Surgical Antimicrobial Prophylaxis Prescribing Guideline

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Government of South Australia
SA Health

Contents

Surgical Antimicrobial Prophylaxis Prescribing Guideline

1. Guideline Statement

Surgical antimicrobial prophylaxis is an accepted part of surgical practice in some procedures to prevent infections at the surgical site and optimise postoperative recovery. The use of antimicrobials for the prevention of infection must be weighed against any harm associated with their use (such as allergic and adverse drug reactions) and potential contribution to the development of antimicrobial resistance.

This Surgical Antimicrobial Prophylaxis Prescribing Guideline has been developed and endorsed by the SAAGAR to assist clinicians with recommendations on appropriate antimicrobial dosage and administration, risks and contraindications, and postoperative care for a range of surgical procedures.

The recommendations within this guideline are in accordance with guidance published in the Australian Therapeutic Guidelines[1], and are intended to allow for some variations for South Australian patient demographics and resistance patterns.

2. Roles and Responsibility

The Surgical Antimicrobial Prophylaxis Prescribing Guideline applies to surgery performed in all South Australian public hospitals. The guideline may also be used in private surgical facilities.

2.1. Local Health Network (LHN) Chief Executive Officers will:

> ensure clinicians have access to this guideline in electronic format

> ensure adequate resources and training are available for the implementation of this guideline throughout the LHN

> maintain an effective mechanism for review of implementation of this guideline within the LHN

> ensure the LHN meets standards for accreditation in relation to surgical antimicrobial prophylaxis.

2.2. LHN AMS Committees are responsible for:

> providing oversight over the use of prophylactic antimicrobial agents in surgery

> providing leadership for addressing requirements of the LHN relating to meeting the surgical prophylaxis national standards for accreditation

> working collaboratively with departments of surgery, anaesthetics, or other relevant hospital committees regarding development and implementation of surgical guidelines

> coordinating actions in response to results of audits of antimicrobial use in surgical prophylaxis

> providing leadership for the training of clinical staff throughout the LHN in relation to AMS.

2.3. Prescribers (including contracted staff) are responsible for:

> safe and appropriate prescribing according to the general principles of antimicrobial surgical prophylaxis
> ensuring antimicrobials are ordered so that they are administered within appropriate time frames as specified in individual surgical prophylaxis guidelines
> prescribing according to the appropriate surgical prophylaxis guideline (see appendices) or using the latest version of *Therapeutic Guidelines:Antibiotic*[1] as part of their practice
> where prescribing is not compliant with guidelines, documenting the reason on the medication chart or case notes
> provision of information to patients and their carers regarding their antimicrobial therapy prior to surgery.

2.4. Pharmacists (including contracted staff) are responsible for:

> timely and accountable supply of antimicrobials used in surgical prophylaxis in accordance with systems introduced by the LHN AMS Program, including mechanisms to control access to restricted antimicrobials where restrictions exist
> safe, appropriate and timely advice to prescribers and nurses with regard to the selection, dose, route, duration and monitoring of antimicrobials used in surgical prophylaxis
> where it is within their scope of practice, participation in providing evidence of monitoring antimicrobial use in relation to surgical prophylaxis through auditing processes
> provision of information to patients and their carers regarding their antimicrobial therapy prior to surgery.

2.5. Nurses are responsible for:

> being aware of the existence of surgical prophylaxis guidelines for a range of surgical specialties, and able to assist prescribers to access electronic guidelines
> where it is within their scope of practice, ensuring safe and timely administration of prescribed antimicrobials used in surgical prophylaxis
> where it is within their scope of practice, participation in providing evidence of monitoring antimicrobial use in relation to surgical prophylaxis through auditing processes
> assisting patients and carers to obtain information and understanding of their antimicrobial therapy.

3. General principles

3.1. Background

Prevention of surgical site infection accounts for between one-third and one-half of all antimicrobial use in Australian hospitals. Surgical prophylaxis remains the most common reason for antimicrobial use in hospitals.[2] Results of the 2019 Surgical National Antimicrobial Prescribing Survey (SNAPS) found procedural prophylaxis was inappropriate in 27.4% of cases due to long duration, incorrect dose, or frequency. [3] This guideline aims to improve the appropriateness of the prescribing of surgical antimicrobial prophylaxis across the state.

3.2. Recommendations

Antimicrobial prophylaxis should be considered where there is a clear indication, a risk of postoperative infection, or if postoperative infection will have serious consequences. In practice many procedures lack the evidence that surgical prophylaxis has any benefit in reducing post-operative infections. For procedures where there is evidence of benefit, a single dose of antibiotic prior to surgical incision is generally sufficient with only a few scenarios

where post-procedural prophylaxis may be considered due to insufficient evidence. In general, the total duration of prophylaxis should **be less than 24 hours**.

The recommended antimicrobial prophylaxis regimens for specific surgical procedures, along with alternatives for patients with a high risk of penicillin/cephalosporin allergy, are available in appendices 1 to 17.

3.3. Patient-specific risk factors

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice or dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, obesity, renal function, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Pre-existing infections at surgical site (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure. Doses should be scheduled to allow for re-dosing just prior to skin incision.

For patients with specific cardiac conditions that increase their risk of endocarditis following surgery, refer to *Antibiotic Prophylaxis for Prevention of Endocarditis in Cardiac Patients* for further information.

For selected elective surgical procedures (e.g. surgery that involves implantable or prosthetic devices), consider *Staphylococcus aureus* screening (for both methicillin-susceptible and methicillin-resistant strains). If the results of screening are positive, perform decolonisation. Refer to SA Health *Methicillin-resistant Staphylococcus aureus (MRSA): Infection prevention and control Clinical Guideline* for more information.

3.4. Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

> IV cefazolin can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
> IV amoxicillin can be given over 3 to 4 minutes and should be administered no more than 60 minutes before skin incision.
> IV gentamicin can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
> IV metronidazole and IV clindamycin infusions can be given over 20 minutes. Maximum plasma concentrations occur at the conclusion of the infusion. They should be fully administered within 120 minutes of surgical incision.
> IV vancomycin infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes (in adult patients). Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

3.5. Classification of surgical wounds

Surgical procedures can be classified according to the level of microbial contamination routinely associated with that procedure and can be used to determine the need for, or choice of, antibiotic prophylaxis (see table A below). In general, antibiotic prophylaxis is indicated in all procedures in the categories of “clean-contaminated”, “contaminated” or “dirty”. Prophylaxis for “clean” procedures is not generally indicated unless specific risk factors or

circumstances that are associated with greater risk or consequence of infectious complications exist.[4]

Table A: Classification of surgical wounds

Classification of surgical wound	Criteria
Clean	Uninfected operative wounds in which no inflammation is encountered and the respiratory, gastrointestinal, genital or urinary tracts are not entered (and no break in aseptic technique). Clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow nonpenetrating (blunt) trauma should be included in this category if they meet the criteria.
Clean-contaminated	Operative wounds in which the respiratory, gastrointestinal, 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.
Contaminated	Major breaks in sterile technique (e.g. open cardiac massage), gross spillage from the gastrointestinal tract, or the incision encounters acute, non-purulent inflammation (including necrotic tissue without evidence of purulent discharge). Open, fresh or accidental wounds are also included in this category.
Dirty (or infected)	Existing clinical infection or perforated viscera, as well as old traumatic wounds with retained devitalised tissue. This definition suggests that the organisms causing postoperative infection were present before the operation. In these cases, antibiotic treatment in addition to prophylaxis is required.

3.6. Dosing in patients with obesity (adults)

- Cefazolin: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg
- Vancomycin: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg
- Gentamicin: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight to calculate the gentamicin dose (cap weight at 100kg). (See *Aminoglycosides: Recommendations for use, dosing and monitoring clinical guideline*)

3.7. MRSA risk

Defined as history of MRSA colonisation or infection, OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility. Patients with a high MRSA risk should be given vancomycin prophylaxis in addition to routine prophylaxis.

Note: Vancomycin is *not as effective* as cefazolin for preventing postoperative infections caused by methicillin-susceptible *Staphylococcus aureus* (MSSA).[5]

3.8. Repeat doses

A single pre-operative dose is sufficient for most procedures; however, repeat intra-operative doses are advisable:

> for prolonged surgery (more than 4 hours from the time of the first pre-operative dose) when a short-acting agent is used (e.g. cefazolin, clindamycin); or

> if major blood loss occurs (e.g. more than 1500mL in adults or > 15-20% of blood volume in children), following fluid resuscitation.

When measuring the time to a second intraoperative dose, the interval from the time of the first preoperative dose rather than the surgical incision time should be used.

3.9. Paediatrics

Although few data exist specifically for paediatric surgical prophylaxis, the principles of antimicrobial prophylaxis and exposure at surgical sites in adults should apply to children.[6] PKPD data are limited in the paediatric population due to historical exclusion from clinical trials.[7] Physiological variables such as age, weight and maturation of organ function may contribute to altered drug clearance compared to adult patients. This guideline provides antibiotic dosing recommendations based on current available evidence at the time of writing, however it is acknowledged that further research into optimal dosing for surgical prophylaxis in paediatrics is required.[7]

4. Implementation and Monitoring

Where they exist, LHN AMS committees coordinate actions in response to results of audits of antimicrobial use in surgical prophylaxis. The results of annual audits or KPI assessments should be reported to LHN Chief Executive Officers and LHN Safety and Quality committees, together with a plan for continuous (PDSA) improvement.

5. Definitions and acronyms

KPI	Key Performance Indicators
IBW	Ideal Body Weight
ID	Infectious Disease Physician
IV	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*
PDSA	Plan-Do-Study-Act
PO	Per oral
SAAGAR	South Australian expert Advisory Group on Antimicrobial Resistance
SSI	Surgical Site Infection

6. Associated Directives / Guidelines & Resources

6.1. SA Policies and guidelines

Antimicrobial Stewardship Policy Directive

Antimicrobial Prescribing Clinical Guideline

Peripartum Prophylactic Antibiotics Clinical Guideline

7. References

1. Antibiotic Expert Groups. Therapeutic Guidelines: Antibiotic (version 16). Melbourne, 2019.
2. Australian Commission on Safety and Quality in Health Care. AURA 2019: third Australian report on antimicrobial use and resistance in human health. Sydney, 2019.
3. National Centre for Antimicrobial Stewardship. Surgical prophylaxis prescribing in Australian hospitals: Results of the 2017 and 2018 Surgical National Antimicrobial Prescribing Surveys. Melbourne: Melbourne Health, 2019.
4. Allegranzi B, Zayed B, Bischoff P, et al. New WHO recommendations on intraoperative and postoperative measures for surgical site infection prevention: an evidence-based global perspective. *Lancet Infect Dis* 2016;16(12):e288-303.
5. McDanel J, Perencevich E, Diekema D, et al. Comparative effectiveness of beta-lactams versus vancomycin for treatment of methicillin-susceptible Staphylococcus aureus bloodstream infections among 122 hospitals. *Clin Infect Dis* 2015;61(3):361-7.
6. Yalamanchi P, Parent A, Baetzel A, et al. Optimization of antibiotic prophylaxis delivery for pediatric surgical procedures. *Pediatrics* 2021;148(2):e20210001689.
7. Le J, Bradley J. Optimising antibiotic drug therapy in paediatrics: Current state and future needs. *Clin Pharmacol* 2018;58(S10):S108-22.

8. Appendices

9. Document Ownership

Clinical Guideline owner: South Australian expert Advisory Group on Antimicrobial Resistance (SAAGAR)

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10. Document History

Version	Date approved	Approved by	Amendment notes
3.0	7/12/2021	Domain Custodian, Clinical Governance, Safety and Quality	Approved by South Australian Medicines Advisory Committee – formal review with update in accordance with updated national guidance and new evidence
2.0	2/11/2017	Safety & Quality Strategic Governance Committee	Formally reviewed in line with 1-5 year scheduled timeline for review.
1.1	12/8/2014	Safety & Quality Strategic Governance Committee	Minor amendments to reflect current practice.
1.0	12/2/2013	Safety & Quality Strategic Governance Committee	Original approved version

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 1: Abdominal, Gastrointestinal, & Biliary Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (clean, clean-contaminated, contaminated, dirty-infected) when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Prophylaxis against enterococcal endocarditis is indicated for patients with specific high risk cardiac conditions undergoing abdominal, gastrointestinal and biliary surgical procedures. Refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole** infusion can be given over 20 minutes and should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Abdominal Surgery		
Appendicectomy (including laparoscopic procedures), exploratory laparotomy, division of adhesions, resection	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV ^ PLUS **metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Splenectomy (Vaccination and post-splenectomy antibiotic prophylaxis required in all cases) See SA Health Clinical Guideline for Vaccination and Antimicrobial Prophylaxis for Adult Asplenic (Splenectomy) and Hyposplenic Patients available here.	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight)**

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Gastrointestinal Surgery		
Gastroduodenal and oesophageal Non-endoscopic procedures that enter the GI tract lumen OR Non-endoscopic procedures that do not enter the GI lumen but only if the patient has risk factors for postoperative infection (morbid obesity, gastric outlet obstruction, reduced gastric acidity/motility, GI bleeding, malignancy or perforation) i.e. gastric bypass, resection, ulcer oversew, oesophagectomy	**cefazolin 2g** IV <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV ^ PLUS **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight)**
Small intestinal Non-endoscopic small intestinal procedures	**cefazolin 2g** IV <u>If the small intestine is obstructed:</u> **ADD metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV ^ PLUS **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Colorectal Non-endoscopic colorectal procedures (e.g. colon resection, revision of anastomosis) **Stoma**	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV ^ PLUS **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Biliary Tract Surgery (including laparoscopic procedures)		
Open cholecystectomy **Laparoscopic surgery** where the patient has risk factors for postoperative infection (e.g. older than 70 years, diabetes, obstructive jaundice, common bile duct stones, acute cholecystitis, non-functioning gallbladder)	**cefazolin 2g** IV <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV ^ PLUS **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight)**
Pancreatic Whipple's procedure, pancreatic necrosectomy, pancreatectomy **Liver resection**	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV ^ PLUS **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Hernia repair with or without mesh insertion	**cefazolin 2g** IV <u>If entry into the bowel lumen is expected:</u> **ADD metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) OR <u>If entry into the bowel lumen is expected give INSTEAD:</u> **metronidazole 500mg** IV infusion PLUS **gentamicin 2mg/kg** IV ^ <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

^ For procedures with a moderate likelihood that they will continue for longer than 6 hours a higher dose of gentamicin (5mg/kg) can be considered.

Special Considerations for Colorectal Surgery:

There is some evidence that oral non-absorbable antibiotics such as neomycin may improve outcomes in elective colorectal resections. Neomycin 500mg tablets are available via the Special Access Scheme. The recommended dose is 1 gram (2 x 500mg tablets) at 1pm, 3pm and 10pm the day before surgery.

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen accordingly to clinical condition and microbiological results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis
GI	Gastrointestinal		

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Basany E, Solis-Pena A, Pellino G, et al. Preoperative oral antibiotics and surgical-site infections in colon surgery (ORALEV): a multi-centre, single-blind, pragmatic, randomised controlled trial. Lancet Gastroenterol Hepatol 2020; 5(8): 729-38.

Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines

Appendix 2: Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients

Preoperative Considerations

Antibiotic prophylaxis to prevent endocarditis is ONLY recommended for patients with cardiac conditions associated with the HIGHEST RISK of adverse outcomes from endocarditis (See Box 1) and only for certain procedures (See Box 2).

Box 1: Cardiac conditions for which antibiotic prophylaxis to prevent endocarditis is recommended

- Prosthetic heart valve, including mechanic, bioprosthetic, and homograft valves (transcatheter-implanted as well as surgically implanted)
- Prosthetic material used for cardiac valve repair (e.g. annuloplasty rings and chords)
- Previous infective endocarditis
- Cardiac transplantation with the subsequent development of cardiac valvulopathy (consult cardiologist)
- Rheumatic heart disease in all populations
- Congenital heart disease, only if it involves:
  - i) unrepaired cyanotic defects, including palliative shunts and conduits;
  - ii) repaired defects with residual defects at or adjacent to the site of a prosthetic patch or device (which inhibit endothelialisation).

Antibiotic prophylaxis for endocarditis MAY BE required. See Box 2.

YES ← **Does the patient have any of the conditions listed in box 1?** → NO

Antibiotic prophylaxis for endocarditis NOT required.

Box 2: Procedures where antibiotic prophylaxis for endocarditis may or may not be required

Endocarditis Prophylaxis ALWAYS REQUIRED

DENTAL PROCEDURES:

- Procedures involving manipulation of the gingival or periapical tissue or perforation of the oral mucosa (e.g. tooth extraction, matrix band placement, subgingival rubber dam and clamp, implant placement, biopsy, removal of soft tissue or bone, subgingival scaling and root planning, replanting avulsed teeth, apicectomy, six-point pocket charting in diseased tissue, root canal treatment before establishment of an apical stop)

RESPIRATORY TRACT OR EAR, NOSE & THROAT PROCEDURES:

- tonsillectomy/ adenoidectomy
- any invasive procedure to treat an established infection (e.g. drainage of abscess)

GENITOURINARY AND GASTROINTESTINAL PROCEDURES:

- any genitourinary procedure in the presence of a genitourinary infection unless already treating enterococci (for elective cystoscopy or urinary tract manipulations, obtain a urine culture and treat any bacteriuria beforehand)
- any gastrointestinal procedure in the presence of infection or colonisation unless already treating enterococci
- sclerotherapy for oesophageal varices.

OTHER PROCEDURES:

- Procedures involving infected skin, skin structures or musculoskeletal tissues (e.g. incision and drainage of local abscess, epidural, lung, orbital, perirectal, pyogenic liver
- Percutaneous endoscopic gastrostomy, PEJ

Endocarditis Prophylaxis IS NOT REQUIRED (list is not exhaustive)

ALL OTHER DENTAL PROCEDURES NOT LISTED IN GREEN BOX:

- oral examination
- infiltration and block local anaesthetic injection through non-infected tissue
- restorative dentistry
- supragingival rubber dam clamping and 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
- dental radiography
- supragingival plaque removal

RESPIRATORY TRACT OR EAR, NOSE & THROAT PROCEDURES:

- endotracheal intubation
- rigid or flexible bronchoscopy with or without incision or biopsy
- transoesophageal echocardiography

GENITOURINARY AND GASTROINTESTINAL PROCEDURES:

- urethral catheterisation
- transervical procedures (e.g. uterine dilation and curettage, sterilisation procedures, insertion or removal of intrauterine device)
- obstetric procedures including surgical termination of pregnancy
- endoscopy (with or without gastrointestinal biopsy including colonoscopy)

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- **Oral antibiotics** should be given 60 minutes (for amoxicillin, cefalexin) or 60 to 120 minutes (for clindamycin) prior to the procedure.
- IV **amoxicillin** can be given over 3 to 4 minutes and should be commenced within 60 minutes prior to the procedure.
- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **clindamycin** infusion should be commenced within 120 minutes prior to the procedure. Administer doses of 600mg over at least 20 minutes (maximum rate is 30mg/min).
- IV **vancomycin infusion** should be given at a rate of 1 g over at least 60 minutes and 1.5g over at least 90 minutes for adult patients. For paediatric patients, the infusion should be given over 120 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	Penicillin / Cephalosporin Allergy
Dental procedures **Tonsillectomy** **Adenoidectomy**	**amoxicillin 2g orally** (child: 50mg/kg up to 2g) 60 minutes prior to procedure OR if oral administration not possible: **amoxicillin 2g** IV (child: 50mg/kg up to 2g)	**^Moderate risk penicillin allergy:** **cefalexin 2g orally** (child: 50mg/kg up to 2g) 60 minutes prior to procedure OR if oral administration not possible: **cefazolin 2g** IV (child: 30mg/kg up to 2g) ***High risk penicillin/cephalosporin allergy:** **clindamycin 600mg orally** (child: 20mg/kg up to 600mg) 60 to 120 minutes prior to procedure OR if oral administration not possible: **clindamycin 600mg** IV infusion (child: 20mg/kg up to 600mg)
All other procedures	**amoxicillin 2g** IV (child: 50mg/kg up to 2g)	**vancomycin 1g** IV infusion (**1.5g** for adult patients more than 80kg **actual body weight**) (child: 30mg/kg up to 1.5g)[#]

^Moderate risk penicillin allergy: History suggestive of moderate risk (e.g. delayed rash which is NOT urticarial or DRESS/SJS/TEN)

***High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

#For patients colonised or infected with vancomycin-resistant enterococci, seek advice from ID about an appropriate regimen

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
PO	Per oral	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

References

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 3: Breast Procedures / Insertion of Infusaport / Skin Excision / Biopsy Procedures

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Breast Procedures		
Uncomplicated clean procedures (diagnostic excisional biopsy, stand-alone sentinel node biopsy, excision of scar tissue, lumpectomy (with or without needle or wire localisation))	Prophylaxis NOT recommended	
Clean-contaminated procedures (reduction mammoplasty, simple mastectomy, wide local excision, axillary lymph node clearance, nipple surgery, all repeat or revision procedures)	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Complicated clean-contaminated procedures (prosthetic breast reconstruction surgery, prosthetic implant or acellular dermal matrix, autologous breast reconstruction surgery, breast augmentation surgery)	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) **POST-OPERATIVE:** For breast reconstruction or augmentation surgery, a further 2 doses of cefazolin (8 hours apart) can be considered	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) **POST-OPERATIVE:** For breast reconstruction or augmentation surgery, a single additional vancomycin dose 12 hours after the first dose can be considered
	Postoperative doses can be considered but prophylaxis (intravenous or oral) **should not continue beyond 24 hours**, even in the presence of surgical drains adjacent to the implant	

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Other		
Insertion of infusaport or other devices (for procedures using either local & sedation or general anaesthetic)	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Clean or clean-contaminated skin procedures (diagnostic excisional biopsy, stand-alone biopsy)	Prophylaxis NOT recommended	

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiology results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / toxic epidermal necrolysis

References

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 4: Cardiac Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Local epidemiology - modify prophylaxis if there is a high local incidence of specific infections.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **teicoplanin** can be given over 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Teicoplanin:** Consider increased dose of teicoplanin (800mg) for adult patients weighing more than 80kg.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

For elective implantation of prosthetic material, consider *Staphylococcus aureus* screening (for both methicillin-susceptible and methicillin-resistant strains). If the results of screening are positive, perform decolonisation. Refer to SA Health Methicillin-resistant Staphylococcus aureus (MRSA): Infection prevention and control clinical guideline.

Applying antimicrobials (e.g. ointments, solutions, powders) to the surgical incision to prevent surgical site infection is not recommended because there is potential for harm (e.g. hypersensitivity reactions, bacterial resistance) and inadequate evidence to support a benefit.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Coronary Artery Bypass Surgery (CABG) **Cardiac Valve Surgery**	**cefazolin 2g** IV HIGH risk of MRSA infection (e.g. reoperation of prosthetic valve): **ADD vancomycin# 1 g** IV infusion (**1.5g** for patients more than 80kg **actual body weight)**	**vancomycin# 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 5mg/kg** IV (single dose only – do not give postoperative dose)
	Postoperative doses can be considered for all cardiac procedures for up to 24 hours	
	Give **cefazolin 2g** IV 8-hourly for another 2 doses commencing 8 hours after the first dose	Check kidney function first – if CrCl > 40 mL/min, give 1 additional dose of **vancomycin# 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) 12 hours after the first dose

 # Note: Teicoplanin may be given as an alternative to vancomycin. A dose of **400mg** IV (**800mg** for patients more than 80kg **actual body weight**) can be considered. If a post-operative dose is required, give 1 additional dose of **teicoplanin 400mg** IV (**800mg** for patients more than 80kg **actual body weight**) 12 hours after the first dose.

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Postoperative antibiotics (> 24 hours from first dose) are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiology results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**CABG**	Coronary Artery Bypass Graft
DRESS	Drug rash with eosinophilia and systemic symptoms	**ID**	Infectious Diseases
IV	Intravenous	**MRSA**	Methicillin-resistant *Staphylococcus aureus*
SJS / TEN	Stevens-Johnson syndrome / Toxic epidermal necrolysis		

References

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 5: Cardiology Procedures Performed in the Cardiac Interventional Suite

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Antibiotic envelope: An antibacterial mesh envelope (TYRX), which locally releases minocycline and rifampicin, has been shown to reduce the incidence of device infection in high risk patients without a higher incidence of complications. The local incidence of CIED infections should be considered and it should only be used for high risk patients defined in the WRAP-IT study population (Tarakii et al).

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Percutaenous Coronary Intervention (PCI) (angioplasty/stent insertion) **Balloon aortic valvuloplasty** **Balloon mitral valvuloplasty** **Subcutaneous implantable loop recorders** **Ablation procedures**	Prophylaxis NOT recommended	
Insertion of cardiovascular implantable electronic devices (CIED) (e.g. permanent pacemaker (PPM)/defibrillator insertion, cardiac resynchronisation device) **PPM / device battery change** **Ventricular assist device insertion – seek specialist advice on antibiotic regimen and duration of prophylaxis**	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight)** PLUS **gentamicin 2mg/kg** IV

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Atrial Septal Defect (ASD) closure **Patent Foramen Ovale (PFO) closure** **Left Atrial Appendage (LAA) Closure** **Valvuloplasty, septal occlusion for high risk patients only** (e.g. femoral catheter > 6hrs, prosthetic valves, past history of endocarditis)	**cefazolin 2g** IV PLUS **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 5mg/kg** IV
Transcatheter Aortic Valve Implantation (TAVI) (antibiotic prophylaxis may need to be modified according to the organisms causing infection within the institution and their susceptibility patterns	**cefazolin 2g** IV High risk of MRSA infection: **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 2mg/kg** IV

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains.

Applying antimicrobials (e.g. ointments, solutions, powders) to the surgical incision to prevent surgical site infection is not recommended because there is potential for harm (e.g. hypersensitivity reactions, bacterial resistance) and inadequate evidence to support a benefit.

If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiology results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

References

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 6: Endoscopic Gastrointestinal Procedures

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Prophylaxis against enterococcal endocarditis is indicated for patients with specific cardiac conditions who are undergoing gastrointestinal endoscopic procedures for which surgical antibiotic prophylaxis is required. If the surgical antibiotic prophylaxis regimen does not include an antibiotic active against enterococci (e.g. amoxicillin, vancomycin) refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for appropriate add-on recommendations.

Prophylaxis against enterococcal endocarditis may also be required for patients with specific cardiac conditions who are undergoing gastrointestinal endoscopic procedures for which surgical antibiotic prophylaxis is not required if the patient has an established gastrointestinal infection – refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole** infusion can be given over 20 minutes and should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentration occurs at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Insertion / revision of: - Percutaneous Endoscopic Gastrostomy/Jejunostomy (PEG/PEJ) - Percutaneous Radiologic Gastrostomy/Jejunostomy (PRG/PRJ)	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Endoscopic Retrograde Cholangiopancreatography (ERCP) > Involving transpapillary or transmural drainage of pseudocysts > With evidence of biliary tract obstruction and only if complete biliary drainage may not be achieved > If the patient has communicating pancreatic cysts or pseudocysts	**gentamicin 2mg/kg** IV OR **cefazolin 2g** IV PLUS consider adding: **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV PLUS consider adding: **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Endoscopic ultrasound-guided fine-needle aspiration of cystic lesions	**metronidazole 500mg** IV infusion PLUS either: **cefazolin 2g** IV OR **gentamicin 2mg/kg** IV <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**metronidazole 500mg** IV infusion PLUS **gentamicin 2mg/kg** IV <u>High risk of MRSA:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
All other procedures (with or without biopsy), e.g. > endoscopic ultrasound-guided fine-needle aspiration of solid lesions along the GI tract > diagnostic endoscopic ultrasound > endoscopy > colonoscopy > sigmoidoscopy > sclerotherapy > oesophageal stricture dilatation	Prophylaxis NOT recommended	

* High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen accordingly to clinical condition and microbiological results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
GI	Gastrointestinal	**ID**	Infectious diseases
IV	Intravenous	**MRSA**	Methicillin-resistant *Staphylococcus aureus*
SJS / TEN	Stevens-Johnson syndrome / Toxic epidermal necrolysis		

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 7: Gynaecological & Obstetric Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Investigate patients for sexually transmitted infections (STIs) if they have symptoms of an STI or before insertion of an intrauterine device or before a transcervical procedure (including surgical termination of pregnancy and hysteroscopy). If the results of investigations are positive, provide appropriate treatment for the STI to reduce the risk of postprocedural infective complications. Ideally treatment should be completed before the procedure.

Prophylaxis against enterococcal endocarditis is indicated for patients with specific cardiac conditions undergoing gynaecological surgery. Refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **amoxicillin + clavulanate** can be given over 3 to 4 minutes.
- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole** and IV **clindamycin** infusions can be given over 20 minutes. They should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Pregnancy

There is a lack of evidence to guide optimal gentamicin doing in pregnancy; altered blood volume and renal function may impact plasma concentrations. It is recommended to use doses as for other patients, except if the patient is obese (pre-pregnancy BMI > 25kg/m^2) where adjusted body weight should be used.

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Gynaecological Surgery / Procedures		
Laparoscopic procedures that do not enter the bowel or vagina (diagnostic, tubal sterilisation, operative (except for hysterectomy))	Prophylaxis NOT recommended	
Other transcervical procedures (cystoscopy, hysteroscopy (diagnostic or operative), intrauterine device insertion, endometrial biopsy, oocyte retrieval, dilation and curettage for non-pregnancy indication, autologous mid-urethral sling, cervical tissue biopsy including LLETZ or endocervical curettage) **(LLETZ = large loop excision of the transformation zone)**		

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Hysterectomy **Gynaecological-oncological procedures** **Gynaecological laparotomy procedures** (omentectomy, oophorectomy) **Pelvic organ prolapse procedures** **Synthetic mid-urethral sling procedures** **Vaginal repair**	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion High risk of MRSA infection: **Add vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV infusion PLUS **gentamicin 2 mg/kg** IV High risk of MRSA infection: **Replace** clindamycin with **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Obstetric Procedures		
Minor procedures (e.g. endoscopic procedures)	Prophylaxis NOT recommended	
Caesarean section (elective and nonelective)	**cefazolin 2g** IV High risk of MRSA infection: **Add vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV infusion PLUS **gentamicin 2mg/kg** IV High risk of MRSA: **Replace** clindamycin with **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Assisted vaginal delivery	**amoxicillin+clavulanate 1+0.2 g** IV (as a single dose as soon as possible after assisted vaginal delivery, ideally within 6 hours) **# Moderate risk penicillin allergy:** **cefazolin 2g** IV (as a single dose as soon as possible after assisted vaginal delivery, ideally within 6 hours) **PLUS** **metronidazole 500mg** IV (as a single dose as soon as possible after assisted vaginal delivery, ideally within 6 hours)	**clindamycin 600mg** IV infusion PLUS **gentamicin 2mg/kg** IV
Prophylaxis for repair of obstetric anal sphincter injuries (including third- or fourth-degree perineal tears)	**cefazolin 2g** IV (as early as possible) PLUS **metronidazole 500mg** IV infusion (as early as possible) High risk of MRSA: **Add vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV infusion (as early as possible)
	Post-operative antibiotic therapy is recommended	
Surgical termination of pregnancy (surgical antibiotic prophylaxis is not required if the patient has been investigated and treated for STIs before the procedure)	**doxycycline 400mg** PO as a single dose (1 hour prior to procedure)^ OR **azithromycin 1g** PO (within 120 minutes before the procedure)	
Later term termination	As for hysterectomy (see above)	

#Moderate risk penicillin allergy: History suggestive of moderate risk (e.g. delayed rash which is NOT urticarial or DRESS/SJS/TEN)

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

^Nausea is common with this regimen, consider concurrent use with an antiemetic drug

Postoperative Care

Postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiological results.

Additional notes

Caesarean section: Administer prophylactic antibiotics preoperatively prior to skin incision. In the past, administration of antibiotics after the cord is clamped was common practice to avoid exposing the neonate to antibiotics. However, studies have shown lower surgical site infection rates, without compromising neonatal outcome, if prophylaxis is administered before skin incision.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 8: Neurosurgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Prophylaxis against endocarditis is indicated for patients with specific cardiac conditions. Refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Craniotomy procedures **Trans-sphenoidal procedures**¥ **Spinal procedures** (laminectomy, discectomy) **External ventricular drain insertion** **Microsurgery** **Pressure monitor insertion** **Procedures involving insertion of prosthetic material** **Re-exploration procedures** **Navigus Brain Biopsy** **Intracranial shunt insertion**#	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)

Patients scheduled for insertion of an intracranial shunt should be vaccinated against *Streptococcus pneumoniae*, ideally before the procedure, to protect against the development of pneumococcal meningitis. See the Australian Immunisation Handbook for further information.

Other minor clean procedures	Prophylaxis NOT recommended

* High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

¥ Following trans-sphenoidal procedures, if nasal packs remain in-situ, oral prophylaxis can be considered where there is an increased risk of infection. If required, use amoxicillin with clavulanic acid 875mg orally every 12 hours for five days (or if high risk penicillin/cephalosporin allergy use clindamycin 450mg orally every 8 hours for five days).

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiological results.

Ventricular drains that remain in situ do not justify extending the duration of antibiotic prophylaxis postoperatively. Extended prophylaxis is associated with an increased risk of adverse effects, including subsequent infection with resistant pathogens and *Clostridium difficile.*

The rate of shunt infection is reduced when the shunt is impregnated with an antibiotic (clindamycin or rifampicin), but data are lacking on the risk of selecting resistant organisms.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**CSF**	Cerebrospinal fluid
DRESS	Drug rash with eosinophilia and systemic symptoms	**ID**	Infectious Diseases
IV	Intravenous	**MRSA**	Methicillin-resistant *Staphylococcus aureus*
SJS / TEN	Stevens-Johnson syndrome / Toxic epidermal necrolysis		

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 9: Ophthalmic Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Active conjunctivitis, dacryocystitis or blepharitis should be treated and resolved prior to surgery when possible.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **clindamycin** infusion can be given over 20 minutes. It should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Replace IV cefazolin with IV clindamycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
All procedures	Preoperatively: Immediately prior to surgical incision, apply sterile povidone-iodine 5% swab to conjunctival cul de sac, lid margins and periorbital skin and dry at 2 minutes. In patients with a povidone iodine (Betadine®) allergy, use a sterile product containing chlorhexidine acetate 0.05% for 5 minutes [1].	
Extra-ocular procedures		
Clean procedures > conjunctival procedures > rectus / oblique muscle procedures > entropion / ectropion repair	There is no strong evidence that IV prophylactic antibiotics improve outcomes for clean extra-ocular procedures in otherwise healthy individuals [2, 3]. If required, use:	
	cefazolin 2g IV High risk of MRSA infection: **REPLACE** cefazolin with **clindamycin 600mg** IV infusion	**clindamycin 600mg** IV infusion
Procedures where infection may be present (e.g. Dacryocystorhinostomy)	No strong evidence for IV prophylaxis (as above). Any infection should be treated appropriately following the surgery.	

Recommended Prophylaxis

	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Intra-ocular procedures		
Anterior procedures > phacoemulsification / lens implant > keratoplasty > trabeculectomy / tube implant > corneal graft	**cefazolin 1mg/0.1mL** intracameral injection as a single dose at the end of the procedure [see NOTE 1]	**# Moderate risk penicillin/cephalosporin allergy:** cefazolin intracameral injection may be considered following thorough allergy history and assessment [2, 4] [Cefazolin has no common side chains with other beta-lactam antibiotics, so can often be tolerated in patients with a moderate risk penicillin or cephalosporin allergy. Ensure a complete and thorough history is obtained; if the history is suggestive of a high risk allergy or there is uncertainty, use moxifloxacin (or contact ID)] *** High risk penicillin/cephalosporin allergy:** moxifloxacin 0.15% intracameral injection at the end of the procedure [see NOTE 3]
Vitreous procedures		
Internal vitreous procedures > e.g. retinal detachment repair	Subconjunctival antibiotics not required	
External vitreous procedures > e.g. scleral buckle	**cefazolin 1mg/0.1mL, give 1-2mL** subconjunctival injection as a single dose at the end of the procedure [see NOTE 1]	**# Moderate risk penicillin/cephalosporin allergy:** cefazolin subconjunctival injection may be considered following thorough allergy history and assessment [2, 4] [Cefazolin has no common side chains with other beta-lactam antibiotics, so can often be tolerated in patients with a moderate risk penicillin or cephalosporin allergy. Ensure a complete and thorough history is obtained; if the history is suggestive of a high risk allergy or there is uncertainty, use moxifloxacin (or contact ID)] *** High risk penicillin/cephalosporin allergy:** moxifloxacin 0.15% intracameral injection at the end of the procedure [see NOTE 3]

#Moderate risk penicillin/cephalosporin allergy: History suggestive of moderate risk (e.g. delayed rash which is NOT urticarial or DRESS/SJS/TEN)

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

NOTE 1: OPHTHALMIC INJECTION AVAILABILITY

Cefazolin 5mg/0.5mL pre-loaded syringes are available from an SA Health approved contractor. Alternatively, the cefazolin injection can be reconstituted in the eye clinic/theatre. See below under *Preparation of ophthalmic syringes in eye clinics / theatre.*

NOTE 2: Moxifloxacin for intracameral injection is prepared aseptically using 0.5% eye drops (5mL) (Vigamox®), which are available via the Special Access Scheme and is an alternative ocular antimicrobial for patients with *severe* penicillin/cephalosporin allergy. However due to increasing fluoroquinolone resistance, to avoid overuse of moxifloxacin, a thorough allergy history should be taken. Cefazolin has no common side chains with other beta-lactam antibiotics, so can often be tolerated in patients with a moderate risk penicillin or cephalosporin allergy. Intracameral vancomycin is not recommended due to the risk of haemorrhagic occlusive retinal vasculitis [8]. See below under *Preparation of ophthalmic syringes in eye clinics / theatre* for dilution and administration instructions.

Postoperative Care

There is a lack of strong evidence to support the use of postoperative topical antibiotics in ophthalmic surgical procedures [2]. Prolonged treatment with antibiotic ointment or drops is not indicated unless there is confirmed or suspected infection. For patients who are treated with extended periods of topical steroids or who have been treated with systemic steroids preoperatively, immunological defenses may be reduced and the risk of infection may be increased [9]. If postoperative topical antibiotics are considered necessary due to higher risk of infection, chloramphenicol 0.5% eye drops can be used four times daily for 7 days [2]. Tobramycin eye drops do not have activity against Gram-positive organisms [2].

If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiology results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

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Preparation of ophthalmic syringes in eye clinics / theatre

All preparation of intravitreal and intracameral antibiotics in the eye clinic/theatre must be performed using strict aseptic technique.

Each step of the preparation should be checked by two staff members, one of whom must be a consultant ophthalmologist.

Cefazolin 2mg/0.2mL

1. Reconstitute 1g vial of cefazolin with 3.5mL of Water for Injection and shake to dissolve. This produces a concentration of cefazolin 1000mg/4mL.
2. Draw up 9.6mL of Sodium Chloride 0.9% injection in a 10mL syringe and to this, add0.4mL of cefazolin 1000mg/4mL solution and thoroughly mix (=10mg/mL).
3. Draw up 0.2mL of this solution into a 1mL syringe to produce 2mg/0.2mL. Inject 0.1mLof this solution to give 1mg dose.

Moxifloxacin 1.5mg/1.0mL (0.15%)

Dilution and administration is to be undertaken by an ophthalmologist

1. Attach a 21G needle to a 5mL syringe, insert into opening of moxifloxacin 0.5% (Vigamox®) eye drops and draw up 3mL.
2. Draw up 7mL of Balanced Salt Solution (BSS®) into a 20mL syringe and to this, add the 3mL of moxifloxacin 0.5% (Vigamox®). Mix thoroughly. This produces a moxifloxacin concentration of 15mg in 10mL (0.15%).
3. Draw up 1mL of this moxifloxacin 0.15% solution into a 1mL syringe (1.5mg/1.0mL)
4. Expel 0.6mL of this diluted moxifloxacin 0.15% solution. For intracameral injection, the surgeon injects 0.3mL (450 microgram) to 0.4mL (600 microgram) into the surgical side port, under the distal capsulorhexis edge and then when the eye is exited, administer the remaining dose at the incision to hydrate the incision and make sure the anterior chamber is left pressurised.

Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 10: Oral and Maxillofacial Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

For patients with specific cardiac conditions undergoing a procedure that involves manipulation of the gingival or periapical tissue or perforation of the oral mucosa antibiotic prophylaxis against streptococcal endocarditis may be required - refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **benzylpenicillin** can be given over 5 to 10 minutes and should be administered no more than 60 minutes before surgical incision.
- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **metronidazole** and IV **clindamycin** infusions can be given over 20 minutes. They should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Procedures involving insertion of dental implants **Clean or clean-contaminated procedures not listed below** (including dentoalveolar surgery (extractions, impactions, exposures); minor pathology (soft tissue, cysts))	Prophylaxis not recommended	
Procedures involving incision through the oral mucosa only (e.g. cleft lip and palate repairs)	**benzylpenicillin 1.2g** IV Repeat dose 1-hourly intra-operatively	**clindamycin 600mg** IV infusion
Full dental clearance	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) THEN postoperative if infected: **amoxicillin/clavulanic acid 875mg/125mg** PO twice daily for 5 days	**clindamycin 600mg** IV infusion THEN postoperative if infected: **clindamycin 450mg** PO three times a day for 5 days

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Procedures involving incision through the skin and oral mucosa (oral cavity not involved) - Temporomandibular joint (arthrocentesis, reconstruction) - Submandibular gland excision/removal - Mandibular reconstruction (without bone graft)	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV infusion
Procedures involving incision through the skin and oral mucosa (oral cavity involved) - Orthognathic surgery^ (temporomandibular joint replacement) - Sublingual gland excision and salivary gland procedures - Intraoral bone grafting procedures - Procedures involving insertion of prosthetic material	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV infusion
	^Postoperative doses can be considered following orthognathic surgery but prophylaxis (intravenous or oral) should not continue beyond 24 hours	
Open reduction and internal fixation of mandibular fractures or midfacial fractures (e.g. Le Fort or zygomatic)	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV infusion
	Postoperative doses can be considered for high risk patients (e.g. fracture in tooth-bearing segment of the mandible, prolonged lag time between injury and surgery, a carious or unhealthy tooth left in the fracture line, inability to surgically restore the mucosal barrier, extensive periodontal disease) but prophylaxis (intravenous or oral) should not continue beyond 24 hours	

* High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiological results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**ORIF**	Open reduction and internal fixation
SJS / TEN	Stevens-Johnson syndrome / Toxic epidermal necrolysis		

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines(adult)

Appendix 11: Orthopaedic & Spinal Surgery

This guideline does not apply to open fractures. Refer to Plastic and Reconstructive Surgery (including open fractures) guideline

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

For arthroplasty procedures, consider *Staphylococcus aureus* screening (for both methicillin-susceptible and methicillin-resistant strains). If the results of screening are positive, perform decolonisation. Refer to SA Health Methicillin-resistant Staphylococcus aureus (MRSA): Infection prevention and control Clinical Guideline.

Only symptomatic patients should be screened for urinary tract infection (UTI) prior to surgery and treated if appropriate. Prophylaxis antibiotics are not required for insertion or removal of urinary catheter unless a UTI is proven.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole** infusion can be given over 20 minutes and should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Cement

The use of antimicrobial-impregnated cement for fixation of the prosthetic device is common practice; however there is insufficient strong evidence to inform recommendations regarding the choice of antimicrobial, or concentration of antimicrobial to be in reconstituted cement. Seek ID advice.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Primary Total Hip Replacement (THR) **Total Knee Replacement** (TKR)	**cefazolin 2g** IV THEN (postoperative): **cefazolin 2g** IV 8-hourly for up to 2 further doses (see NOTE 2 below) High risk of MRSA infection : **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (1.5g for patients more than 80kg **actual body weight**) **POST-OP**: nil antibiotics required

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High risk Penicillin / Cephalosporin Allergy*
Patients requiring revision / re-operation (joint replacement)	**cefazolin 2g** IV PLUS **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) THEN (postoperative): **cefazolin 2g** IV 8-hourly for a further 2 doses PLUS **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) **single dose** given 12 hours after initial dose	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) THEN (postoperative): **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) **single dose** given 12 hours after initial dose
	Note: Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure. Doses should be scheduled to allow for re-dosing just prior to skin incision.	
Routine arthroscopic procedures not involving insertion of prosthetic material (e.g. pins, plates) or avascular tissue	Prophylaxis NOT recommended	
Spinal procedures	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight)**
Internal fixation of fractures of large bones **Procedures involving insertion of prosthetic or allograft material** **Other (closed) internal fixation**	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Lower limb amputation	**cefazolin 2g** IV If limb is ischaemic: **ADD metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 2mg/kg** IV (for procedures likely to continue for longer than 6 hours, consider using a **5mg/kg** dose) If limb is ischaemic: **ADD metronidazole 500mg** IV infusion

*****High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

NOTE 1: BONE CEMENT

There is limited RCT evidence available to inform recommendations on the choice or dose of antibiotic in primary or secondary arthroplasty. Meta-analyses of available evidence report differing outcomes dependent upon inclusion criteria of trials. The evidence for antibiotic-impregnated bone cement in reducing deep infection rates appears stronger for secondary/revision procedures compared to primary arthroplasty. Other factors such as the use of appropriate systemic prophylaxis, laminar air-flow in the operating room, surgical proficiency and patient co-morbidities impact infection rates, and the comparative outcomes in studies investigating the efficacy of antibiotic-impregnated bone cement.

NOTE 2: POST-OPERATIVE DOSING (JOINT REPLACEMENT)

Although a single preoperative dose of surgical antibiotic prophylaxis is expected to be sufficient to prevent postoperative infection following total hip or knee arthroplasty, there is insufficient evidence to show that a single dose of prophylaxis is as effective as 24 hours of prophylaxis. Postoperative doses can be considered but **prophylaxis should not continue beyond 24 hours**.

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiological results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

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Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 12: Otorhinolaryngology / Head & Neck Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Prophylaxis against endocarditis is indicated for patients with specific cardiac conditions. Refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole** and IV **clindamycin** infusions can be given over 20 minutes. They should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Otorhinolaryngology Procedures		
Uncomplicated or minor clean procedures - uncomplicated ear surgery including tympanoplasty (not infected), otoplasty - uncomplicated nose or sinus surgery including septoplasty and turbinoplasty, endoscopic procedures (microlaryngoscopy, panendoscopy) - stapedectomy - tonsillectomy‡ - adenoidectomy‡	**Prophylaxis NOT recommended** ‡ Patients with specific cardiac conditions (e.g. prosthetic heart valve) undergoing these procedures require antibiotic prophylaxis for endocarditis - refer to **Antibiotic Prophylaxis for Prevention of Endocarditis in Cardiac Patients** for further information.	
Hearing implant procedures, including cochlear implant	**cefazolin 2 g** IV	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Otorhinolaryngology Procedures		
Major ear surgery **Complex septorhinoplasty** **Revision sinus surgery**	**cefazolin 2 g** IV PLUS **metronidazole 500mg** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV
Tympanomastoid surgery **Laryngectomy# (primary or salvage)**	**cefazolin 2 g** IV PLUS **metronidazole 500mg** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV PLUS **gentamicin 2mg/kg** IV
	# Postoperative doses following laryngectomy can be considered but prophylaxis (intravenous or oral) should not continue beyond 24 hours	
Note: Procedures undertaken in the setting of recent or active infection may require continuing antibiotics guided by culture and susceptibility test results		
Head and Neck Surgery		
Thyroidectomy **Simple lymph node excision (including submandibular lymph node excision)** **Parotidectomy** **Other clean procedures not listed below**	**Prophylaxis NOT recommended**	
Clean-contaminated procedures **Procedures involving insertion of prosthetic material**	**cefazolin 2 g** IV If incision through mucosal surfaces: **ADD metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV
Note: Procedures undertaken in the setting of recent or active infection may require continuing antibiotics guided by culture and susceptibility test results		
Extensive neck dissection for malignancy **Debulking or reconstructive surgery for malignancy**	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) **POST-OPERATIVE:** A further 2 doses of cefazolin (8 hours apart) and 1 dose of metronidazole (12 hours apart) may be considered. Prophylaxis should not extend beyond 24 hours.	**clindamycin 600mg** IV PLUS **gentamicin 2mg/kg** IV **POST-OPERATIVE:** A further 2 doses of clindamycin (8 hours apart) may be considered. Prophylaxis should not extend beyond 24 hours.

* High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen accordingly to clinical condition and microbiological results.

Antibiotic prophylaxis should not routinely be given to patients with nasal packing or a tamponade device *in situ* following epistaxis.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / toxic epidermal necrolysis

References

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Surgical Antimicrobial Prophylaxis Guidelines

Appendix 13: Paediatric Surgical Procedures

This guideline applies to surgical procedures performed in paediatric patients aged from 3 months to 14 years. In select paediatric populations, clinicians may elect to use the adult guidelines at their own discretion. For more specialised procedures not included in this guideline, refer to the Women's and Children's Hospital surgical prophylaxis guidelines. For neonatal patients alternative antibiotic regimens may be required - seek expert advice.

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Prophylaxis against endocarditis is indicated for patients with specific cardiac conditions. Refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Dose, timing and administration of antibiotics

Dosing of antibiotic should generally be based on actual body weight except for gentamicin where ideal body weight (IBW) should be used. Paediatric doses should never exceed the recommended adult dose.

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin 30mg/kg (up to 2g)** can be given over 3-5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin 2mg/kg** can be given over 30 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole 12.5mg/kg (up to 500mg)** can be given over 20 to 30 minutes. It should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **clindamycin 15mg/kg (up to 600mg)** should be given over 10 to 15 minutes. It should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin 30mg/kg (up to 1.5g)** infusion should be given over 2 hours (4 hours if history of infusion reaction (formerly "red man syndrome")). Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- If surgery is delayed or prolonged, administer a second dose of antibiotics after half the normal dosing interval (e.g. 4 hours for cefazolin, clindamycin and metronidazole, 6 hours for vancomycin and 12 hours for gentamicin), OR
- if major blood loss occurs (> 15-20% of blood volume), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Procedures	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
ABDOMINAL SURGERY		
Clean procedures (e.g. endoscopic or colonoscopic)	**Prophylaxis NOT recommended**	
Biliary tract	**cefazolin IV** 30mg/kg/dose (up to 2g) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)	**vancomycin IV** 30mg/kg/dose (up to 1.5g) PLUS **gentamicin IV** 2mg/kg/dose ^
Hernia repair **Splenectomy** (vaccination and post-splenectomy antibiotic prophylaxis required in all cases)	**cefazolin IV** 30mg/kg/dose (up to 2g) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)	**vancomycin IV** 30mg/kg/dose (up to 1.5g)

Recommended Prophylaxis		
Procedures	**Recommended Prophylaxis**	**High Risk Penicillin / Cephalosporin Allergy***
All surgery involving incision into the small bowel, large bowel and rectum (including appendicectomy)	**cefazolin IV** 30mg/kg/dose (up to 2g) PLUS **metronidazole IV** 12.5mg/kg/dose (up to 500mg) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)	**gentamicin IV** 2mg/kg/dose (IBW)^ PLUS **metronidazole IV** 12.5 mg/kg/dose (up to 500mg) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)
EAR, NOSE AND THROAT PROCEDURES		
Tonsillectomy*, adenoidectomy*, uncomplicated ear surgery, otoplasty, stapedectomy, nasal septoplasty, endoscopic sinus surgery, other uncomplicated nose or sinus surgery and minor clean procedures	**Prophylaxis NOT recommended** *Endocarditis prophylaxis may be required – refer to Antibiotic Prophylaxis for Prevention of Endocarditis in Cardiac Patients	
Major ear surgery **Revision sinus surgery** **Complex septorhinoplasty** **Tympanomastoid surgery** **Laryngectomy (primary or salvage)***	**cefazolin IV** 30mg/kg/dose (up to 2g) PLUS **metronidazole IV** 12.5mg/kg/dose (up to 500mg) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g) ***POSTOPERATIVE** doses can be considered but should not continue beyond 24 hours	**vancomycin IV** 30mg/kg/dose (up to 1.5g) PLUS **(for laryngectomy or tympanomastoid surgery)** **gentamicin IV** 2mg/kg/dose^ ***POSTOPERATIVE** doses can be considered but should not continue beyond 24 hours
ORAL / DENTAL SURGERY		
Clean or clean-contaminated procedures not listed below **Dental extractions, impactions, exposures, implants, minor pathology (soft tissue, cysts)**	**Prophylaxis NOT recommended**	
Insertion of prosthetic material (except dental implants) **Intraoral bone grafting** **Open reduction and internal fixation of mandibular or midfacial fractures** **Orthognathic surgery***	**cefazolin IV** 30mg/kg/dose (up to 2g) PLUS **(if insertion through the skin and oral mucosa)** **metronidazole IV** 12.5mg/kg/dose (up to 500mg) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g) ***POSTOPERATIVE** doses can be considered for orthognathic surgery but should not continue beyond 24 hours.	**clindamycin IV** 15mg/kg/dose (up to 600mg) ***POSTOPERATIVE** doses can be considered for orthognathic surgery but should not continue beyond 24 hours.
ORTHOPAEDIC SURGERY		
Arthroscopic procedures and other clean procedures not involving insertion of prosthetic material or avascular tissue	**Prophylaxis NOT recommended**	
Procedures involving insertion of prosthetic or allograft material **Internal fixation of fractures**	**cefazolin IV** 30mg/kg/dose (up to 2g) High risk of MRSA infection or re-operation of bone and joint surgery: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g) **POSTOPERATIVE** doses can be considered but should not continue beyond 24 hours.	**vancomycin IV** 30mg/kg/dose (up to 1.5g)

Recommended Prophylaxis

Procedures	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
OPEN FRACTURES / SOFT TISSUE INJURIES / PLASTIC SURGERY		
Open fractures (non-severe injuries+) **Traumatic wounds (non-severe injuries)** ****Broader antibiotic cover may be required for wounds that have been immersed in water – refer to the Therapeutic Guidelines**	**cefazolin IV** 30mg/kg/dose (up to 2g) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)	**clindamycin IV** 15mg/kg/dose (up to 600mg) OR For known MRSA colonisation/infection give INSTEAD: **vancomycin IV** 30mg/kg/dose (up to 1.5g)
	Prophylaxis for non-severe injuries comparable to Gustilo-Anderson type I or II can be discontinued at definitive wound closure. The total duration of prophylaxis should be no more than 72 hours, even if soft tissue coverage is not achievable.	
Open fractures (severe injury‡) **Traumatic wounds (severe injuries#)** ****Broader antibiotic cover may be required for wounds that have been immersed in water – refer to the Therapeutic Guidelines**	**cefazolin IV** 30mg/kg/dose (up to 2g) then 8-hourly for a further 2 doses PLUS for heavily contaminated severe injuries (e.g. agricultural injuries): **ADD metronidazole IV** 12.5mg/kg/dose (up to 500mg) then 12-hourly for a further 1 dose High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)	**clindamycin IV** 15mg/kg/dose (up to 600mg) then 8-hourly for a further 2 doses OR For known MRSA colonisation/infection give INSTEAD: **vancomycin IV** 30mg/kg/dose (up to 1.5g) then 12-hourly for a further 1 dose PLUS for heavily contaminated severe injuries (e.g. agricultural injuries): **ADD metronidazole IV** 12.5mg/kg/dose (up to 500mg) then 12-hourly for a further 1 dose
	Do not continue prophylaxis for more than 24 hours after definitive closure of a severe injury comparable to Gustilo-Anderson type III. The total duration of prophylaxis should be no more than 72 hours, even if soft tissue coverage is not achievable.	
UROLOGICAL PROCEDURES		
Preoperative screening for bacteriuria is advised for all elective urological procedures apart from routine cystoscopy. If bacteriuria is confirmed, treatment is recommended with short course antibiotics even if the patient is asymptomatic. Choice of antibiotic is guided by results of cultures and susceptibility patterns. Preoperative treatment of bacteriuria does not exclude the need for surgical prophylaxis.		
Circumcision, orchidopexy or hydrocele repair	**Prophylaxis NOT recommended**	
Endoscopic urological procedures	**gentamicin IV** 2mg/kg/dose If gentamicin is contraindicated use: **cefazolin IV** 30mg/kg/dose (up to 2g)	**gentamicin IV** 5mg/kg/dose
Procedures that enter the urinary tract or involve prosthetic device implantation	**cefazolin IV** 30mg/kg/dose (up to 2g) PLUS **gentamicin IV** 2mg/kg/dose If inadvertent rectal injury then: **ADD metronidazole IV** 12.5mg/kg/dose (up to 500mg) High risk of MRSA infection: **REPLACE** cefazolin with **vancomycin IV** 30mg/kg/dose (up to 1.5g)	**gentamicin IV** 2mg/kg/dose PLUS **vancomycin IV** 30mg/kg/dose (up to 1.5g) If inadvertent rectal injury then: **ADD metronidazole IV** 12.5mg/kg/dose (up to 500mg)
Procedures that enter the urinary tract or involve prosthetic device implantation in which entry into the bowel lumen is expected	**cefazolin IV** 30mg/kg/dose (up to 2g) PLUS **metronidazole IV** 12.5mg/kg/dose (up to 500mg) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)	**gentamicin IV** 2mg/kg/dose PLUS **metronidazole IV** 12.5mg/kg/dose (up to 500mg) High risk of MRSA infection: **ADD vancomycin IV** 30mg/kg/dose (up to 1.5g)

* High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

^ For procedures likely to continue for longer than 6 hours, a higher dose of gentamicin (5mg/kg/dose up to 480mg) can be considered

+ Open fractures - non-severe injuries: open fractures resulting from indirect injury or direct, low-energy injury (Gustilo-Anderson type I or II) – see Table 1

‡ Open fractures - severe injuries: open fractures resulting from high-energy injury or exhibiting high-energy fracture patterns (Gustilo-Anderson type III) – see Table 1

Traumatic wounds - severe injuries: muscular, skeletal and soft tissue trauma, crush injuries, penetrating injuries, stab wounds

Table 1: Gustilo-Anderson Classification of Open Fractures (Garner, 2020)

Type 1	Open fracture with a wound less than 1cm long, low energy, without gross contamination
Type 2	Open fracture with a wound 1-10cm long, low energy, without gross contamination or extensive soft-tissue damage, flaps, or avulsions
Type 3	A: Open fracture with a wound > 10cm with adequate soft-tissue coverage, or any open fracture due to high energy trauma or with gross contamination, regardless of the size of the wound B: Open fracture with extensive soft-tissue injury or loss, with periosteal stripping and bone exposure that requires soft-tissue coverage in the form of muscle rotation or transfer C: Open fracture associated with arterial injury requiring repair

Postoperative Care

Postoperative antibiotics are NOT indicated unless infection is confirmed or suspected. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiological results.

Prophylactic antibiotics until residual surgical drains (including extra-ventricular drains), intravascular or urinary catheters are removed is not supported by current evidence and increases the risk of adverse outcomes.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

References

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 14: Plastic and Reconstructive Surgery (including open fractures)

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

For patients with specific cardiac conditions undergoing a skin or soft tissue procedure through infected skin, skin structures or musculoskeletal tissues, prophylaxis against staphylococcal and streptococcal endocarditis may be required - refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Unless otherwise stated, surgical antibiotic prophylaxis is NOT routinely indicated for clean or clean-contaminated procedures of the skin or subcutaneous tissue (including procedures that breach the oral mucosa).

Topical antibiotics should NOT be applied to the wound during or after surgery

For human or animal bite injuries and clenched fist injuries, surgical antibiotic prophylaxis is required – refer to the Therapeutic Guidelines.

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **metronidazole** and IV **clindamycin** infusions can be given over 20 minutes. They should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Clean bone or soft tissue injury **Open fractures of the distal phalanx (provided prompt irrigation/debridement of the fracture within 8 hours of injury)** **Non-infected lesions & minor excisions** **Blepharoplasty / Ptosis repair** **Rhytidectomy** **Other clean or clean-contaminated skin and soft tissue procedures, including those that breach the oral mucosa**	Prophylaxis NOT recommended	

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Groin/axilla dissection **Abdominoplasty** **Insertion of implants, mesh, prostheses, screws, plates etc.** **Traumatic wounds (non-severe injuries)** **Open fractures (non-severe injuries +)** ****Broader antibiotic cover may be required for wounds that have been immersed in water – refer to the Therapeutic Guidelines**	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV OR For known MRSA colonisation/infection give INSTEAD: **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Open fractures (severe injury ^) **Traumatic wounds (severe injuries#)** ****Broader antibiotic cover may be required for wounds that have been immersed in water – refer to the Therapeutic Guidelines**	**cefazolin 2g** IV then 8-hourly for a further 2 doses PLUS for heavily contaminated severe injuries (e.g. agricultural injuries): **ADD metronidazole 500mg** IV then 12-hourly for a further 1 dose High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**clindamycin 600mg** IV then 8-hourly for a further 2 doses OR For known MRSA colonisation/infection give INSTEAD: **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) then 12-hourly for a further 1 dose PLUS for heavily contaminated severe injuries (e.g. agricultural injuries): **ADD metronidazole 500mg** IV then 12-hourly for a further 1 dose
	Antibiotic prophylaxis for severe injuries should not continue for more than 24 hours after definitive wound closure. The total duration of prophylaxis should not be more than 72 hours, even if soft tissue coverage is not achievable.	

* High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

+ Open fractures - non-severe injuries: open fractures resulting from indirect injury or direct, low-energy injury (Gustilo-Anderson type I or II) – see Table 1

^ Open fractures - severe injuries: open fractures resulting from high-energy injury or exhibiting high-energy fracture patterns (Gustilo-Anderson type III) – see Table 1

Traumatic wounds - severe injuries: muscular, skeletal and soft tissue trauma, crush injuries, penetrating injuries, stab wounds

Table 1: Gustilo-Anderson Classification of Open Fractures (Garner, 2020)

Type 1	Open fracture with a wound less than 1cm long, low energy, without gross contamination
Type 2	Open fracture with a wound 1-10cm long, low energy, without gross contamination or extensive soft-tissue damage, flaps, or avulsions
Type 3	A: Open fracture with a wound > 10cm with adequate soft-tissue coverage, or any open fracture due to high energy trauma or with gross contamination, regardless of the size of the wound B: Open fracture with extensive soft-tissue injury or loss, with periosteal stripping and bone exposure that requires soft-tissue coverage in the form of muscle rotation or transfer C: Open fracture associated with arterial injury requiring repair

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiology results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

References

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 15: Thoracic Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Prophylaxis against endocarditis is indicated for patients with specific cardiac conditions. Refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **metronidazole** infusion can be given over 20 minutes and should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Intercostal catheter insertion **Brachiocephalic procedures (e.g. carotid endarterectomy, brachial artery repair) not involving prosthetic material**	Prophylaxis NOT recommended	
Procedures involving insertion of prosthetic material **Procedures associated with an increased risk of infection, including video-assisted thoracoscopic surgery (VATS), aneurysm repair, thromboendarterectomy, vein bypass, mediastinoscopy**	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Pneumonectomy / Lobectomy **If infection present, continue with current antibiotic therapy**	**cefazolin 2g** IV THEN **cefazolin 2g** IV 8-hourly for 2 more doses commencing 8 hours after the initial dose *If anaerobic cover required (empyema or abscess) then* ADD: **metronidazole 500mg** IV infusion THEN **metronidazole 500mg** IV infusion for 1 more dose commencing 12 hours after the initial dose High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) THEN **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) for 1 more dose commencing 12 hours after the initial dose *If anaerobic cover required (empyema or abscess) then* ADD: **metronidazole 500mg** IV infusion THEN **metronidazole 500mg** IV infusion for 1 more dose commencing 12 hours after the initial dose
Decortication / Pleurectomy **If infection present, continue with current antibiotic therapy**	**cefazolin 2g** IV *If anaerobic cover required (empyema or abscess) then ADD:* **metronidazole 500mg** IV infusion High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) *If anaerobic cover required (empyema or abscess) then ADD:* **metronidazole 500mg** IV infusion

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiology results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

References

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 16: Urological Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

Screening for preoperative bacteriuria

- For uncomplicated cystoscopic diagnostic procedures do not screen for bacteriuria as the risk of postoperative infection is low. If the results of urinalysis suggest urinary tract infection, urine culture should be performed
- For other elective urological procedures that enter the urinary tract, perform preoperative urine culture. In catheterised patients, collect samples using a new catheter to avoid contamination of the sample by organisms colonizing the old catheter.
- If perioperative screening is not possible before an immediate operation, empirical treatment may be required.

Treating preoperative bacteriuria

If bacteriuria is confirmed by screening, treat with a short course of antibiotics even if the patient is asymptomatic.
If confirmed bacteriuria before an elective procedure OR if an immediate operation is required and there is clinical evidence of a urinary tract infection but culture results are unavailable, give gentamicin 3mg/kg IV as a single preoperative dose. Higher doses may be required if systemic symptoms (e.g. pyelonephritis) are present.
NOTE: Preoperative treatment of bacteriuria does not negate the need for surgical antibiotic prophylaxis unless the antibiotic used is the same as the recommended prophylaxis AND adequate plasma and tissue concentrations are likely to be achieved throughout the procedure. For patients treated for bacteriuria preoperatively, modify the choice of surgical antibiotic prophylaxis based on the results of culture and susceptibility testing.

Endocarditis prophylaxis

Prophylaxis against enterococcal endocarditis is indicated for patients with specific cardiac conditions who are undergoing urological surgery which surgical antibiotic prophylaxis is required. If the surgical antibiotic prophylaxis regimen does not include an antibiotic active against enterococci (e.g. amoxicillin, vancomycin) refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for appropriate add-on recommendations.

Prophylaxis against enterococcal endocarditis may also be required for patients with specific cardiac conditions who are undergoing urological surgery for which surgical antibiotic prophylaxis is not required, if the patient has an established genitourinary infection – refer to Antibiotic Prophylaxis for Prevention of Endocarditis in High Risk Patients for further information.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole** infusion can be given over 20 minutes and should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis		
Procedure	**Recommended Prophylaxis**	**High Risk Penicillin / Cephalosporin Allergy***
C**lean procedures** **Diagnostic cystoscopy without manipulation of urinary tract** **Extracorporeal shock-wave lithotripsy** **Urodynamic studies** **Open or laparoscopic urological procedures** when urinary tract not entered (e.g. vasectomy, scrotal surgery, varicocele ligation) **and** prosthetic material is not implanted	Prophylaxis NOT recommended	
Open or laparoscopic urological procedures in which entry into the bowel lumen is not expected and when: > urinary tract entered > prosthetic material (e.g. penile prosthesis, artificial urinary sphincters, mesh) is implanted	**cefazolin 2g** IV PLUS **gentamicin 2mg/kg** IV <u>If inadvertent rectal injury then ADD immediately:</u> **metronidazole 500mg** IV infusion <u>High risk of MRSA infection :</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 2mg/kg** IV <u>If inadvertent rectal injury then ADD immediately:</u> **metronidazole 500mg** IV infusion
Open or laparoscopic urological procedures in which entry into the bowel lumen is expected (e.g. ileal conduit, rectocele repair)	**cefazolin 2g** IV PLUS **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV PLUS **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (1.5g for patients more than 80kg **actual body weight**)
Endoscopic intrarenal and ureteric stone procedures (e.g. percutaneous nephrolithotomy, pyeloscopy for ureteric or kidney stones) **Ureteroscopy/ instrumentation of upper tract** (incl. retrograde pyelogram) **Other endoscopic procedures** only if there are risk factors for postoperative infection (e.g. urinary tract obstruction or abnormalities, urinary stones, indwelling or externalised catheters)	**gentamicin 2mg/kg** IV <u>If gentamicin is contraindicated use:</u> **cefazolin 2g** IV <u>Known urinary MRSA colonisation:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV <u>Known urinary MRSA colonisation:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Open prostatectomy / robotic prostatectomy	**cefazolin 2g** IV PLUS **gentamicin 2mg/kg** IV <u>If risk of entry into bowel lumen then ADD:</u> **metronidazole 500mg** IV infusion <u>High risk of MRSA infection:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 2mg/kg** IV <u>If risk of entry into bowel lumen then ADD:</u> **metronidazole 500mg** IV infusion
Transurethral resection of prostate (TURP) (consider culture and susceptibility results if available)	**gentamicin 2mg**/kg IV <u>If gentamicin is contraindicated use:</u> **cefazolin 2g** IV <u>Known urinary MRSA colonisation:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV <u>Known urinary MRSA colonisation:</u> **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)

Recommended Prophylaxis

Procedure	Recommended Prophylaxis	High Risk Penicillin \ Cephalosporin Allergy*
Transperineal prostatic biopsy (consider culture and susceptibility results if available)	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**gentamicin 2mg/kg** IV PLUS **vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Transrectal prostatic biopsy (consider culture and susceptibility results if available)	**ciprofloxacin 500mg** PO as a single dose, 2 hours before procedure *If there is a history of overseas travel (India, South East Asia, Southern Europe) in the last 6 months or use of quinolone therapy within the preceding 3 months, prebiopsy screening for ciprofloxacin-resistant Enterobacteriaceae (with faecal samples or rectal swabs) can be considered. Contact ID/Clinical Microbiology for advice.*	

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

Postoperative Care

Except where included above, postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen according to clinical condition and microbiology results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). Last reviewed and amended December 2021.

Surgical Antimicrobial Prophylaxis Guidelines (adult)

Appendix 17: Vascular Surgery

Preoperative Considerations

Consider individual risk factors for every patient including the need for prophylaxis. Antibiotic choice/dose may need to be modified according to patient factors (e.g. immune suppression, presence of prostheses, allergies, renal function, obesity, malnutrition, diabetes, malignancy, infection at another site, colonisation with multi-drug resistant bacteria and available pathology).

Consider surgical wound classification (**clean, clean-contaminated, contaminated, dirty-infected)** when determining the need for, or choice of, antibiotic prophylaxis. Refer to Surgical Antimicrobial Prophylaxis Prescribing Guideline for further information.

Pre-existing infections (known or suspected) – if present, use appropriate treatment regimen instead of prophylactic regimen for procedure but ensure the treatment regimen has activity against the organism(s) most likely to cause postoperative infection. Adjust the timing of the treatment dose to achieve adequate plasma and tissue concentrations at the time of surgical incision and for the duration of the procedure - seek advice from ID or the AMS team if unsure.

For elective implantation of prosthetic material, consider *Staphylococcus aureus* screening (for both methicillin-susceptible and methicillin-resistant strains). If the results of screening are positive, perform decolonisation. Refer to SA Health Methicillin-resistant Staphylococcus aureus (MRSA): Infection prevention and control Clinical Guideline.

Practice Points

Timing and administration of antibiotics

Surgical antibiotic prophylaxis must be administered before surgical incision to achieve effective plasma and tissue concentrations at the time of incision. Administration of any antibiotic after skin incision reduces effectiveness.

- IV **cefazolin** can be given over 5 minutes and should be administered no more than 60 minutes before skin incision.
- IV **gentamicin** can be given over 3 to 5 minutes and should be administered within 120 minutes before surgical incision.
- IV **metronidazole** and IV **clindamycin** infusions can be given over 20 minutes. They should be fully administered within 120 minutes of surgical incision. Maximum plasma and tissue concentrations occur at the conclusion of the infusion.
- IV **vancomycin** infusion should be given at a rate of 1g over at least 60 minutes and 1.5g over at least 90 minutes. Vancomycin should be timed to begin 15 to 120 minutes before skin incision. This ensures adequate concentration at the time of incision and allows for any potential infusion-related toxicity to be recognised before induction. The infusion can be completed after skin incision.

Dosing in patients with obesity

- **Cefazolin**: Consider increased dose of cefazolin (3g) for adult patients weighing more than 120kg.
- **Gentamicin**: For adult patients with a body mass index 30 kg/m^2 or more, use adjusted body weight (up to a maximum of 100kg) to calculate the gentamicin dose.
- **Vancomycin**: Consider increased dose of vancomycin (1.5g) for adult patients weighing more than 80kg.

High MRSA risk (defined as history of MRSA colonisation or infection OR frequent stays or a current prolonged stay in hospital with a high prevalence of MRSA OR residence in an area or aged care facility with high prevalence of MRSA OR current residence, or residence in the past 12 months, in a correctional facility):

- Add vancomycin

Repeat dosing

A single preoperative dose is sufficient for most procedures; however repeat intraoperative doses are advisable:

- for prolonged surgery (more than 4 hours from the time of first preoperative dose) when a short-acting agent is used (e.g. cefazolin dose should be repeated after 4 hours and clindamycin after 6 hours), OR
- if major blood loss occurs (e.g. more than 1500 mL in adults), following fluid resuscitation.

When measuring the time to a second intraoperative dose, measure the interval from the time of the first preoperative dose rather than the surgical incision time.

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
Vascular reconstructive surgery involving the abdominal aorta, carotid, upper or lower limbs (including graft/patch/stent insertion, groin incision)	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 2mg/kg** (for procedures likely to continue for longer than 6 hours, consider using a **5mg/kg** dose)
Limb amputation	**cefazolin 2g** IV PLUS for amputation of an ischaemic limb: **ADD metronidazole 500mg** IV infusion Reoperation (return to theatre or early revision) OR high risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**) PLUS **gentamicin 2mg/kg** (for procedures likely to continue for longer than 6 hours, consider using a **5mg/kg** dose) PLUS for amputation of an ischaemic limb: **ADD metronidazole 500mg** IV infusion

Recommended Prophylaxis

Surgery	Recommended Prophylaxis	High Risk Penicillin / Cephalosporin Allergy*
AVF / AVG with insertion of prosthetic material (e.g. Dacron graft) **AVF / AVG revision** **Fasciotomy** **Carotid artery procedures involving prosthetic material**	**cefazolin 2g** IV High risk of MRSA infection: **ADD vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)	**vancomycin 1g** IV infusion (**1.5g** for patients more than 80kg **actual body weight**)
Brachial or carotid artery procedures not involving insertion of prosthetic material (e.g. primary autogenous AVF formation) **All other clean procedures** (e.g. thoracoscopic sympathectomy, varicose vein procedures, percutaneous thrombectomy)	Prophylaxis NOT recommended	

*High risk penicillin/cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN)

The safety and efficacy of intraoperative irrigation with antimicrobial solutions, or soaking surgical implants (e.g. vascular grafts, mesh) with antimicrobial solutions before insertion, has not been established. There is concern about the development of resistance; in particular, rifampicin should not be used as a single drug. There is also potential for adverse effects. Consequently, these practices cannot be recommended.

Postoperative Care

Postoperative antibiotics are NOT indicated unless infection is confirmed or suspected, regardless of the presence of surgical drains. If infection is suspected, consider modification of antibiotic regimen accordingly to clinical condition and microbiological results.

Definitions / Acronyms

AMS	Antimicrobial Stewardship	**AVF**	Arteriovenous fistula
AVG	Arteriovenous graft	**DRESS**	Drug rash with eosinophilia and systemic symptoms
ID	Infectious Diseases	**IV**	Intravenous
MRSA	Methicillin-resistant *Staphylococcus aureus*	**SJS / TEN**	Stevens-Johnson syndrome / Toxic epidermal necrolysis

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Endorsed by South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR), Last reviewed and amended December 2021.