Guidelines for antibiotic prophylaxis at the time of hip and knee arthroplasty

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Introduction

Hip and knee arthroplasty continues to be amongst the most successful medical interventions for improving quality of life. However, these interventions are a balance of benefit and exposure to risk. Prosthetic joint infection (PJI) is a significant complication which can occur following this procedure. It can be devastating to the patient as it impedes recovery, may be painful and may require several operations in an attempt to overcome it. It is a huge burden to patients and costly in health care resources. One aspect in reducing the risk of a PJI is to ensure the patient is given effective, evidenced based antibiotic prophylaxis at the time of the initial surgery.

The Arthroplasty Society of Australia considers literature, registry data, the Therapeutic Guidelines, recommendations by the AAOS, ACCP, RACS and other learned organisations to formulate these guidelines. They are based on evidence and evaluation by practising arthroplasty surgeons in Australia.

Clinical considerations in antibiotic selection

The prophylactic antibiotic regimen should be directed against the organisms most likely to cause postoperative infection. Consideration should be given to patient risk factors such as pre-existing infection, the potential for colonisation with antibiotic-resistant organisms and recent antimicrobial use. Local knowledge of the organisms causing infection within the institution and patterns of antibiotic susceptibility may influence the selection.

Routine prophylaxis for primary hip or knee replacement

A first-generation cephalosporin is the preferred drug for the majority of procedures.

Use Cefazolin 2g IV for all patients, irrespective of weight.

Vancomycin should **NOT** routinely be used for surgical prophylaxis except for patients with immediate hypersensitivity (eg anaphylaxis) to penicillin (where it **replaces** the cephalosporin) or with an increased risk of postoperative infection with methicillin-resistant Staphylococcus aureus

(MRSA) (where it is **added to** the cephalosporin). This includes patients known to be infected or colonised pre-operatively with MRSA, or with a history of infection or colonisation with MRSA.

Teicoplanin may also be considered as an alternative to Vancomycin (10-15 mg/kg to a maximum of 800mg).

Some use Clindamycin in patients with immediate hypersensitivity to penicillin but this may not be adequate due to the increasing incidence of resistance in MRSA and methicillin-resistant Staphylococcus epidermidis (MRSE).

Patients with VRE should be discussed with the local ID team. There seems little or no evidence to support a change to routine antibiotic prophylaxis for a patient with incidental vancomycin-resistant enterococcus (VRE) colonisation. A delay in elective surgery may allow for natural VRE decolonisation.

Timing

Aim to achieve effective plasma and tissue concentrations at the time of incision and for the duration of the surgical procedure, when the risk of bacterial contamination is maximal.

The optimal timing for the majority of preoperative IV antibiotic administration is within 60 minutes.

When Vancomycin is used the dose is 1g or 1.5g in patients over 80 kg. It should be infused at a rate not exceeding 10 mg/min (e.g. 100 minutes for a 1g dose, or 150 minutes for a 1.5g dose), starting 30 to 120 minutes before surgical incision to ensure adequate blood and tissue concentrations at the time of incision and allowing any infusion-related toxicity to be recognised before induction. The infusion can be completed after surgical incision.

Duration

A single preoperative dose of antibiotic is sufficient to achieve effective antibiotic concentrations in blood and tissue at the time of incision and for the duration of the procedure, for most procedures.

A second intra-operative dose of Cefazolin should be added if the operation takes over 4 hours or there is excessive blood loss during the procedure.

Although Therapeutic Guidelines states that postoperative doses for up to 24 hours are not required as a routine, most arthroplasty surgeons in Australia still use post-operative doses 8 hourly for 2 doses of 1 or 2g of Cefazolin. Further large-scale studies are required in this area.

Continuing prophylactic antibiotics until residual surgical drains or intravascular or urinary catheters are removed is not supported by current evidence. They provide no extra benefit and increase the risk of adverse outcomes such as subsequent infections with resistant pathogens and *Clostridium difficile*.

Revision surgery

Consideration should be given to adding Vancomycin, as above, to Cefazolin for early revision surgery but evidence for its addition in late revisions is lacking. If infection is suspected, antibiotics may be delayed until several (5 or 6) deep fresh tissue samples have been taken for bacteriology, although there is no clear consensus on this. Antibiotics may be continued post-op until the results of cultures are known.

Obesity

Consider increasing the dose of Cefazolin to 3g in patients over 120kg.

Non-antibiotic measures

Minimising the risk for surgical site infection requires a comprehensive approach to patient management, including optimal peri-operative medical management such as glycaemic control in patients with diabetes and good surgical technique.

Smoking cessation for 4 weeks preoperatively has been shown to reduce post-surgical infection by 20-40%.

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