Surgical Antibiotic Prophylaxis Guideline: Adults

Key principles of surgical prophylaxis

- Only use antibiotic prophylaxis if there is a significant risk of infection.
- Surgical antibiotic prophylaxis should not be the only strategy used to reduce the risk of postoperative infection. Minimising the risk requires a comprehensive approach to patient management, including optimal perioperative medical management (e.g. perioperative glycaemic control in patients with diabetes), adequate debridement, and good surgical technique.
- Preoperative intravenous (IV) antibiotic administration should occur up to 60 minutes before surgical incision; however 15 to 30 minutes before surgical incision is optimal.
- Antibiotic selection may need to be modified according to patient risk factors.
- Vancomycin is not as effective as cefazolin for preventing postoperative infections caused by methicillin-susceptible Staphylococcus aureus (MSSA).
- Antibiotic pharmacokinetics are altered in obese patients, so dosage adjustment may be necessary. Seek pharmacist/infectious disease physician input in patients with BMI >30.
- Antibiotic prophylaxis with urinary catheter insertion or removal is not recommended with the exception of some high-risk patients following urological procedures.
- A single dose of antibiotic(s) is sufficient for the majority of procedures.
- Prophylaxis should not extend beyond 24 hours. Postoperative doses of IV antibiotics of up to 24 hours are only required in defined circumstances, such as some cardiac and vascular surgeries or a lower limb amputation, for which a benefit for up to 24 hours of prophylaxis has been demonstrated in clinical trials.
- Urinary or intravascular catheters or indwelling surgical drains that remain in situ are not a justification to extend the duration of antibiotic prophylaxis.
- Antibiotics for infective endocarditis prophylaxis may be needed for patients with specific cardiac conditions (see fact sheet Prophylaxis for Endocarditis).
- Extemporaneous or novel use of antimicrobials, such as topical, intracavitary, intra-tissue or in prosthetic materials, should be avoided.
- Some antibiotics may be subject to restricted use or requiring approval from a clinical microbiologist or infectious disease physician. Please refer to the WA State Medicine Formulary for details https://formulary.hdwa.health.wa.gov.au/Home

Surgical Antibiotic Prophylaxis Guideline: Adults

Abdominal Surgery

Patients with specific cardiac conditions (see list in Endocarditis) undergoing abdominal surgery where surgical antibiotic prophylaxis is indicated, include an antibiotic active against enterococci.

Gastroduodenal and oesophageal surgery

Not indicated: procedures not entering the gastrointestinal tract lumen, unless there are risk factors for postoperative infection (e.g. significant obesity or immunocompromise; gastric outlet obstruction; reduced gastric acidity or motility; gastrointestinal bleeding, malignancy or perforation).

Indicated: gastroduodenal or oesophageal surgical procedures that enter the gastrointestinal tract lumen.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Biliary surgery, including laparoscopic surgery

Not indicated: low risk, uncomplicated elective biliary procedures, including laparoscopic surgery.

Indicated: high risk of infective complications, such as: patients older than 70 years, diabetes, obstructive jaundice, common bile duct stones, acute cholecystitis or a non-functioning gall bladder; and open cholecystectomy.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Small intestinal surgery

Indicated: all small intestine surgery, except endoscopic procedures.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

  If obstruction present **add**:

- **metronidazole** 500 mg IV, 15 to 30 minutes before surgical incision

  OR (as a single drug) **cefoxitin** 2 g IV 15 to 30 minutes before surgical incision.
Colorectal surgery and appendicectomy

- **metronidazole** 500 mg IV, 15 to 30 minutes before surgical incision
  PLUS EITHER:
  - **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision
  OR
  - **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision
  OR (as a single drug) **cefoxitin** 2 g IV, 15 to 30 minutes before surgical incision.

Hernia repair

**Not indicated:** for hernia repair without prosthetic material (mesh).

**Indicated:** If there are risk factors for postoperative infection (e.g. immunocompromise, advanced age, reoperation, prolonged duration of surgery, use of surgical drains), consider **cefazolin** as for Gastrostomy or jejunostomy tube insertion. In complicated repairs where entry into the bowel lumen is expected refer to Colorectal surgery and appendicectomy prophylaxis.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au

Surgical Antibiotic Prophylaxis Guideline: Adults

Breast Surgery

The benefits of routine postoperative antibiotic doses in reconstruction surgery are uncertain; there may be a benefit in obese patients or those treated with radiation therapy. The need for postoperative doses should be considered on an individual patient basis; if used, postoperative prophylaxis should not exceed 24 hours.

**Not Indicated:** for wound revision, diagnostic excisional biopsy, or lumpectomy without wire localisation.

**Indicated:** patients undergoing breast cancer surgery (including lymph node exploration), reduction mammoplasty, procedures involving prosthetic implantation or wire localisation, and reoperations.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), add to cefazolin.

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

*Immediate hypersensitivity to penicillins* replace cefazolin with vancomycin (as above).

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Surgical Antibiotic Prophylaxis Guideline: Adults

Burns Surgery

It may be necessary to provide prophylaxis for a wide range of organisms including *Staphylococcus aureus*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa* and aerobic Gram-negative bacilli; the prevalence of these organisms varies with the duration of inpatient stay.

Patients with burns often have altered pharmacokinetics; antibiotic dosing should be adjusted accordingly.

Antibiotic choice should be guided by local epidemiology and the results of cultures and susceptibility testing.

**Not indicated:** for patients with burns that do not require immediate debridement surgery; if the patient is already receiving antibiotic therapy for established infection; however, the timing of the antibiotic dose should be adjusted to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure.

**Indicated:** for patients with burns or extensive skin loss undergoing surgical debridement.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Surgical Antibiotic Prophylaxis Guideline: Adults

Cardiac surgery

Gram-positive organisms, particularly *Staphylococcus aureus* coagulase-negative staphylococci, and aerobic Gram-negative organisms are important causes of postoperative infection.

Consider *Staphylococcus aureus* screening and decolonisation (*see details in eTG: Antibiotic Guideline*) for all patients undergoing cardiac surgery. Known methicillin-resistant *Staphylococcus aureus* (MRSA) carriage should not delay urgent cardiac surgery.

Duration of antibiotic prophylaxis is up to 24 hours. Extended prophylaxis is associated with an increased risk of adverse effects, including infection with resistant pathogens or *Clostridium difficile*.

**Indicated:** valve replacement, coronary artery bypass surgery, cardiac transplantation, transcatheter aortic valve implantation (TAVI) and insertion of ventricular assist devices.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision, then 8-hourly for up to 2 further doses.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), add **vancomycin** (as below) to **cefazolin**.

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

**Immediate hypersensitivity to penicillins** use **vancomycin** (as above).

**PLUS**

- **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision.
Surgical Antibiotic Prophylaxis Guideline: Adults

Cardiac device insertion-implantable

**Indicated:** for the insertion of implantable cardiac devices, such as permanent pacemaker devices, cardioverter-defibrillators, or cardiac resynchronisation devices.

A single preoperative dose of antibiotic prophylaxis is adequate; postoperative doses are not required.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), **add vancomycin** (as below) to cefazolin.

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

**Immediate hypersensitivity to penicillins**

- **vancomycin** (as above)
- PLUS
  - **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au

Surgical Antibiotic Prophylaxis Guideline: Adults

Dermatological surgery

Do not apply topical antibiotics (e.g. chloramphenicol) to the surgical incision for the prevention of surgical site infection.

Pre-emptive antibiotic therapy or treatment of established infection is required for traumatic wounds and wounds caused by bites and clenched fists (refer to the eTG: Antibiotic Guideline for details – Wound infections; Bites and clenched fist injuries).

Not indicated: for routine sterile dermatological surgery; it may be indicated in defined circumstances (see Plastic surgery).

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Indicated: in patients with the following cardiac conditions, undergoing certain dental procedures or other procedures (see relevant subsections below):

List of:

Cardiac conditions associated with the highest risk of adverse outcomes from endocarditis.
- prosthetic cardiac valve or prosthetic material used for cardiac valve repair
- previous infective endocarditis.

Congenital heart disease but only if it involves:
- unrepaired cyanotic defects, including palliative shunts and conduits
- completely repaired defects with prosthetic material or devices, whether placed by surgery or catheter; during the first 6 months after procedure (after which the prosthetic material is likely to have been endothelialised)
- repaired defects with residual defects at or adjacent to the site of a prosthetic patch or device (which inhibit endothelialisation)
- rheumatic heart disease in high-risk patients.

Note: Patients who have had a heart transplant consult the patient’s cardiologist for specific recommendations.

Dental procedures

Not indicated: procedures with a low incidence of bacteraemia; oral examination; infiltration and block local anaesthetic injection; restorative dentistry; supragingival rubber dam clamping / placement of rubber dam; intracanal endodontic procedures; removal of sutures; impressions and construction of dentures; orthodontic bracket placement and adjustment of fixed appliances; application of gels; intraoral radiographs; supragingival plaque removal.

Indicated in some circumstances in patients with cardiac conditions (Listed)- multiple and prolonged procedures or periodontal disease: full periodontal probing with periodontitis; supragingival calculus removal/cleaning; rubber dam placement with clamps (if a risk of damaging gingiva); restorative matrix band/strip placement; endodontics beyond the apical foramen; placement of orthodontic bands; placement of interdental wedges; subgingival placement of retraction cords, antibiotic fibres or strips.
**Indicated always:** in patients with the cardiac conditions *(Listed)* undergoing: extraction, periodontal procedures including surgery, subgingival scaling and root planing; replanting avulsed teeth; other surgical procedures (e.g. apicoectomy).

- **amoxicillin** 2 g orally, 1 hour before the procedure
  
  OR
  
- **amoxicillin** 2 g IV, 15 to 30 minutes before the procedure
  
  OR
  
- **amoxicillin** 2 g IM, 30 minutes before the procedure.

**Hypersensitive to penicillins** *(excludes immediate hypersensitivity)*:

- **cefalexin** 2 g orally, 1 hour before the procedure
  
  OR
  
- **cefazolin** 2 g IV, 15 to 30 minutes before the procedure
  
  OR
  
- **cefazolin** 2 g IM, 30 minutes before the procedure.

**Immediate hypersensitivity to penicillins**

- **clindamycin** 600 mg orally, 1 hour before the procedure
  
  OR
  
- **clindamycin** 600 mg IV over at least 20 minutes, 15 to 30 minutes before the procedure.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Genitourinary and gastrointestinal tract procedures

**Not indicated:** prophylaxis solely to prevent endocarditis; genitourinary or gastrointestinal tract procedure where surgical antibiotic prophylaxis is **not** routinely indicated (e.g. insertion or removal of intrauterine contraceptive device, transoesophageal echocardiography, routine endoscopy +/- biopsy, including colonoscopy); obstetric indications not routinely required (for indications see Obstetric and gynaecological surgery).

**Indicated:** (Cardiac conditions **Listed**) suspected/confirmed genitourinary tract or intra-abdominal infection (regardless if a procedure is involved); genitourinary or gastrointestinal tract procedure where surgical antibiotic prophylaxis is routinely indicated. Ensure, included is an antibiotic active against enterococci.

If the regimen does **not** include an antibiotic active against enterococci, **add:**

- amoxicillin 2 g IV, 15 to 30 minutes before the procedure
  OR
- amoxicillin 2 g IM, 30 minutes before the procedure.

**Hypersensitive to penicillins**

- vancomycin
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  ending 5-30 minutes prior to surgical incision.
  OR
- teicoplanin 400 mg IV 15 to 30 minutes before the procedure.

Patients colonised or infected with vancomycin-resistant enterococci, seek expert advice about an appropriate antibiotic regimen.
Upper and lower respiratory tract procedures

Empirical antibiotic therapy should include a drug active against viridans group streptococci and, in some circumstances, *Staphylococcus aureus* (see relevant respiratory tract infection in eTG: Antibiotic guideline for appropriate regimen).

**Not indicated:** respiratory tract procedure where surgical antibiotic prophylaxis is not routinely recommended (e.g. tracheostomy, endotracheal intubation, bronchoscopy with or without incision or biopsy, tympanoplasty).

**Indicated** in patients with the cardiac conditions (**Listed**): invasive ear/nose/throat or respiratory tract procedure to treat an established infection (e.g. drainage of abscess).

Tonsillectomy and/or adenoidectomy (see Dental procedures for regime).

Respiratory tract procedure where surgical antibiotic prophylaxis is routinely recommended (clean–contaminated surgery), (e.g. laryngectomy, pharyngectomy, complex septorhinoplasty).

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au

Surgical Antibiotic Prophylaxis Guideline: Adults

Gastrointestinal Endoscopic Procedures

There is no evidence for antibiotic prophylaxis in routine upper or lower gastrointestinal endoscopy.

Patients with specific cardiac conditions (see list in Endocarditis) who are undergoing an endoscopic retrograde cholangiopancreatography (ERCP) or endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) for which surgical antibiotic prophylaxis is indicated, the prophylaxis regimen should include an antibiotic active against enterococci.

Endoscopic retrograde cholangiopancreatography

**Not indicated:** patient is already receiving antibiotic treatment for an established infection; however, the dose should be adjusted to achieve adequate plasma and tissue concentrations for the duration of the procedure.

**Indicated:** evidence of biliary tract obstruction and incomplete biliary drainage may not be achieved; before endoscopic retrograde cholangiopancreatography (ERCP) with communicating pancreatic cysts or pseudocysts, and before transpapillary or transmural drainage of pseudocysts.

- **cefazolin** 2 g IV, 15 to 30 minutes before the procedure
  - OR
- **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before the procedure.
Endoscopic ultrasound-guided fine-needle aspiration

**Not indicated:** diagnostic endoscopic ultrasound (EUS) or endoscopic ultrasound-guided fine-needle aspiration (EUS-FNA) of solid lesions adjacent to the upper gastrointestinal tract.

**Indicated:** EUS-FNA of cystic lesions adjacent to the gastrointestinal tract, and may be considered for solid lesions adjacent to the lower gastrointestinal tract.

- **metronidazole** 500 mg IV, 15 to 30 minutes before the procedure
  
  PLUS EITHER

  - **cefazolin** 2 g IV, 15 to 30 minutes before the procedure
  
  OR

  - **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before the procedure
  
  OR (as a single drug) **cefoxitin** 2 g IV, 15 to 30 minutes before the procedure.

Gastrostomy or jejunostomy tube insertion

**Indicated:** percutaneous gastrostomy or jejunostomy tube insertion, either endoscopically (i.e. PEG or PEJ) or radiologically (i.e. PRG or PRJ), as reduces the risk of peristomal infective complications.

- **cefazolin** 2 g, 15 to 30 minutes before surgical incision.

If known to be, or at risk of being colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA) add to **cefazolin**.

- **vancomycin**
  
  $< 75$ kg: $1$ g IV infusion over 60 minutes
  
  $\geq 75$ kg: $1.5$ g IV infusion over 90 minutes

  ending 5-30 minutes prior to surgical incision.

**Immediate sensitivity to penicillins, replace cefazolin with vancomycin** (as above).

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Surgical Antibiotic Prophylaxis Guideline: Adults
Head and Neck Surgery

The risk of postoperative infection is increased in the presence of head and neck cancer.

**Not indicated:** in tonsillectomy, adenoidectomy, nasal septoplasty, endoscopic sinus surgery, or uncontaminated neck dissection (unless indicated above for cardiac conditions).

**Indicated:** procedures that involve an incision through oral, nasal, pharyngeal or oesophageal mucosa; stapedectomy or similar operations; procedures that involve insertion of prosthetic material; and patients with specific cardiac conditions (see *Endocarditis*) who are undergoing tonsillectomy or adenoidectomy require antibiotics for the prevention of infective endocarditis.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision
  **PLUS** (for incisions through mucosal surfaces)
  - **metronidazole** 500 mg IV, 15 to 30 minutes before surgical incision.

**Immediate hypersensitivity to penicillins** as a single drug.

- **clindamycin** 600 mg IV, 15 to 30 minutes before surgical incision.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au

Surgical Antibiotic Prophylaxis Guideline: Adults

Lower limb amputation

Amputation (esp. ischaemic leg), carries a small but important risk of clostridial infection. Duration of antibiotic prophylaxis for lower limb amputation, in the absence of an established infection, is up to 24 hours.

**Not indicated:** if already receiving antibiotic treatment for an established infection.

**Indicated:** for amputation of an ischaemic limb, prophylactic metronidazole (as below) should be given if the treatment regimen does not have adequate activity against anaerobic bacteria.

The timing of the antibiotic treatment dose should be adjusted so that adequate plasma and tissue concentrations are achieved at the time of surgical incision and maintained for the duration of the procedure. In these patients, antibiotic treatment can be stopped 2 to 5 days after amputation if the infected bone and tissue has been removed.

- **cefazolin** 2 g 15 to 30 minutes before surgical incision, then 8-hourly for up to 2 further doses.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), add **vancomycin** (as below) to cefazolin.

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

Immediate hypersensitivity to penicillins, use **vancomycin** (as above), then consider repeating the dose after 12 hours.

**PLUS**
- **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision.

For amputation of an ischaemic limb, add **metronidazole** to all of the above regimens.

- **metronidazole** 500 mg IV, 15 to 30 minutes before surgical incision, then consider repeating the dose after 12 hours.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Surgical Antibiotic Prophylaxis Guideline: Adults

Neurosurgery

Ventricular drains that remain in situ are not a justification to extend the duration of antibiotic prophylaxis beyond what is otherwise indicated for a specific procedure.

The most common organisms causing postoperative infection are *Staphylococcus aureus*, coagulase-negative staphylococci, and diphtheroids.

**Not indicated:** for cerebrospinal fluid leakage following trauma.

**Indicated:** craniotomy when the procedure is prolonged, for re-explorations and microsurgery, and for the insertion of prosthetic material such as acrylic plates. Although widely used, the benefit of routine prophylaxis for the insertion of shunts, ventricular drains or pressure monitors has not been demonstrated in clinical trials. Antibiotic-impregnated shunts (with clindamycin or rifampicin) lower shunt infection rates, but data is lacking on the potential risk of selecting resistant organisms.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), add **vancomycin** to cefazolin.

- **vancomycin**
  
  < 75 kg: 1 g IV infusion over 60 minutes
  
  ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  
  ending 5-30 minutes prior to surgical incision.

**Immediate hypersensitivity to penicillins** replace cefazolin with vancomycin (as above).

For neurosurgical spinal procedures (see Orthopaedic surgery).

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au

Surgical Antibiotic Prophylaxis Guideline: Adults

Obstetrics and Gynaecological Surgery

Surgical antibiotic prophylaxis is not recommended for low-risk obstetric or gynaecological procedures, such as insertion of an intrauterine device or laparoscopy. Infection following medical (pharmacological) termination of pregnancy is rare and is usually related to retained products of conception; antibiotic prophylaxis is not required.

Caesarean section

Indicated: always, even if receiving antibiotics for; Preterm prelabour rupture of membranes or Prevention of neonatal Streptococcus agalactiae (group B streptococcus) disease.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Immediate hypersensitivity to penicillins

- **clindamycin** 600 mg IV over at least 20 minutes, 15 to 30 minutes before surgical incision.

Surgical termination of pregnancy

Screen for *Chlamydia trachomatis* and bacterial vaginosis and treat before the procedure.

Indicated: always.

- **doxycycline** 400 mg orally, 60 minutes before the procedure (doxycycline has alternatively been administered 10 to 12 hours before the procedure, so that it can be administered with food to reduce the risk of nausea).

OR

- **doxycycline** 100 mg orally, 60 minutes before the procedure, then 200 mg orally, 90 minutes after the procedure.

No evidence outcomes are improved by including metronidazole in prophylactic regimens.
**Hysterectomy**

Preoperative screening and treatment for bacterial vaginosis (BV) reduces BV-associated cuff infection.

**Indicated:** both abdominal and vaginal hysterectomy.

**For vaginal hysterectomy**

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision  
  PLUS  
- **metronidazole** 500 mg IV, 15 to 30 minutes before surgical incision.

**For abdominal hysterectomy**

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

**Immediate hypersensitivity to penicillins**

- **clindamycin** 600 mg IV over at least 20 minutes, 15 to 30 minutes before surgical incision.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Surgical Antibiotic Prophylaxis Guideline: Adults
Ophthalmic Surgery

The aim of antibiotic prophylaxis is to reduce acute postoperative endophthalmitis.

Prevention of endophthalmitis involves a combination of preoperative screening, antisepsis, intraoperative techniques, and postoperative patient care.

Active conjunctivitis, dacryocystitis or blepharitis must be treated and resolved before surgery.

Antibiotics (particularly vancomycin) in irrigation solutions should not be used.

Intracameral administration (injection into the anterior chamber of the eye) of antibiotics at the end of surgery is the most effective method of reducing the risk of endophthalmitis after cataract surgery. Use:

- **cefazolin** 1 to 2.5 mg intracamerally, as a single dose at the end of surgery.

Use of preoperative topical antibiotics does not provide additional benefit.

Providing postoperative topical antibiotics lack adequate evidence.

Topical **tobramycin** or **quinolones** should not be prescribed either pre- or postoperatively.

**If postoperative topical antibiotics are considered necessary, use chloramphenicol 0.5% eye drops** (1 to 2 drops into the operated eye, 4 times daily for 7 days).

(Tobramycin eye drops should only be considered for patients hypersensitive to chloramphenicol).

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au

Surgical Antibiotic Prophylaxis Guideline: Adults
Orthopaedic Surgery

Preoperative considerations

*Staphylococcus aureus* colonisation (both methicillin-susceptible and methicillin-resistant) increases the risk of prosthetic joint infection. Consider *Staphylococcus aureus* decolonisation in orthopaedic surgery.

Test for bacteriuria preoperatively in symptomatic patients (If present, see the eTG: Antibiotic Guidelines on Acute cystitis in adults). It is not appropriate to administer an antibiotic (e.g. gentamicin) at the time of catheter insertion; this practice is not supported by evidence. For surgery on an infected joint, or when joint infection is suspected, ideally delay until after the collection of specimens.

**Not indicated**: routine arthroscopic procedures unless they involve insertion of prosthetic material or avascular tissue, or the patient is immunocompromised.

**Indicated**: prosthetic large joint replacement and other procedures that involve insertion of prosthetic or transplant material; internal fixation of fractures of large bones; and spinal surgery.

For antibiotic management of open fractures (see the eTG: Antibiotic Guidelines). For antibiotic prophylaxis for lower limb amputation (see Lower limb amputation).

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), add to cefazolin:

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
    ending 5–30 minutes prior to surgical incision.

**Immediate hypersensitivity to penicillins** replace cefazolin with vancomycin (as above).
Surgical Antibiotic Prophylaxis Guideline: Adults

Plastic Surgery

Pre-emptive treatment or treatment of established infection following trauma or human or animal bites (see Post-traumatic wounds and Bites and clenched fist injuries in eTG: Antibiotics).

**Not indicated:** for the majority of clean procedures*, unless the patient has risk factors for postoperative infection (e.g. implantation of prosthetic material, prior skin irradiation). The continuation of antibiotics while waiting for non-infected skin grafts or flaps to epithelialise is not evidence-based. Topical antibiotics (e.g. chloramphenicol, mupirocin) to the surgical incision site to prevent postoperative wound infection

**Indicated:** for clean–contaminated procedures**.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), **add** to **cefazolin**:

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

**Immediate hypersensitivity to penicillins replace cefazolin with vancomycin** (as above).

*clean surgical wound as an uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tracts are not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow non-penetrating (blunt) trauma should be included in this category if they meet the criteria.

** a clean–contaminated surgical wound as an operative wound in which the respiratory, alimentary, genital (including female and male reproductive tracts), or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.

Surgical Antibiotic Prophylaxis Guideline: Adults

Thoracic Surgery

**Indicated:** undergoing thoracic surgery (including video-assisted thoracoscopic surgery [VATS]).

- **cefazolin** 2 g IV, within 15 to 30 minutes before surgical incision.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), **add** to cefazolin:

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

**Immediate hypersensitivity to penicillins** replace **cefazolin** with **vancomycin** (as above).

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Surgical Antibiotic Prophylaxis Guideline: Adults
Urological Surgery

General principles

Patients with specific cardiac conditions (see Endocarditis).

**Pre-operative considerations:** urine cultures before elective urological procedures involving manipulation of the urinary tract. Treat significant bacteriuria even if asymptomatic. Use culture and sensitivity results for treatment regime.

**Postoperative considerations:** Do not continue antibiotic prophylaxis until the urinary catheter is removed – unless it offers a benefit for some high-risk patients.

If immediate operation is required with clinical evidence of a UTI or confirmed bacteriuria, treat with a single dose of gentamicin.

- **gentamicin** 5 mg/kg IV (max 320 mg), as a single preoperative dose.

If systemic symptoms are present (e.g. severe pyelonephritis) a higher dose of gentamicin is needed (see eTG: Antibiotic Guidelines, Acute cystitis in adults).

**Endoscopic procedures**

**Not indicated:** sterile urine undergoing diagnostic cystoscopy without other manipulation of the urinary tract.

**Indicated:** endoscopic intrarenal and ureteric stone procedures (e.g. percutaneous nephrolithotomy, ureteroscopy or pyeloscopy for ureteric or renal stones); specific risks for postoperative infection (e.g. resection of large or necrotic tumours, risk of bleeding, bladder outlet obstruction with incomplete bladder emptying).

**Individual patient based decision:** extracorporeal shock-wave lithotripsy and ureteroscopy procedures not involving ureteric stones; specific risks for postoperative infection (e.g. lithotripsy in patients with an internal stent, nephrostomy tube or indwelling catheter in situ) or immediate operation and bacteriuria cannot be excluded.

- **cefazolin** 2 g IV 15 to 30 minutes before the procedure.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au
Immediate hypersensitivity to penicillins replace cefazolin with gentamicin:

- **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before the procedure.

Patients known to have urinary colonisation or urinary tract infection with methicillin-resistant *Staphylococcus aureus* (MRSA), add vancomycin to the above regimens.

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

Transurethral resection of the prostate (TURP)

- **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision.

If preoperative bacteriuria has not been treated or there is clinical evidence of a urinary tract infection, use a higher dose of gentamicin (see Preoperative considerations in eTG: Antibiotic Guidelines).

If **gentamicin** is contraindicated or relevant precautions preclude its use, provide:

- **cefazolin** 2 g IV, 15 to 30 minutes before the procedure
  - OR
- **trimethoprim** 300 mg orally, 60 minutes before the procedure
  - OR
- **trimethoprim+sulfamethoxazole** 160+800 mg orally, 60 minutes before the procedure.

Patients known to have urinary colonisation or urinary tract infection with methicillin-resistant *Staphylococcus aureus* (MRSA), and who have not been preoperatively treated for MRSA, add vancomycin to the above regimens.

- **vancomycin**
  - < 75 kg: 1g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.
Transrectal prostatic biopsy

Asymptomatic bacteriuria and bacteraemia are common after transrectal prostatic biopsy; less commonly, symptomatic postoperative urinary tract infection, prostatitis, sepsis and, rarely, septic shock occur.

**Indicated:** Prophylaxis improves outcomes.

- **ciprofloxacin** 500 mg orally, as a single dose, 60 to 120 minutes before the procedure.
  
  If procedure delayed beyond 6 hours, repeat ciprofloxacin dose (500 mg).

Seek expert advice for alternative prophylactic antibiotic regimes in patients at high risk of carriage of ciprofloxacin resistance isolates.

**Transperineal prostatic biopsy**

Unclear indication for prophylaxis:

- If required: **cefazolin** 2 g IV, 15 to 30 minutes before the procedure.

**Open or laparoscopic urological procedures where the urinary tract is not entered**

**Not indicated:** sterile urine who are undergoing open or laparoscopic urological procedures where the urinary tract is not entered (e.g. vasectomy, scrotal surgery, varicocele ligation), **unless** the patient has risk factors for postoperative infection (e.g. urinary tract obstruction or abnormalities) or the procedure involves implantation of prosthetic devices (e.g. penile prostheses, artificial urinary sphincters, mesh).

**Indicated:** immediate operation is required and bacteriuria cannot be excluded.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

For implantation of prosthetic devices (e.g. penile prostheses, artificial urinary sphincters, mesh), **add gentamicin** to **cefazolin**:

- **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision.
If gentamicin is contraindicated or relevant precautions preclude its use replace gentamicin with:

- **trimethoprim** 300 mg orally, 60 minutes before surgical incision
  
  OR
  
  - **trimethoprim+sulfamethoxazole** 160+800 mg orally, 60 minutes before surgical incision.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), add **vancomycin** to the above regimens:

- **vancomycin**
  
  < 75 kg: 1 g IV infusion over 60 minutes
  
  ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  
  ending 5–30 minutes prior to surgical incision.

Immediate hypersensitivity to penicillins replace **cefazolin** in the above regimens with **vancomycin** (as above).

Open or laparoscopic urological procedures where the urinary tract is entered

**Indicated**: where the urinary track is entered.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision.

Patients undergoing radical prostatectomy or implantation of prosthetic devices (e.g. mesh), add **gentamicin** to the above regimen:

- **gentamicin** 5 mg/kg IV (max 320 mg) 15 to 30 minutes before surgical incision.
If gentamicin is contraindicated or relevant precautions preclude its use replace gentamicin with:

- trimethoprim 300 mg orally, 60 minutes before surgical incision
  OR
- trimethoprim+sulfamethoxazole 160+800 mg orally, 60 minutes before surgical incision.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant Staphylococcus aureus (MRSA), add vancomycin to the above regimens:

- vancomycin
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

Immediate hypersensitivity to penicillins

- vancomycin
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision.

  PLUS
  - gentamicin 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision.

If there is a risk of entry into the bowel lumen (e.g. ileal conduit, rectocele repair), add metronidazole to the above regimens:

- metronidazole 500 mg IV, 15 to 30 minutes before surgical incision
  OR
- cefoxitin, as a single drug, can be used as an alternative to cefazolin plus metronidazole (see Colorectal surgery and appendicectomy for dosage).
Surgical Antibiotic Prophylaxis Guideline: Adults

Vascular Surgery

For elective implantation of prosthetic material consider screening for *Staphylococcus aureus* and decolonisation. WACA discourages intraoperative irrigation or soaking surgical implants (e.g. vascular grafts, mesh) with antimicrobial solutions.

There is some evidence for benefits up to 24 hours for vascular reconstruction or amputation of an ischaemic limb. For other procedures (e.g. arteriovenous fistula formation), a single preoperative dose is recommended.

**Not indicated:** surgery on varicose veins, unless prosthetic material is inserted, on the brachial and carotid arteries.

**Indicated:** Vascular reconstructive surgery involving abdominal aorta or lower limbs, especially if groin incision is made or foreign material implanted.

- **cefazolin** 2 g IV, 15 to 30 minutes before surgical incision, then 8-hourly for up to 2 further doses.

Patients known to be, or at risk of being, colonised or infected with methicillin-resistant *Staphylococcus aureus* (MRSA), add **vancomycin** (as below) to cefazolin.

**Immediate hypersensitivity to penicillins**

- **vancomycin**
  - < 75 kg: 1 g IV infusion over 60 minutes
  - ≥ 75 kg: 1.5 g IV infusion over 90 minutes
  - ending 5–30 minutes prior to surgical incision, then consider repeating the dose after 12 hours

**PLUS** (when a risk of infection with Gram-negative organisms)

- **gentamicin** 5 mg/kg IV (max 320 mg), 15 to 30 minutes before surgical incision.

For further information on the eTG: Antibiotic Guidelines go to: www.tg.org.au