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		

References

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