

Guideline

CHQ Paediatric surgical antibiotic prophylaxis guidelines

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Purpose

The recommendations of this guideline are for peri-operative antibiotic prophylaxis for patients undergoing a surgical procedure at the Queensland Children's Hospital (QCH) and who are cared for by Children's Health Queensland (CHQ). These guidelines are to be used only before the results of microbiological investigations are available or finalised.

Scope

This guideline provides information for all Children's Health Queensland (CHQ) employees (permanent, temporary and casual) and all organisations and individuals acting as its agents (including Visiting Medical Officers and other partners, contractors, consultants and volunteers).

Related documents

Procedures, Guidelines, Protocols

- [CHQ-PROC-01036 Antimicrobial: Prescribing and Management](#) and [CHQ Antimicrobial restrictions list](#)
- [CHQ-GDL-01023 Tetanus Prophylaxis in Wound Management- Prescribing aid algorithm](#)
- [CHQ-PROC-01430 Kidney Transplant Admission - Pre-operative preparation and post-operative management](#)
- [CHQ-GDL-01218 Paediatric Post-Liver Transplant Medication Management Guideline](#)
- [CHQ-GLD-01064-1 Antibiotic pre-operative prophylaxis guideline Poster](#)

Peri-operative considerations:

- A. The process for administration of antibiotic prophylaxis should be standardised to ensure consistent, timely administration. Antibiotics must be administered within 60 minutes prior to first incision. There is evidence that the period of 15 to 60 minutes prior to first incision is ideal so therefore this is the recommended timing for high risk procedures and wherever practically possible.
- B. The choice of antibiotic should be in accordance with the [Children's Health Queensland \(CHQ\) Paediatric Surgical Antibiotic prophylaxis guideline](#) and be guided by previous microbiological results and known colonisation. For further advice please contact the Infectious Diseases (ID) team.
- C. Review and document a comprehensive antibiotic allergy history prior to admission for elective surgery. If antibiotic allergy de-labelling is considered appropriate prior to surgery, please consult the Immunology and ID teams. This can assist with selection of the most appropriate peri-operative antibiotic prophylaxis.
- D. Implementation of these recommendations will mean that the health service has taken responsible steps to respond to the legal duty to improve the quality of care provided with regard to the surgical antibiotic prophylaxis standard.
- E. The current recommendations are available via the [CHQ AMS website](#) and the [CHQ eGovernance catalogue](#).
- F. Compliance with surgical antibiotic prophylaxis will be monitored via the [CHQ Surgical Antibiotic prophylaxis dashboard](#) and results reported to the CHQ Antimicrobial Stewardship Steering committee, Infection Control Committee and the Patient Safety and Quality Committee. This aligns with the recommendations from the [Australian Commission for Safety and Quality in Healthcare](#).
- G. Antibiotic dose and timing must be clearly and accurately documented in the electronic medical record (via SA Anaesthesia or ieMR Medication administration record).

Antibiotic administration

- Pre-operative IV antibiotics – should be given within 15 to 60 minutes of skin incision.
- Administration after skin incision, or more than 60 minutes before incision, reduces effectiveness.
- One dose is generally sufficient for prophylaxis, when required. Unless specified below, continued dosing will always require ID discussion and approval.
- A second prophylactic dose should be given intra-operatively if the procedure is longer than two half- lives of the agent used:
 - *Cefazolin, ceftiofloxacin, benzylpenicillin and piperacillin/tazobactam*: give a repeat dose after 3 hours.
 - *Gentamicin*: only a single dose per 24-hour period should be given. Use ideal body weight to calculate dose. Seek Infectious Diseases (ID) team/Pharmacy advice about re-dosing and therapeutic drug monitoring.
 - *Vancomycin*: only a single dose of 15 mg/kg (maximum 500mg) is sufficient to cover procedures up to 6 hours. If procedure is likely to continue for more than 6 hours, a second dose can be administered at 6 hours in patients with normal renal function. Seek ID team/Pharmacy advice on therapeutic drug monitoring. For patients with pre-existing renal impairment or undergoing renal transplant – see specific renal dosing recommendations included in this guideline.
 - *Teicoplanin*: only a single dose per 24-hour period should be given. Seek ID/Pharmacy advice about re-dosing.
 - *Lincomycin*: give a repeat dose after 8 hours.

Pre-existing infections (known or suspected) – if patients are on broad spectrum antibiotics, additional surgical antibiotic prophylaxis may not be necessary. Doses should be scheduled to allow for re-dosing just prior to skin incision.

Multi-drug resistance - Colonisation with known Multi-drug resistant organisms may need to be taken into consideration as an alternative regimen could be required. Seek ID advice.

Neonates - Prophylaxis regimens should be individualised by surgeons in consultation with the ID team. Refer to [CHQ Paediatric Antibiocard: Empirical Antibiotic Guidelines](#) or [Neofax](#) for neonatal antibiotic dosing advice.

Therapeutic drug monitoring: Seek pharmacist/ID advice on appropriate therapeutic drug monitoring (TDM) and appropriate dosing for patients in renal failure

- [Paediatric Tobramycin/Gentamicin Therapeutic drug monitoring](#)
- [Paediatric Vancomycin Therapeutic drug monitoring](#)

Peri-operative MRSA screening and Mupirocin nasal treatment for cardiac surgery patients

- Test should be offered to at-risk ethnic groups and patients with a personal or family history of boils/furuncles.
- Appropriate sterile swab should be used for swabbing anterior nares, one nostril followed by the other with same swab; prior to swabbing, the swab should be moistened in the transport medium within the tube or by using sterile saline.
- Request form (or ieMR Pathology order) should state 'nasal swab for MRSA screen'.
- Patients with MRSA grown from nasal swabs should receive antibiotic prophylaxis as detailed under "Multi-resistant organism – MRSA" for specific procedure.
- Patients with MRSA in nasal swabs are given peri-operative **Mupirocin 2% nasal ointment** as for all cardiac surgery patients, and will require contact precaution until cleared; they should wash daily with 2% **Chlorhexidine** solution or soap (see [CHQ procedure: Detection and Management of MRSA \(Methicillin resistant Staphylococcus aureus\)](#)).
 - The objective with mupirocin 2% nasal treatment is to eradicate *Staphylococcus aureus* nasal colonisation in cardiac surgery patients.
 - Nasal mupirocin applied twice daily should be commenced at least the day before surgery but ideally 2 days prior to surgery and continued for a total of 5 days for all cardiac surgery patients.
 - A parent information leaflet (see appendix A) and a prescription for nasal mupirocin 2% ointment should be given to parents at the pre-operative visit with instructions for application.
 - All patients will also receive one dose of nasal mupirocin 2% ointment at induction of surgery.

Table 1: Surgical Antibiotic Prophylaxis Guidelines

SURGERY	PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation
ENT (adenotonsillectomy/ grommet insertion prophylaxis not required)	Cefazolin IV 30 mg/kg before incision (Max 2 g if less than 119 kg; Max 3 g if more than 120 kg).	Substitute with Lincomycin IV 15 mg/kg (Max 600 mg) as a single dose infused over 60 minutes	For MRSA: Add Vancomycin IV 15 mg/kg (Max 500mg) slow IV infusion (maximum rate of 10 mg/minute)
Head/Neck/Thoracic Neurosurgery Orthopaedic Surgery	For Cochlear implantation: Cefazolin IV 30 mg/kg before incision (Max 2 g if less than 119 kg; Max 3 g if more than 120 kg). Continue Cefazolin IV 30 mg/kg/dose every 8 hours for total of 3 postoperative doses.	For cochlear implantation: Substitute with Lincomycin IV 15 mg/kg (Max 600 mg) as a single dose infused over 60 minutes.	For VRE: Add Teicoplanin IV 10 mg/kg (Max 400 mg) as an IV bolus over 5 minutes and contact ID for further advice. Note: Vancomycin not required if concurrently MRSA colonised
	For Laryngeal reconstruction: Cefazolin IV 30 mg/kg before incision (Max 2 g if less than 119 kg; Max 3 g if more than 120 kg). Continue Cefazolin IV 30 mg/kg/dose every 8 hours for total of 7 days.	For Laryngeal reconstruction: Substitute with Lincomycin IV 15 mg/kg (Max 600 mg) as a single dose infused over 60 minutes.	For Pseudomonas aeruginosa: Base antibiotic prophylaxis choice on sensitivities and seek ID advice
	For Cranial vault remodelling or Craniosynostosis surgery: Cefazolin IV 30 mg/kg before incision (Max 2 g if less than 119 kg; Max 3 g if more than 120 kg). Continue Cefazolin IV 30 mg/kg/dose every 8 hours for total of 48 hours.	For Cranial vault remodelling or Craniosynostosis surgery: Seek ID advice.	

SURGERY	PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation
<p>Most cardiac surgery If NOT on antibiotics with Gram negative and positive cover. Including valve replacement.</p>	<p>Eradication of <i>S. aureus</i> nasal colonisation in cardiac surgery patients: Apply Mupirocin 2% (Bactroban®) intranasally twice daily. Ideally start 2 days prior to surgery. Continue to a total of 5 days. (Parent/carer information leaflet – Appendix A)</p>		<p>For MRSA: Add Vancomycin IV 15 mg/kg (Max 500mg) as a slow IV infusion (maximum rate of 10 mg/minute).</p> <p>For VRE: Add Teicoplanin IV 10 mg/kg (Max 400 mg) as a single bolus dose over 5 minutes and contact ID for further advice. Note: Vancomycin not required if concurrently MRSA colonised</p> <p>For ESBL infection: Cefazolin IV PLUS Gentamicin IV</p>
	<p>Cefazolin IV 50 mg/kg (Max 2 g) at induction as loading dose, Intraoperative doses: 30 mg/kg/dose (Max 1 g) every 3 hours. Post-operative doses: 30 mg/kg/dose (Max 1 g) every 8 hours for a further 3 doses.</p>	<p>Substitute with Lincomycin IV 15 mg/kg (Max 600 mg) as a single dose infused over 60 minutes PLUS Gentamicin IV 5 mg/kg as a single dose infused over 30minutes (1 month to 10 years: Maximum 320 mg) (More than 10 years: Maximum 560 mg)</p>	
<p>If patient is already <u>on</u> antibiotics with Gram negative and positive cover – No further prophylaxis required for the following scenarios:</p> <ul style="list-style-type: none"> • Most cardiac surgery • Cannulation, reopen, decannulation whilst on ECMO • Chest opening, re-cannulation, exploration or closure 			
<p>If patient is <u>NOT</u> on antibiotics with Gram negative and positive cover and undergoing either:</p> <ul style="list-style-type: none"> • Cannulation, reopen, decannulation whilst on ECMO • Chest opening, re-cannulation, exploration or closure <p>Give antibiotic prophylaxis: Cefazolin IV 50 mg/kg (Max 2 g) at induction as loading dose, then give 30 mg/kg/dose (Max 1 g) every 8 hours for a further 3 doses then cease. Do not continue cefazolin beyond three post procedural doses.</p>			
<p>If patient is on ECMO or open chest <u>without</u> any of the above procedures - No ongoing prophylaxis required</p>			<p>For <i>Pseudomonas aeruginosa</i>: Base antibiotic prophylaxis choice on sensitivities and seek ID advice.</p>

SURGERY	PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation
<p>Abdominal Surgery (Including colorectal, appendicectomy, upper GIT or biliary including laparoscopic surgery)</p> <p>For Endoscopic or colonoscopic procedures: antibiotic prophylaxis not indicated</p> <p>For appendicitis, if antibiotics to continue for treatment, see CHQ-GDL-01202 Paediatric Antibiocard: Empirical Antibiotic Guidelines for recommendations</p>	<p>Cefoxitin IV 40 mg/kg (Max 2 g) as a single dose before incision.</p>	<p>Substitute with Metronidazole IV 7.5 mg/kg (Max 500 mg) as a single dose, infused over 20 minutes PLUS Gentamicin 5 mg/kg IV as a single dose, infused over 30 minutes (1 month to 10 years: Maximum 320 mg) (More than 10 years: Maximum 560 mg)</p>	<p>For MRSA: Add Vancomycin IV 15 mg/kg (Max 500 mg) as a slow IV infusion (maximum rate of 10 mg/minute).</p> <p>For VRE: Add Teicoplanin IV 10 mg/kg (Max 400 mg) as a single bolus dose over 5 minutes and contact ID for further advice Note: Vancomycin not required if concurrently MRSA colonised</p> <p>For Pseudomonas aeruginosa: Base antibiotic prophylaxis choice on sensitivities and seek ID advice</p>
	<p>For Kasai procedure and similar biliary reconstructive surgery: Continue Cefoxitin IV 40 mg/kg/dose (Max 2 g) every 8 hours until biliary drain is removed.</p>	<p>Substitute with Metronidazole IV 7.5 mg/kg/dose (Max 500 mg) slow IV infusion every 8 hourly PLUS Gentamicin 5 mg/kg IV once daily (infuse over 30 minutes) (1 month to 10 years: Maximum 320 mg) (More than 10 years: Maximum 560 mg), until biliary drain is removed.</p>	
	<p>For Gastro-intestinal anastomosis performed, without bowel prep: Continue Cefoxitin IV 40mg/kg/dose (Max 2 g) every 8 hours for total 3 postoperative doses. **Neonates – seek ID advice on appropriate antibiotic choice**</p>	<p>Substitute with Metronidazole 7.5mg/kg/dose (Max 500 mg) slow IV infusion every 8 hourly for total of 3 post operative doses PLUS Gentamicin 5mg/kg IV (infuse over 30 minutes) as a single dose (1 month to 10 years: Maximum 320 mg) (More than 10 years: Maximum 560 mg)</p>	

SURGERY	PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation
<p>Liver transplantation (For further information, see CHQ Paediatric Post-Liver Transplant Medication Management Guideline)</p>	<p>Piperacillin / Tazobactam IV 100 mg/kg/dose (Max 4 g Piperacillin component) as a single dose, infused over 30 minutes, before incision.</p> <p>A second dose to be given after 4 hours intra-operatively if surgery prolonged.</p> <p>Prophylaxis should be no greater than 24 hours, with a single dose sufficing in most cases.</p> <p>If abdomen left unsutured or chronic cholangitis present, continue Piperacillin/Tazobactam IV 100 mg/kg (Max 4 g Piperacillin component) every SIX hourly for 72 hours.</p> <p>For use in high risk patients per transplant surgeon (e.g. PELD score >22, Cholestasis, Second transplant, previous Kasai surgery) Liposomal Amphotericin (Ambisome®) IV 1 mg/kg (max 50 mg/day) once DAILY and continue for 5 days.</p>	<p>For delayed hypersensitivity (e.g. Rash) use: Meropenem IV 20 mg/kg/dose (Max 1 g) every EIGHT hourly intraoperatively</p> <p>For immediate hypersensitivity (e.g. anaphylaxis) use: Aztreonam IV 30 mg/kg/dose (Max 2 g) every SIX hourly intraoperatively PLUS Vancomycin IV 15 mg/kg/dose (Max 500 mg) every SIX hourly intraoperatively</p> <p>Prophylaxis should be no greater than 24 hours, with a single dose sufficing in most cases.</p>	<p>For MRSA: Add Vancomycin IV 15 mg/kg (Max 500 mg) as a slow IV infusion (maximum rate of 10 mg/minute).</p> <p>For VRE: Add Teicoplanin IV 10 mg/kg (Max 400 mg) as a single bolus dose over 5 minutes and contact ID for further advice Note: Vancomycin not required if concurrently MRSA colonised</p>

SURGERY	PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation
<p>Renal transplantation (For further information, see CHQ-PROC-01430 Kidney Transplant Admission – Pre-operative preparation and post-operative management)</p>	<p>Piperacillin / Tazobactam IV 100 mg/kg/dose (Max 4 g Piperacillin component) as a single dose, infused over 30 minutes, before incision.</p> <p>If surgery continues longer than 6 hours consider repeating the Piperacillin/Tazobactam dose.</p> <p>Prophylaxis should be no greater than 24 hours, with a single dose sufficing in most cases.</p>	<p>For delayed hypersensitivity (e.g. Rash) use: Meropenem IV 20 mg/kg/dose (Max 1 g)</p> <p>Repeat dose after 8 hours if surgery longer than 6 hours. Prophylaxis should be no greater than 24 hours, with a single dose sufficing in most cases.</p> <p>For immediate hypersensitivity (e.g. anaphylaxis) use: Aztreonam IV plus Vancomycin IV</p> <p>Dose recommendations: Aztreonam IV 30 mg/kg/dose (Max 2 g) Repeat dose after 8 hours if surgery longer than 6 hours. Prophylaxis should be no greater than 24 hours, with a single dose sufficing in most cases.</p> <p>Vancomycin IV 10 mg/kg (Max 500 mg) as a slow IV infusion (Maximum rate 10 mg/minute). For renal transplant, if renal consultant has advised to continue Vancomycin, check trough level after 24 hours. If trough level is less than 15 mg/L, and continuation recommended by the renal and ID consultant: Re-dose at 10 mg/kg (Max 500 mg) as a slow IV infusion (Max rate 10 mg/minute).</p>	<p>For MRSA: Add Vancomycin IV 10 mg/kg (Max 500 mg) as a slow IV infusion (Maximum rate 10 mg/minute).</p> <p>For renal transplant, if renal consultant has advised to continue Vancomycin, check trough level after 24 hours. If trough level is less than 15 mg/L, and continuation recommended by the renal and ID consultant: Re-dose at 10 mg/kg (Max 500 mg) as a slow IV infusion (Max rate 10 mg/minute).</p> <p>For VRE: Add Teicoplanin IV 10 mg/kg (Max 400 mg) as a single bolus dose over 5 minutes and contact ID for further advice Note: Vancomycin not required if concurrently MRSA colonised</p>

SURGERY	PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation
Percutaneous transhepatic cholangiogram (with or without stent placement) with expected incomplete drainage (e.g. PSC, hilar strictures) or recent ERCP (within 1 week)	Piperacillin / Tazobactam IV 100 mg/kg/dose (Max 4 g Piperacillin component) as a single dose, infused over 30 minutes, before incision.	Substitute with Gentamicin 5 mg/kg IV (infuse over 30 minutes) as a single dose (1 month to 10 years: Maximum 320 mg) (More than 10 years: Maximum 560 mg)	For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice
Interventional radiology (Percutaneous endoscopic gastrostomy (PEG) or jejunostomy (PEJ) or nephrostomy tube placement)	Cefazolin IV 30 mg/kg before incision (Max 2 g if less than 119 kg; Max 3 g if more than 120 kg).	Substitute with Gentamicin 5 mg/kg IV (infuse over 30 minutes) as a single dose (1 month to 10 years: Maximum 320 mg) (More than 10 years: Maximum 560 mg)	For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice
Tenckhoff peritoneal dialysis catheter insertion	Cefazolin IV 30 mg/kg before incision (Max 2 g if less than 119 kg; Max 3 g if more than 120 kg).	Seek ID advice	For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice
Urinary tract surgery Prophylaxis indicated only if suspected or confirmed abnormal urinary tract.	Nil if on-going oral prophylaxis, otherwise Gentamicin 5 mg/kg IV (infuse over 30 minutes) as a single dose (1 month to 10 years: Max 320 mg; More than 10 years: Max 560 mg) Adjust dose if renal impairment.		For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice
Micturating cystourethrogram (MCUG)	Trimethoprim/Sulfamethoxazole 4 mg/kg orally (160 mg Trimethoprim component) as a single dose prior to procedure/imaging. If patient is on existing antibiotic UTI prophylaxis, increase antibiotic to a therapeutic dose for a single dose prior to procedure/imaging.		
Hypospadias surgery	Cefazolin IV 30 mg/kg before incision (Max 2 g if less than 80 kg; Max 3 g if more than 120 kg). Then Oral Trimethoprim/sulfamethoxazole 2 mg/kg once daily (Maximum 80 mg Trimethoprim component) until IDC removed.	Substitute cefazolin with Gentamicin 5 mg/kg IV (infuse over 30 minutes) as a single dose (1 month to 10 years: Maximum 320 mg) (More than 10 years: Maximum 560 mg)	For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice

SURGERY	PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation
Amputations (ischaemic limbs and lower limbs)	Benzylpenicillin IV 60 mg/kg (Max 1.2 g) before incision, then every six hours for 3 further doses	Substitute with Lincomycin IV 15 mg/kg (Max 600 mg) as a single dose infused over 60 minutes	For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice
Burns Antibiotics may be given before surgical debridement if clinical evidence of infected burns	Antibiotics based on microbiological results where possible. <u>If no microbiology:</u> Flucloxacillin IV 50 mg/kg (Max 2 g) as a single dose before incision, OR <u>If dirt contaminated wound:</u> Piperacillin/Tazobactam IV 100 mg/kg/dose (Up to 4 g Piperacillin component) as a single dose before incision. Antibiotics should not be continued post procedure in absence of documented infection.	Substitute with Lincomycin IV 15 mg/kg (600 mg if more than 12 years old) as a single dose infused over 60 minutes <i>and</i> single dose of Metronidazole IV 12.5 mg/kg (Max 500 mg) as slow IV infusion over 20 minutes	For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice

Prevention of Endocarditis

Endocarditis in Children with Heart Defects

- Children at risk should establish and maintain the best possible oral health to reduce potential sources of bacteraemia which includes tooth brushing and regular dental review.
- Single dose antibiotic prophylaxis (refer to “Endocarditis” antibiotic prophylaxis – Table 2) is now only recommended for children with the highest risk of adverse outcome of infective endocarditis who are undergoing certain dental or other procedures (see Table 3 and 4).
- In certain individual circumstances, medical and dental practitioners may consider giving antibiotics to patients not covered by these revised guidelines including those who have received prophylaxis over their lifetime. Recommendations for individual patients should be discussed with the treating cardiologist.

Table 2: Endocarditis prophylaxis (for at risk conditions see Table 3 and 4)

ENDOCARDITIS PROPHYLAXIS	ALTERNATIVE (Immediate type or severe penicillin or cephalosporin hypersensitivity)	Multi resistant organism colonisation	Use in addition to usual antibiotic prophylaxis for the procedure unless the prophylaxis already contains penicillin (eg benzylpenicillin, piperacillin/tazobactam) For example, use oral amoxicillin and cefazolin IV
Oral amoxicillin 50 mg/kg (Max 2 g) 1 hour before the procedure OR IV Ampicillin 50 mg/kg (Max 2 g)	Substitute with Oral clindamycin 20 mg/kg (Max 600 mg) 1 hour before the procedure OR substitute with Lincomycin IV 15 mg/kg (Max 600 mg) as a single dose infused over 60 minutes	For MRSA, VRE or <i>Pseudomonas aeruginosa</i> colonisation, seek ID advice	

Table 3: Cardiac Conditions for which endocarditis prophylaxis with dental procedures is recommended (for antibiotic choice, refer to Endocarditis antibiotic prophylaxis section- Table 2)

- Prosthetic cardiac valve or prosthetic valve material used for cardiac valve repair
- Previous episode of infective endocarditis
- Congenital heart disease (CHD) but only if it involves:
 - Unrepaired cyanotic defects, including palliative shunts and conduits
 - Repaired congenital heart defect with prosthetic material or device (surgical or catheter intervention) during the first 6 months after the procedure
 - Repaired defects with residual defect at the site or adjacent to the side of a prosthetic patch or prosthetic device
- Cardiac Transplantation recipients who develop cardiac valvulopathy
- Rheumatic heart disease in indigenous Australians
- If recommended by the Queensland Paediatric Cardiology service Cardiologist in the most recent clinic review letter

Does the patient have any of the conditions listed in Table 3?

- If Yes, Antibiotic prophylaxis for endocarditis MAY BE required. See Table 4.
- If No, Antibiotic prophylaxis for endocarditis NOT required.

Table 4: Procedures where antibiotic prophylaxis for endocarditis may or may not be required (for antibiotic choice, refer to Endocarditis antibiotic prophylaxis section- Table 1)

Prophylaxis ALWAYS REQUIRED (Antibiotic prophylaxis with streptococcal and enterococcal cover required)	Prophylaxis SHOULD BE CONSIDERED (Antibiotic prophylaxis with streptococcal and enterococcal cover required)	Prophylaxis IS NOT REQUIRED
<p>DENTAL PROCEDURES: Extractions, periodontal procedures including surgery, subgingival scaling, and root planning, replanting avulsed teeth or other surgical procedures (e.g. implant placement, apicoectomy)</p> <p>RESPIRATORY/ ENT PROCEDURES: Any invasive procedure involving incision or biopsy of respiratory mucosa, for example:</p> <ul style="list-style-type: none"> • tonsillectomy/ adenoidectomy • rigid or flexible bronchoscopy with incision or biopsy • surgery involving bronchial, sinus, nasal or middle ear mucosa, including tympanostomy tube insertion <p>GENITOURINARY AND GASTROINTESTINAL PROCEDURES: Any procedure where antibiotic prophylaxis is indicated for surgical reasons:</p> <ul style="list-style-type: none"> • lithotripsy • any genitourinary procedure in the presence of a genitourinary infection unless already treating <i>Enterococci</i> (for elective cystoscopy or urinary tract manipulations, obtain a urine culture and treat any bacteriuria beforehand) • any gastrointestinal procedure in the presence of an intra-abdominal infection unless already treating <i>Enterococci</i> • sclerotherapy for oesophageal varices <p>OTHER PROCEDURES:</p> <ul style="list-style-type: none"> • Incision and drainage of local abscess: brain, boils and carbuncles, dacryocystitis, epidural, lung, orbital, perirectal, pyogenic liver, tooth, surgical procedures through infected skin. • Percutaneous endoscopic gastrostomy 	<p>DENTAL PROCEDURES: Consider prophylaxis for the following procedures if multiple procedures are being conducted, the procedure is prolonged, or periodontal disease is present:</p> <ul style="list-style-type: none"> • full periodontal probing for patients with periodontitis • intra-ligamentary and intraosseous local and anaesthetic injection • supragingival calculus • removal or cleaning • rubber dam placement with clamps (where risk of damaging gingiva) • restorative matrix band/strip placement • endodontics beyond the apical foramen • placement of orthodontic bands or interdental wedges • subgingival placement of retraction cords, antibiotic fibres or antibiotic strips 	<p>DENTAL PROCEDURES:</p> <ul style="list-style-type: none"> • oral examination • infiltration and block local anaesthetic injection • 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 • intraoral radiographs • supragingival plaque removal <p>RESPIRATORY PROCEDURES:</p> <ul style="list-style-type: none"> • endotracheal intubation • rigid or flexible bronchoscopy without incision or biopsy <p>GENITOURINARY AND GASTROINTESTINAL PROCEDURES:</p> <ul style="list-style-type: none"> • urethral catheterisation • vaginal delivery • transoesophageal echocardiography • endoscopy (with or without gastrointestinal) • biopsy including colonoscopy)

Consultation

Key stakeholders who reviewed this version:

- Pharmacist Advanced - Antimicrobial Stewardship Pharmacist (CHQ)
- Director of IMPS, immunology and rheumatology (CHQ)
- Surgeon
- Paediatric Surgical JHO

Key stakeholders who reviewed the previous version:

- Director of IMPS, immunology and rheumatology (CHQ)
- Infection specialists, IMPS (CHQ)
- Chief of Surgery (CHQ)
- Director – Paediatric Intensive care Medicine (CHQ)
- Deputy Director - Paediatric Intensive care Medicine (CHQ)
- Director- Anaesthetics (CHQ)
- Deputy Director – Anaesthetics (CHQ)
- Senior Staff Specialist Paediatric Surgeon (CHQ)
- Anaesthetist (CHQ)
- Consultant Cardiac Surgeon (CHQ)
- Pharmacist Advanced - Antimicrobial Stewardship Pharmacist (CHQ)
- Clinical Pharmacist Team Leader – Critical care (QCH)
- Senior Clinical Pharmacist – Critical care (QCH)

Definitions

- **IgE-mediated (allergic) immediate hypersensitivity** is characterised by the development of urticaria, angioedema, bronchospasm or anaphylaxis (with objectively demonstrated hypotension, hypoxia or elevated mast-cell tryptase concentration) within 1 to 2 hours of exposure to a drug. Anaphylaxis is more likely with parenteral rather than oral administration. For penicillin, anaphylaxis occurs at an estimated frequency of 1 to 4 cases per 10 000 courses, with up to 10% of these reactions being fatal. A clear history of an IgE-mediated reaction means the drug should not be administered again without appropriate precautions (eg desensitisation).
- **IgE-independent (non-allergic) immediate hypersensitivity** refers to any acute or immediate reaction that does not involve an IgE-mediated mechanism, usually caused by direct mast-cell degranulation (e.g. vancomycin infusion-related reactions such as 'red-man' syndrome). The reaction may be ameliorated by prophylactic antihistamines and slowing the infusion rate.
- **Delayed-type (nonimmediate) hypersensitivity reactions** are characterised by macular, papular or morbilliform rash, occurring several days after starting treatment. They are more common than immediate reactions, and may be caused by the infection or its treatment. Such reactions are usually T-cell (not IgE) mediated. Delayed-type reactions commonly occur in patients with intercurrent infection, and such

reactions may not be reproducible upon a supervised challenge when the patient is well. Delayed rash due to penicillins, especially amoxy/ampicillin, is not strongly predictive of a future reaction, and repeat exposure to beta lactams is not necessarily contraindicated.

Three kinds of delayed-type reaction warrant special mention:

- **Serum sickness** — characterised by vasculitic rash, arthralgia/arthritis, influenza-like symptoms, and sometimes fever and proteinuria. Serum sickness is triggered more commonly with cefaclor than other cephalosporins, and also by sulfonamides, and commences several days after starting treatment drug rash with eosinophilia and systemic symptoms (DRESS)—characterised by peripheral blood eosinophilia, desquamative dermatitis and liver dysfunction.
- **Stevens–Johnson syndrome / toxic epidermal necrolysis (SJS/TEN)** — a very rare, acute and potentially fatal skin reaction characterised by sheet-like skin and mucosal loss.
- **DRESS** and **SJS/TEN** are contraindications to further drug exposure (including desensitisation) because this can be fatal. Patients with a known severe hypersensitivity should be strongly advised to wear an alert bracelet or necklace.

References and suggested reading

1. Therapeutic Guidelines: Antibiotic 2019 Therapeutic Guidelines Ltd. Melbourne
2. Bratzler DW et al. Clinical Practice guidelines for antimicrobial prophylaxis in surgery. *AJHSP*. 2013; 70:195-283
3. Taketomo CK eds. Pediatric and Neonatal Dosage handbook International (25th edition) Lexi-comp. 2018-2019
4. BNF for Children 2019-2020. BMJ Group, London, UK.
5. South Australian expert Advisory Group on Antibiotic Resistance (SAAGAR). [Clinical Guideline- Surgical Antibiotic Prophylaxis Guideline – Prevention of Endocarditis or Infection of Prosthetic Implants or Grafts. Objective file number: 2011-10137](#). Accessed online on 24/04/2020
6. Wilson W, Taubert KA, Gewitz M, Lockhart PB, et al. Prevention of Infective Endocarditis. Guidelines From the American Heart Association. A Guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation* 2007; 116:1736
7. Moussa Y et al. De-labeling of β -lactam allergy reduces intraoperative time and optimizes choice in antibiotic prophylaxis. *Surgery* 164 (2018) 117–123
8. Trubiano JA et al. The 3 Cs of Antibiotic Allergy—Classification, Cross-Reactivity, and Collaboration. *J Allergy Clinical Immunology Practice*. 2019; 5 (6): 1532 - 1542

Guideline revision and approval history

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4.0	Infectious Diseases Consultants- Antimicrobial Stewardship (Infection Management and Prevention Service (IMPS) and Antimicrobial Stewardship Pharmacist (CHQ)	Medicines Advisory Committee (CHQ) Infectious Diseases Consultant team and Medical Lead - Antimicrobial Stewardship (Infection Management and Prevention Service)	Executive Director of Hospital Services
5.0 06/03/2017	Infectious Diseases Consultants- Antimicrobial Stewardship (IMPS), Anaesthetists, Cardiologist and Antimicrobial Stewardship Pharmacist (CHQ)	Medicines Advisory Committee (CHQ) Infectious Diseases Consultant team and Medical Lead - Antimicrobial Stewardship (Infection Management and Prevention Service)	Executive Director of Hospital Services
6.0 16/05/2019	Director – IMPS, Immunology and Rheumatology Pharmacist Advanced- Antimicrobial Stewardship Pharmacist (CHQ)	Medicines Advisory Committee (CHQ)	Executive Director of Clinical Services
7.0 27/05/2020	Infection Management specialist Director – Cardiology Chief of Surgery Paediatric Surgeon Pharmacist Advanced- Antimicrobial Stewardship Pharmacist (CHQ)	Medicines Advisory Committee (CHQ)	Executive Director of Clinical Services
7.1 14/07/2020	Infection Management specialist Director – Cardiology Chief of Surgery Paediatric Surgeon Pharmacist Advanced- Antimicrobial Stewardship Pharmacist (CHQ)	Medicines Advisory Committee (CHQ)	Executive Director of Clinical Services QCH
8.0 11/12/2020	Pharmacist Advanced- Antimicrobial Stewardship Pharmacist (CHQ)	Medicines Advisory Committee (CHQ)	Executive Director of Clinical Services QCH
8.1 26/05/2021	Poster development and review: Infection Management specialist Paediatric Surgeon Pharmacist Advanced- Antimicrobial Stewardship Pharmacist (CHQ)	Director, Infection Management and Prevention Service	Divisional Director Medicine

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Accreditation references	NSQHS Standards (1-8): 3 Preventing and Controlling Healthcare-Associated Infection, 4 Medication Safety ISO 9001:2015 Quality Management Systems: (4-10)

Appendix A

MUPIROCIN 2% (Bactroban®) NASAL OINTMENT **TO PREVENT SURGICAL SITE INFECTION**

Information for Paediatric Cardiac Surgery patients and families

What causes infection at the site of recent heart surgery?

- *Staphylococcus aureus* is a bacterium often carried by healthy people on the skin and in the nose.
- This bacterium may not cause any problems but in some cases it can be responsible for infection at the site of recent surgery. Following heart surgery, infection can occur in the skin at the surgical site and may involve deeper structures such as bone.

What can help to prevent surgical site infection?

- Treatment with mupirocin 2% nasal ointment (Bactroban®) clears *Staphylococcus aureus* from the nose and will help to prevent surgical site infection.
- A small amount of the ointment, placed on the end of a finger, is put into each nostril twice a day beginning 24 to 48 hours before surgery and continuing for a total of 5 days. Hands should be washed before and after applying the ointment.

It is important to remember to apply the ointment at home twice a day for the 2 days before surgery.

Are there any side effects from using mupirocin treatment?

- There are no significant side effects associated with this treatment.

If you have any questions, please do not hesitate to contact your child's treating Doctor or Infection Control staff at the Queensland Children's Hospital via the hospital switchboard (07) 3068 1111.