

Guidelines for the use of antibiotics in surgical Prophylaxis

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Antibiotics for surgical prophylaxis

- Surgical antibiotic prophylaxis is defined as the use of antibiotics to prevent infections at the surgical site.
- Prophylaxis has become the standard of care for contaminated and clean-contaminated surgery and for surgery involving insertion of artificial devices.
- The antibiotic selected should only cover the likely pathogens. It should be given at the correct time
- A single dose of antibiotic is usually sufficient if the duration of surgery is four hours or less
- Inappropriate use of antibiotics for surgical prophylaxis increases both cost and the selective pressure favouring the emergence of resistant bacteria.

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Principles of surgical antibiotic prophylaxis

- Decide if prophylaxis is appropriate
- Determine the bacterial flora most likely to cause postoperative infection (not every species needs to be covered)
- Choose an antibiotic, based on the steps above, with the narrowest antibacterial spectrum required
- Choose the less expensive drug if two drugs are otherwise of equal antibacterial spectrum, efficacy, toxicity, and ease of administration
- Administer dose at the right time
- Administer antibiotics for a short period (one dose if surgery of four hours duration or less)
- Avoid antibiotics likely to be of use in the treatment of serious sepsis
- Do not use antibiotic prophylaxis to overcome poor surgical technique
- Review antibiotic prophylaxis protocols regularly as both cost and hospital antibiotic resistance patterns may change

Indications for surgical antibiotic prophylaxis

- A classification system which ranks procedures according to their potential risk for infectious complications has greatly facilitated the study of surgical antibiotic prophylaxis. This system ranks procedures as:
 - clean
 - clean-contaminated
 - contaminated.
- This has become a widely accepted standard.
- Widely accepted indications for antibiotic prophylaxis are contaminated and clean-contaminated surgery and operations involving the insertion of an artificial device or prosthetic material. Less well-accepted indications for prophylaxis include clean operations in patients with impaired host defences or patients in whom the consequences of infection may be catastrophic, for example neurosurgery, open heart surgery and ophthalmic surgery.

Table 1

Classification of surgical procedures according to infection risk⁶

Type of surgery	Definition	Examples	Indication for surgical antibiotic prophylaxis
Clean surgery	Healthy skin incised Mucosa of respiratory, alimentary, genitourinary tract and oropharyngeal cavity not traversed	Hemiorrhaphy, mastectomy, cosmetic surgery	Not recommended
	Insertion of prosthesis or artificial device	Hip replacement, heart valve	Recommended
Clean-contaminated	Respiratory, alimentary or genitourinary tract is penetrated under controlled conditions without unusual contamination	Laryngectomy, uncomplicated appendicectomy, cholecystectomy, transurethral resection of prostate gland	Recommended
Contaminated	Macroscopic soiling of operative field	Large bowel resection, biliary or genitourinary tract surgery with infected bile or urine	Strongly recommended

Choice of antibiotic

- The choice of the antibiotic for prophylaxis is based on several factors.
- Always ask the patient about a prior history of antibiotic allergy, as beta-lactams are the commonest type of antibiotics used in prophylaxis.
- A history of severe penicillin allergy (anaphylaxis, angioedema) means that cephalosporins are also contraindicated, as there is a small but significant risk of cross-reaction.

- It is important to select an antibiotic with the narrowest antibacterial spectrum required, to reduce the emergence of multi-resistant pathogens and also because broad spectrum antibiotics may be required later if the patient develops serious sepsis.
- The use of 'third generation' cephalosporins such as ceftriaxone and cefotaxime should therefore be avoided in surgical prophylaxis.
- Often several antibiotics are equal in terms of antibacterial spectrum, efficacy, toxicity, and ease of administration. If so, the least expensive drug should be chosen, as antibiotics for surgical prophylaxis comprise a large portion of hospital pharmacy budgets.

- Commonly used surgical prophylactic antibiotics include:
- intravenous 'first generation' cephalosporins - cephazolin or cephalothin
- intravenous gentamicin
- intravenous or rectal metronidazole (if anaerobic infection is likely)
- oral tinidazole (if anaerobic infection is likely)
- intravenous flucloxacillin (if methicillin-susceptible staphylococcal infection is likely)
- intravenous vancomycin (if methicillin-resistant staphylococcal infection is likely).[7](#)

Table 2

Commonest postoperative infective pathogen by type of surgery

Type of surgery	Commonest postoperative pathogens	Suitable antibiotic choice
Insertion of prosthetic heart valves Insertion of prosthetic joints	Staphylococci	Intravenous cephalothin or intravenous cephalazolin
Instrumentation of the lower urinary tract	Enteric Gram-negative bacteria, enterococci	Intravenous gentamicin
Colorectal surgery	Enteric Gram-negative bacteria, enterococci anaerobes	Intravenous metronidazole plus either intravenous cephalothin or intravenous cephalazolin or intravenous gentamicin
Upper respiratory tract surgery	Aerobic and microaerophilic streptococci, anaerobes	Intravenous cephalothin or intravenous cephalazolin

Route and timing of antibiotic administration

- Oral or rectal antibiotics need to be given earlier to ensure adequate tissue concentrations during surgery.
- Metronidazole suppositories are commonly used in bowel surgery and must be given 2-4 hours before it begins.
- Topical antibiotics are not recommended, with the exceptions of ophthalmic or burns surgery.
- Prophylactic antibiotics are usually given intravenously as a bolus on induction of anaesthesia to ensure adequate tissue concentrations at the time of surgical incision.
- Intramuscular antibiotics are less commonly used than intravenous antibiotics. They are typically given at the time of pre-medication so that peak tissue levels are attained at the most critical time, the time of surgical incision.

Thank You

So Much