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

Antibiotic Expert Group. Therapeutic Guidelines: Antibiotic, Version 16. Melbourne: Therapeutic Guidelines Limited; 2019

Baddour, LM et al. (2010). "AHA Scientific Statement: Update on Cardiovascular Implantable Electronic Device Infections and Their Management." Circulation. 121:458-477.

Bratzler, D., E. P. Dellinger, K. M. Olsen, T. M. Perl, P. G. Auwaerter, M. K. Bolon, et al (2013). "Clinical practice guidelines for antimicrobial prophylaxis in surgery." Am J Health Syst Pharm 70: 195-283.

Darouiche, R., Mosier, M, Voigt, J. (2012). "Antibiotics and antiseptics to prevent infection in cardiac rhythm management device implantation surgery". Pacing Clin Electrophysiol 35: 1348-60.

Karchmer, AW (2020). "Infections involving cardiac implantable electronic devices: Treatment and prevention".In: Calderwood, SB., and Ganz, LI (Eds), UpToDate, Waltham, MA. [www.uptodate.com]. Accessed February 2021

Korantzopoulos, P., Sideris, S, Dilaveris, P, Gatzoulis, K, Goudevenos, JA. (2016). "Infection control in implantation of cardiac implantable electronic devices: current evidence, controversial points, and unresolved issues". Europace 18: 473-8.

European Heart Rhythm Association (EHRA) international consensus document on how to prevent, diagnose, and treat cardiac implantable electronic device infections— endorsed by the Heart Rhythm Society (HRS), the Asia Pacific Heart Rhythm Society (APHRS), the Latin American Heart Rhythm Society (LAHRS), International Society for Cardiovascular Infectious Diseases (ISCVID), and the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS).Consensus Document. (2020).European Heart Journal 41:2012-2032

Khalighi K, Aung TT, Elmi F. The role of prophylaxis topical antibiotics in cardiac device implantation. Pacing Clin Electrophysiol 2014;37(3):304–11

Tarakji KG, Mittal S, Kennergren C (2019) Antibacterial envelope to prevent cardiac implantable device infection. N Engl J Med;380:1895–1905.

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