Title: Post-Operative and Pre-Operative IV Antibiotic Use: Guidelines for Use

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Research question:

1. What are the guidelines for the use of IV antibiotics to prevent infection pre-operatively and post-operatively?

2. What are the guidelines for duration of use of IV antibiotics to prevent infection pre-operatively and post-operatively?

Methods:

A limited literature search was conducted on key health technology assessment resources, including PubMed, the Cochrane Library (Issue 1, 2008), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, EuroScan, international HTA agencies, and a focused Internet search. Results include articles published between 2003 and March 2008, and are limited to English language publications only. Filters were applied to limit the retrieval to health technology assessment, systematic reviews, and guideline studies. Internet links are provided, where available.

The summary of findings was generated from the information contained within the abstracts or the summaries of the relevant information.

Results:

HTIS reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews and meta-analyses are presented first. These are followed by evidence-based guidelines.

Five systematic reviews and three evidence-based guidelines were identified regarding the guidelines for the pre- and post-operative use and duration of IV antibiotics to prevent infection. No relevant health technology assessments were identified in the literature search. Additional information, including specific surgical guidelines and randomized controlled trials (RCTs), is included in the Appendix.
Overall summary of findings:

The five systematic reviews identified evaluated the use of antibiotic prophylaxis for the prevention of infections in various surgical indications.

To assess the effectiveness of prophylactic antibiotics to reduce infection rates in hernia repair, a systematic review and meta-analysis of RCTs was conducted. The meta-analysis showed an overall infection rate of 2.9% in the prophylaxis group and 3.9% in the control group (OR 0.64, 95% CI: 0.48-0.85). The authors concluded that antibiotic prophylaxis could neither be universally recommended nor discounted. There was no indication of whether antibiotics were administered pre- or post-operatively.

Cunningham et al. evaluated the use of antibiotic prophylaxis to prevent surgical site infection after breast cancer surgery. The pooling of data from RCTs showed that in patients undergoing breast cancer surgery without reconstruction, pre-operative antibiotics significantly reduced the incidence of surgical site infection (pooled RR 0.66, 95% CI: 0.48 - 0.89). Due to the potential morbidity of infection in these patients, the authors suggested that morbidity be balanced against factors such as the cost of treatment and increased bacterial resistance.

Two systematic reviews (for different indications) found systemic prophylactic antibiotics to be beneficial to reduce infection risk. However, Ratilal and colleagues remained uncertain as to the benefit of the use of antibiotics for more than 24 hours following the surgical introduction of intracranial shunts, and Stewart et al. concluded that antibiotic prophylaxis for longer than 24 hours following arterial reconstruction surgery had no added benefit (RR 1.28, 95% CI: 0.82 - 1.98).

After a meta-analysis to identify the most effective regimen for antibiotic prophylaxis following hip fracture surgery, Southwell-Keely et al. found that antibiotic prophylaxis is effective for wound infections (deep and superficial). Their analysis showed no difference between a single dose or multiple doses of intravenous antibiotics. There was no indication whether the administration of the antibiotics was pre-or post-operative.

A best practice statement on urologic surgery antimicrobial prophylaxis concluded that the benefit of antimicrobial prophylaxis is determined by patient factors, procedural factors, and the potential morbidity of infection. Antimicrobial prophylaxis is therefore recommended when the potential benefit outweighs the risks (risks of adverse events and bacterial resistance) and potential costs. The statement suggested the duration of prophylaxis should extend through the period when bacterial infection is likely to occur; beginning within 60 minutes of the surgical incision (with the exception of intravenous fluoroquinolones and vancomycin which should begin within 120 minutes), and should generally last no longer than 24 hours.

The American Heart Association’s (AHA) revised guidelines for the prevention of infective endocarditis (IE) no longer recommends that prophylaxis be based solely on an increased lifetime risk of acquisition of infective endocarditis. They were unable to find published data that demonstrated that prophylactic antibiotics prevent IE associated with bacteremia from an invasive procedure. If antibiotic prophylaxis is deemed necessary, the AHA recommended that antibiotics be administered as a single dose before a procedure and should only be administered following a procedure if the pre-operative dose has been inadvertently missed.

The Society of Thoracic Surgeons Workforce on Evidence Based Surgery guideline for antibiotic prophylaxis in cardiac surgery stated that there is evidence that prophylactic treatment with
antibiotics for 48 hours after cardiac surgery is effective. There is some evidence that 24 hours of treatment may be sufficient, but that additional studies are needed to conclude that a 24 hour treatment duration is as effective as 48 hours. The guideline also stated that patients undergoing cardiac surgery should not continue antibiotic prophylaxis longer than 48 hours post-operatively.

Two systematic reviews concluded that prophylaxis is likely unnecessary for longer than 24 hours, another showed no difference between one dose and multiple doses. The best practice statement for urological surgery also suggests an antibiotic prophylactic period of 24 hours or less. The guideline for antimicrobial prophylaxis following cardiac surgery, however, found insufficient evidence to recommend a 24 hour regimen. As well, one systematic review could neither recommend nor discourage the universal use of antibiotic prophylaxis. Another systematic review showed a significant reduction in surgical site infections following antibiotic use. Overall, guidance for the pre- and post-operative administration of intravenous antibiotics to prevent infection varies depending on the surgical indication. Additional guidelines, recommendations, and advisory statements that briefly discuss the use of antibiotic prophylaxis in specific surgical indications can be found in the Appendix.
References summarized:

Health technology assessments
None identified

Systematic reviews and meta-analyses


Guidelines and recommendations


Appendix – Further information:

Randomized controlled trials


Observational studies


Other surgical guidelines

See Use of Peri-operative Antibiotics at the Time of Surgical Abortion


See section on Periprocedural antibiotics


Grade A evidence presented. See section entitled Surgical Techniques for CS


See section on Management of Sepsis


See Item 9


See section IV G


See section IV H

Advisory statements


Protocols

32. Marjoribanks J, Jordan V, Calis K. Antibiotic prophylaxis for elective hysterectomy [protocol for a Cochrane review]. In: *Cochrane Database of Systematic Reviews 2004*


Additional references