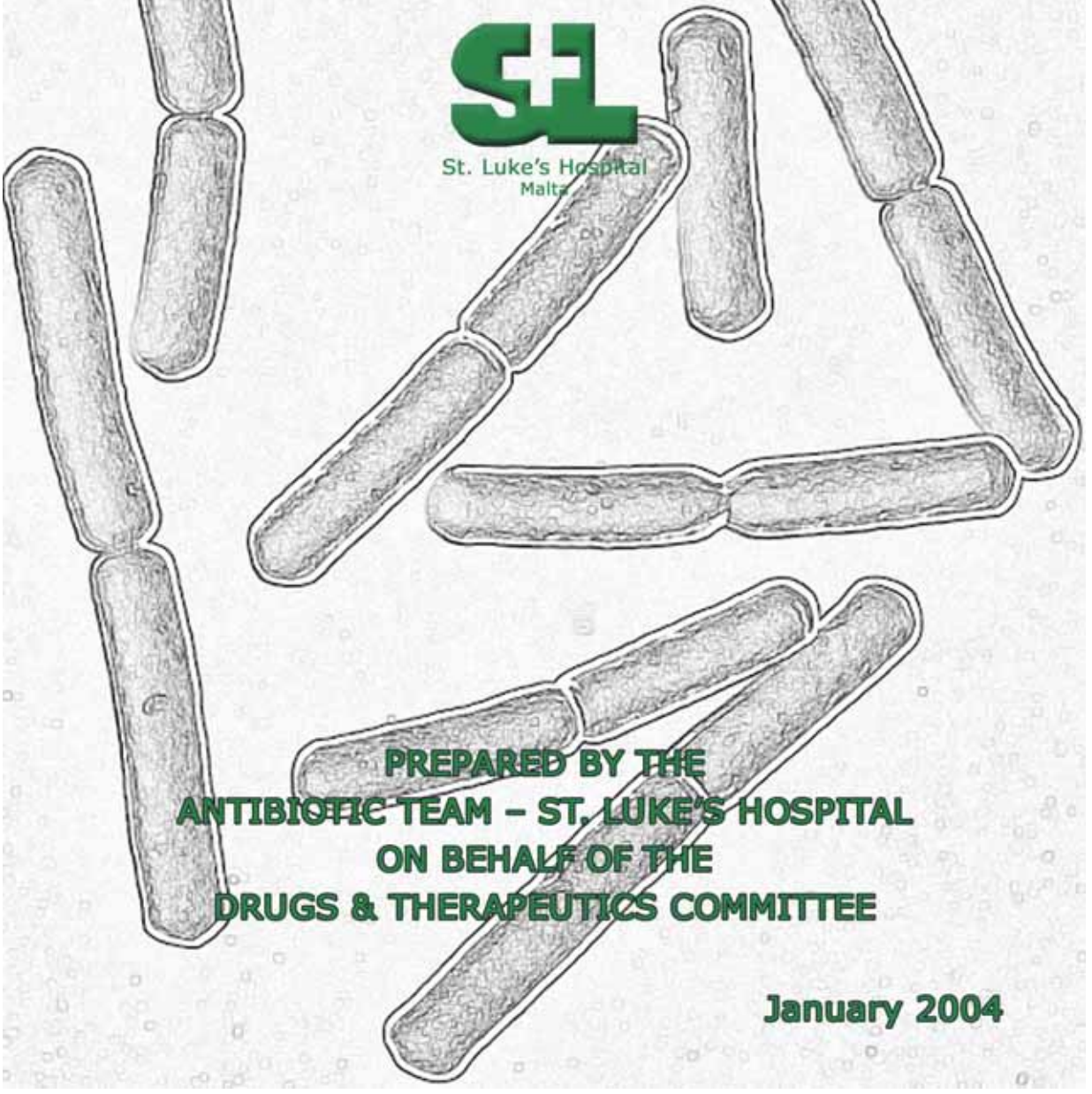
PRESCRIBING GUIDELINES FOR ANTIMICROBIAL PROPHYLAXIS IN SURGERY



St. Luke's Hospital
Malta

PREPARED BY THE
ANTIBIOTIC TEAM – ST. LUKE'S HOSPITAL
ON BEHALF OF THE
DRUGS & THERAPEUTICS COMMITTEE

January 2004

Introduction

Wound infections are a major source of infectious morbidity in the surgical patient. The use of perioperative antibiotics has become an essential component of the standard care in many surgical procedures and has resulted in a reduced risk of postoperative infection when sound and appropriate principles of prophylaxis are applied.
30% to 50% of all antibiotics used in hospital practice, are for surgical prophylaxis. However many studies have shown evidence of inappropriate use especially with respect to the timing and duration. The result of such misuse is an upsurge in antimicrobial resistance within hospital pathogens and increases in the cost of stay.

Benefits and Risks

- ✓ The final decision on the benefits and risks of prophylaxis for an individual patient will depend upon the:
  - Patient's risk of developing a surgical site infection (SSI)
  - Potential severity of consequences of SSI
  - Effectiveness of prophylaxis in that particular operation
  - Consequences of prophylaxis for the patient (e.g. increased risk of colitis)

Principles

- ✓ **In most circumstances prophylaxis should be started preoperatively, ideally within 30 minutes of the induction of anaesthesia.**

Administering Intravenous Prophylactic Antibiotics

- ✓ **The antibiotic/s chosen should cover the most common pathogen/s likely to cause a wound infection at the specific surgical site in question.**
- ✓ The antibiotic used for prophylaxis should, as much as possible, be different from the one that would be used if a postoperative infection develops.
- ✓ Patients with a history of anaphylaxis, urticaria or rash occurring immediately after penicillin therapy are at increased risk of immediate hypersensitivity to penicillins and should not receive prophylaxis with a beta-lactam antibiotic. *Patients with a history of rash or minor rash, occurring more than 72 hours after administration of penicillin, are probably not allergic to penicillin. Advice should be sought as to the appropriateness of using a cephalosporin alternative*
- ✓ **In most surgical operations, one dose of antibiotic prophylaxis is normally all that is required**. An additional dose of prophylactic agent is not usually indicated in adults, unless there is blood loss up to 1500ml during surgery or haemodilution up to 15ml/kg or an excessively prolonged surgical operation.
- ✓ Fluid replacement bags should not be primed with prophylactic antibiotics because of the potential risk of contamination and calculation errors.

Further assistance on these guidelines or any aspect of antimicrobial prophylaxis in surgery can be obtained the Antibiotic Team on (2595) 1659 or pager 4512.

Antibiotic	At induction	Further doses (if any)
1 CARDIOTHORACIC SURGERY		
Prosthetic Valve Insertion:		
Conclusive evidence, based on controlled trials, for the effectiveness of prophylactic antibiotics in this area is lacking. However, prophylaxis is commonly given when prosthetic heart valves are inserted. The usefulness of routine prophylactic antibiotics in coronary artery bypass surgery has not been established.		
Cefuroxime	**1.5g IV**	**750mg at 8 & 16 hours**
Co-amoxiclav	**1.2g IV**	**± 1.2g at 8 & 16 hours**
Vancomycin	**500mg over 100 min**	**500mg at 8 & 16 hours**
Arterial Reconstructive Surgery:		
Surgery involving the abdominal aorta and/or the lower limb, particularly if a groin incision is involved, may benefit from the administration of prophylactic antibiotics. Patients undergoing any vascular procedure involving prosthesis should probably also receive prophylaxis. The incidence of infection after operations on the brachial and carotid arteries, not involving prosthetic materials, is too low to justify the use of prophylactic antibiotics.		
Cefuroxime	**1.5g IV**	**750mg at 8 & 16 hours**
Co-amoxiclav	**1.2g IV**	**1.2g at 8 & 16 hours**
Vancomycin	**500mg over 100 min**	**500mg at 8 & 16 hours**
2 ORTHOPAEDIC SURGERY		
There is some evidence that an antibiotic with proven activity against local strains of staphylococci can decrease the incidence of infection of prosthetic joints following total hip replacement. Similarly, a decrease in the infection rate has been demonstrated for proximal femoral fractures treated with internal fixation by nail or plate under appropriate anti-staphylococcal antibiotic cover. It may also be appropriate to use prophylactic antibiotics for other orthopaedic procedures involving insertion of prosthetic material, but this remains unproven. *The value of incorporating antibiotics into cement for primary or non-infected joint insertion is unproven but has been used successfully in replacement of infected joint prostheses. It is recommended that antibiotic prophylaxis be given in situations involving severe musculoskeletal and soft tissue trauma, including compound fractures. In this situation, an increased duration of therapy (early treatment) may be appropriate.*		
Joint replacement, internal fixation of selected fracture		
Cefuroxime	**1.5g IV**	**up to 2 days**
Co-amoxiclav	**1.2g IV**	**up to 2 days**
Vancomycin	**1g over 100 min**	**up to 2 days**

Antibiotic	At induction	Further doses (if any)
Muscular, skeletal and soft tissue trauma		
Grade I and II fractures		
Co-amoxiclav	**1.2g IV**	**Single dose**
Clindamycin	**600mg IV**	**Single dose**
Grade III fractures		
Ceftriaxone	**2g IV**	**Single dose**
Ciprofloxacin	**200mg IV**	**Single dose**
3 LOWER LIMB AMPUTATION		
Amputation, particularly of an ischaemic leg carries a small but important risk of clostridial infection. Appropriate antibiotic prophylaxis must be given.		
Metronidazole	**500mg IV or 1g rectally**	
4 NEUROSURGERY		
With the exception of cerebrospinal fluid leakage following trauma, and craniotomy involving the implantation of prosthetic material, e.g. shunts, prophylactic antibiotic use remains unproven.		
CSF leakage		
Ceftriaxone	**2g IV**	
Co-amoxiclav	**1.2g IV**	**2nd dose if procedure > 3 hours**
Clindamycin	**900mg IV**	**2nd dose if procedure > 3 hours**
Craniotomy involving prosthetic implants		
Flucloxacillin	**2g IV**	**2nd dose if procedure > 3 hours**
Clindamycin	**900mg IV**	**2nd dose if procedure > 3 hours**
5 HEAD, NECK & THORACIC SURGERY (including ENT procedures)		
Prophylaxis should in general be considered for procedures that involve an incision through oral, nasal, pharyngeal or oesophageal mucosa, stapedectomy or similar operation, or the insertion of prosthetic material. The benefits of antibiotic prophylaxis for tonsillectomy and adenoidectomy are unproven. Where an established focus of infection is suspected or shown to be present, e.g. chronic mastoiditis, an early treatment regimen may be appropriate.		
Antibiotic	**At induction**	**Further doses (if any)**
Involving oral, pharyngeal or oesophageal mucosa		
Co-amoxiclav	**1.2g IV**	**2nd dose if procedure > 3 hours**
Clindamycin	**600-900mg IV**	**2nd dose if procedure > 3 hours**

Antibiotic	At induction	Further doses (if any)
Extensive procedures particularly for carcinoma		
Cefuroxime + metronidazole	**1.5g IV + 500mg IV**	**2nd dose if procedure > 3 hours**
Co-amoxiclav	**1.2g IV**	**2nd dose if procedure > 3 hours**
Clindamycin ± gentamicin	**600-900mg IV ± 1.5mg/kg IV**	**2nd dose if procedure > 3 hours**
6 ABDOMINAL SURGERY		
Appendicectomy		
Metronidazole	**500mg rectally**	
If gangrenous, perforated or severely inflamed appendix seen during operation		
Co-amoxiclav	**1.2g IV**	**8-hourly for 2 days**
Cefuroxime + Metronidazole	**1500mg IV + 500mg IV**	**8-hourly for 2 days**
Gentamicin + Clindamycin	**1.5mg/kg IV + 600mg IV**	**8-hourly x 2 days**
Ruptured, perforated or gangrenous viscus (e.g. perforated colon or appendix) suspected before procedure		
Co-amoxiclav + Gentamicin	**1.2g IV + 1.5mg/kg IV**	**8-hourly for 2 days**
Gentamicin + Clindamycin	**1.5mg/kg IV + 600mg IV**	**8-hourly for2 days**
Gastroduodenal Surgery		
When the stomach or duodenum is to be opened, prophylaxis should be considered if the mechanisms that normally inhibit bacterial growth in the stomach and duodenum, namely, gastric acidity and gastrointestinal motility are diminished by conditions such as obstruction, haemorrhage, gastric ulceration, gastric malignancy, previous gastric surgery. (e.g., vagotomy, gastrectomy, or drugs reducing gastric acidity such as ranitidine.)		
Cefuroxime + metronidazole	**1.5g IV + 500mg IV**	**2nd dose if procedure > 3 hours**
Co-amoxiclav	**1.2g IV**	**2nd dose if procedure > 3 hours**
Ciprofloxacin + metronidazole	**200mg IV + 500mg IV**	**2nd dose if procedure > 3 hours**

Antibiotic	At induction	Further doses (if any)
Biliary Tract Surgery		
Prophylaxis should generally be considered only for patients at increased risk of acquiring infection. These include those: ✓ older than 70 years; ✓ with acute cholecystitis; ✓ in whom complicated surgery or re-operation is to be undertaken; ✓ having surgery involving the common bile duct, particularly in the presence of obstruction, (when anaerobic organisms are more likely to be present).		
At risk patients:		
Ceftriaxone	**1g IV**	**2nd dose if procedure > 3 hours**
Common bile duct surgery:		
Co-amoxiclav	**1.2g IV**	**2nd dose if procedure > 3 hours**
Ciprofloxacin + metronidazole	**200mg IV + 500mg IV**	**2nd dose if procedure > 3 hours**
Colorectal Surgery		
The measures that can be taken to reduce the high risk of infection associated with colorectal surgery are not equally applicable to both elective and emergency procedures.		
Elective procedures		
Pre-operative mechanical bowel preparation with appropriate peri-operative antibiotic(s) (administered parenterally, rectally or orally) substantially reduces infective complications. Marked improvement accompanies the use of drugs against *Bacteroides fragilis.* However, additional protection results if an aminoglycoside or ß-lactam is added to provide aerobic Gram-negative cover.		
Metronidazole + ceftriaxone	**500mg IV + 1g1V**	
Metronidazole + Gentamicin	**1g rectal / 500mg IV + 1.5mg/kg IV**	**2nd dose if procedure > 3 hours**
*Evacuate the bowel by 4L polyethylene glycol in electrolyte solution orally		
Emergency procedures		
Mechanical bowel preparation is not possible and parenterally administered antibiotics are recommended. If **obvious peritonitis** is detected at the time of surgery or if **major peritoneal soiling** occurs then an **early treatment** regimen should be adopted.		
Cefotaxime + Metronidazole	**2g IV + 500mg IV**	**Continue 8-hourly for 24 hours**
Gentamicin + Clindamycin	**1.5mg/kg IV + 600mg IV**	**Continue 8-hourly for 24 hours**

Antibiotic	At induction	Further doses (if any)
Laparotomy		
Co-amoxiclav + Gentamicin	**1.2g IV + 1.5mg/kg IV**	**Continue 8-hourly for 24 hours**
Cefuroxime + Metronidazole	**1.5g IV + 500mg IV**	**Continue 8-hourly for 24 hours**
Gentamicin + Clindamycin	**1.5mg/kg IV + 600mg IV**	**Continue 8-hourly for 24 hours**
Endoscopic Procedures		
Endoscopic Retrograde Cholagiopan-creatography (ERCP) — **If Bile Duct Obstruction Suspected**	**Norfloxacin 400mg orally STAT DOSE**	**2 hours prior to procedure**
Endoscopic Retrograde Cholagiopan-creatography (ERCP) — **If patient has abnormal (or prosthetic) heart valve**	**Cefuroxime 750mg IV STAT DOSE**	**30 minutes before surgery**
7 UROLOGICAL SURGERY		
Prophylaxis is usually necessary for prolonged or difficult endoscopic procedures (e.g. urethral dilatation or percutaneous nephrolithotripsy). Prophylaxis is not usually recommended for simple procedures (e.g. cystoscopy) in patients with sterile urine at the time of urological surgery. Patients suspected of having urinary tract infection should be treated pre-operatively to prevent postoperative sepsis and ideally this should be on the basis of prior urine culture, with therapy being guided by sensitivity results. Strict maintenance of closed-catheter drainage can prevent urinary tract infection in patients who temporarily require an indwelling catheter. The use of bladder irrigants does not provide any additional benefit and may select out resistant organisms. Equally, administration of oral antibiotics to cover the period of catheterisation is not recommended.		
For proven or suspected urinary infection, according to urine culture and sensitivity.		
If C&S data unavailable,		
Ciprofloxacin	**200mg IV**	**2nd dose if procedure > 3 hours**
8 TRANSPLANT SURGERY		
Kidney Transplantation		
Ceftriaxone	**1g IV**	**Single dose**
Teicoplanin	**400mg IV**	**Single dose**

Antibiotic	At induction	Further doses (if any)
9 OPHTHALMIC SURGERY		
Chloramphenicol eye drops or ointment		**1-2 days only**
10 OBSTETRIC AND GYNAECOLOGICAL SURGERY		
Antibiotic prophylaxis has been shown to decrease the incidence of septic complications following Caesarean section in high-risk patients, esp. those in labour or with ruptured membranes. To avoid exposing the infant to the drug, administration can be delayed until after the cord is clamped. Infective complications following hysterectomy, particularly if performed by the vaginal route, can also be reduced by appropriate prophylaxis.		
Hysterectomy		
Cefuroxime + Metronidazole	**1.5g IV + 1g rectal (500mg IV)**	**Single Dose**
Co-amoxiclav	**1.2g IV**	**Single Dose**
Gentamicin + Clindamycin	**6mg/kg IV + 600mg IV**	**Single Dose**
Caesarian section - high risk only		
Co-amoxiclav	**1.2g IV**	**Single Dose**
Clindamycin	**600 mg IV**	**Single Dose**
Bowel Injury: add **gentamicin**		
11 DENTAL PROCEDURES		
Prevention of endocarditis in patients with heart-valve lesions, septal defects, patent ductus or prosthetic valve. It is important to use chlorhexidine gluconate 0.2% mouthwash 5 minutes prior to the procedure.		
Under local or no anaesthesia		
Normal Risk		
Patients who are not allergic to penicillin and who have not received more than a single dose of penicillin in the previous month.		
Amoxicillin	**3g [sachet] orally**	**Stat Dose**
Penicillin-allergic patients or who have received more than a single dose of penicillin in the previous month.		
Clindamycin	**300mg PO or IV (over at least 10 min.)**	

Antibiotic	At induction	Further doses (if any)
Special Risk		
Patients who are not allergic to penicillin and who have not received more than a single dose of penicillin in the previous month.		
Amoxicillin + Gentamicin	**1g IV + 120mg IV**	**amoxicillin 500mg PO after 6 hours**
Penicillin-allergic patients or who have received more than a single dose of penicillin in the previous month.		
Clindamycin	**300mg IV over ≥ 10min**	**150mg PO or IV 6 hours later**
Under general anaesthesia		
Patients who are not allergic to penicillin and who have not received more than a single dose of penicillin in the previous month.		
Normal Risk		
Amoxicillin	**1g IV or**	**500mg IV after 6 hours [for nil by mouth] or**
	3g [sachet] 4 hours before induction orally	**3g sachet orally (ASAP after surgery)**
Special Risk		
Amoxicillin + Gentamicin	**1g IV + 120mg IV**	**amoxicillin 500mg PO after 6 hours**
Penicillin-allergic patients or who have received more than a single dose of penicillin in the previous month. (Normal/Special Risk)		
Clindamycin	**300mg IV (over at least 10 min.)**	**150mg PO or IV 6 hours later**
Teicoplanin + Gentamicin	**400mg IV + 120mg IV**	**Stat dose of each**

Regimen in green are suitable for patients with a reliable history of penicillin allergy