

Surgical Antibiotic Prophylaxis (SAP)
Cardiac Intensive Care Unit (CICU)

Background

Surgical antibiotic prophylaxis (SAP) is recommended to decrease the incidence of major infections post cardiac surgery. Major infections (surgical site infection (SSIs), sepsis, pneumonia) which occur in 5% of the total cardio-surgical population, are associated with increased mortality rates, prolonged hospitalisation and increased health-care cost. The majority of pathogens isolated from patients with SSIs post cardiac surgery are Gram-positive bacteria ^{1,7}.

Beta-lactam antibiotics exhibit time dependent bacterial kill. Maintaining beta-lactam levels above the minimum inhibitory concentration (MIC) for a percentage of the dosing interval (50% for penicillins) will ensure near maximal bactericidal effect ². Improved outcomes have been demonstrated in critically ill patients when beta-lactams are administered as a continuous infusion, rather than the conventional bolus or 30 minute infusion, producing a drug concentration in excess of the MIC for a longer period of time ^{1,3,4,5,6}. The recommended optimal length of SAP with beta-lactam antibiotics undergoing cardiac surgery is 24h (should not exceed 48h) ¹.

To ensure an effective antibiotic concentration throughout surgery, flucloxacillin or cefuroxime should be given as an initial bolus, 30 minutes before skin incision, followed immediately by a continuous infusion until the end of surgery. An adequate loading dose of teicoplanin and gentamicin should be determined according to patient weight.

Risk of postoperative acute kidney injury

For patients with pre-existing renal impairment (eGFR<60mL/min), or who have additional risk factors for developing AKI, consider using cefuroxime instead of flucloxacillin + gentamicin.

Body Weight

Use actual body weight for weight-based dosing. If elevated BMI (≥30), use adjusted body weight (ABW) to calculate gentamicin dose ⁸.

Choose one of the three regimens according to MRSA status, renal function and penicillin allergy

Flucloxacillin (bolus & infusion) + Gentamicin (bolus) - no history of penicillin allergy. <u>MAX 12G/24HOURS</u>				
Normal renal function (eGFR>60mL/min). MRSA negative				
		Dose	Reconstitution and dilution ¹²	Infusion Rate
Flucloxacillin	Loading Dose	2000mg as slow IV bolus over at least 8 minutes	Reconstitute each 1g vial with 10mL of sodium chloride 0.9%	
	Intra-op continuous infusion	500mg/hour for duration of surgery	Reconstitute each 1g vial (total 3g) with 20mL sodium chloride 0.9% Final volume= 60mL (50mg/mL)	10mL per hour
	Post-op continuous infusion (2x12hour infusions)	6g/24hours - 3g in 60mL	Reconstitute each 1g vial (total 3g) with 20mL sodium chloride 0.9% Final volume= 60mL (50mg/mL)	5mL per hour (over 12hours)
Gentamicin		Single dose 5mg/kg (max dose 480mg)	Can be given undiluted, or diluted to a convenient volume with sodium chloride 0.9% to aid slow administration	

Written by: Elaine McDonald (Pharmacist), Anna Gesicka (CICU Clinical Sister) & Dr Robert Kong (Consultant Cardiac Anaesthetist) May 2022

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[†] Medusa recommends reconstitution with water for injection however sodium chloride 0.9% used in clinical practice and appropriate

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Cefuroxime (bolus & infusion) ¹¹ - possible or probable penicillin allergy (not severe) ⁹				
Moderate or severe renal impairment or additional risk factors for developing AKI. MRSA negative				
		Dose	Reconstitution and dilution ¹²	Infusion Rate
Cefuroxime	Loading Dose	1500mg	Reconstitute each 1.5g vial with 15mL sodium chloride 0.9% [†] . Should be given by IV infusion only. Dilute to 50mL sodium chloride and give over 30 minutes	
	Intra-op continuous infusion	200mg/hour	Reconstitute each 1.5g vial (total 3g) with 30mL sodium chloride 0.9% [†] Final volume= 60mL (50mg/mL)	4mL per hour
	Post-op continuous infusion	3g/24hours	Reconstitute each 1.5g vial (total 3g) with 30mL sodium chloride 0.9% Final volume= 60mL (50mg/mL)	2.5mL per hour (over 24hours)

Teicoplanin (bolus) + Gentamicin (bolus)- severe penicillin allergy (anaphylaxis, Stevens-Johnson syndrome)				
Normal renal function (eGFR>60mL/min). MRSA positive (or risk of MRSA)				
		Dose	Reconstitution and dilution ¹²	Infusion Rate
Teicoplanin		Single dose 12mg/kg (1200mg max)	Reconstitute each vial with 1 ampoule of water for injection (provided in teicoplanin box) and give slowly over 3-5 minutes	
	Post-op	Give a 2nd dose (800mg) 12h after initial dose; 3rd +/- 4th dose (800mg) at 12h intervals to cover 24hrs after the end of surgery	Reconstitute each vial with 1 ampoule of water for injection (provided in teicoplanin box) and give slowly over 3-5 minutes	
Gentamicin		Single dose 5mg/kg (max dose 480mg)	Can be given undiluted, or diluted to a convenient volume with sodium chloride 0.9% to aid slow administration	

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