mg IV	Infusion over 20 minutes in > 50 mL	Within 120 minutes prior to incision
Gentamicin	2 to 5 mg/kg IV (up to 360 mg)	2 to 5 mg/kg IV (up to 360 mg)	Inject over 3 to 5 minutes	Within 120 minutes prior to incision
Metronidazole	500 mg IV	12.5mg/kg up to 500 mg IV	Infuse over 15 to 30 minutes	Infusion end at time of induction
Teicoplanin	800 mg IV	15 mg/kg up to 800 mg IV	Inject over 5 minutes	15 to 30 minutes prior to incision
Teicoplanin (urology)	10 mg/kg up to 400 mg	10 mg/kg up to 400 mg	Inject over 5 minutes	15 to 30 minutes prior to incision
Trimethoprim	300 mg PO	Not applicable	Oral	60 minutes prior to incision
Vancomycin	25mg/kg up to 1.5 g	25 mg/kg up to 1.5 g	Maximum rate of 10 mg/minute	Infusion end 15 to 30 minutes prior to induction

- Use surgical antibiotic prophylaxis only where there is a clear **indication** for use.
- **Surgical antibiotic prophylaxis must be administered before surgical incision**
- **A single perioperative dose of antibiotic(s) is sufficient for the significant majority of procedures.**
- **Antibiotic choice** may need to be modified according to patient factors, including the presence of infection, recent antimicrobial use, colonisation with multidrug-resistant bacteria, prolonged hospitalisation or the presence of prostheses.
- **Cefazolin** is more effective than vancomycin in preventing postoperative infections caused by methicillin-susceptible *Staphylococcus aureus* (MSSA)
- ***Staph. aureus* carriage (MSSA or MRSA)** increases the risk of postoperative infection; perioperative screening and targeted decolonisation is warranted for a range of procedures.