

Table 6.2 Antimicrobial prophylaxis in clean operations

| Type of operation | Indications | Recommended drugs ¹ |
|---------------------------|--|--|
| Cardiac ² | <ul style="list-style-type: none"> • Prosthetic valve • Coronary artery bypass • Pacemaker implant • Open heart surgery | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ then every 4 hours <p>Note: The duration of antimicrobial prophylaxis should <u>not</u> be longer than 48 hours.</p> |
| Thoracic ² | <ul style="list-style-type: none"> • Pulmonary resection • Closed tube thoracostomy for chest trauma | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ OR • I.V. cefuroxime 1.5 g OR • I.V. amoxicillin-clavulanate 1.2 g⁴ |
| Vascular | <ul style="list-style-type: none"> • Abdominal aortic operations • Prosthesis • Groin incision • Lower extremity amputation for ischaemia | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ OR • I.V. cefuroxime 1.5 g OR • I.V. amoxicillin-clavulanate 1.2 g⁴ |
| Neurosurgery ² | <ul style="list-style-type: none"> • Craniotomy • Ventriculoperitoneal shunt • Implantation of intrathecal pump (492) • Re-exploration or microsurgery | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ OR • I.V. cefuroxime 1.5 g OR • I.V. amoxicillin-clavulanate 1.2 g⁴ |

| Type of operation | Indications | Recommended drugs ¹ |
|---|---|--|
| Orthopaedic & Traumatology ² | <ul style="list-style-type: none"> • Total joint replacement with prosthesis • Internal fixation of closed fractures • Prophylactic antibiotic is indicated for all open fractures and should be given as soon as possible⁵ • Wound cultures and sensitivity testing are useful for informing subsequent choice of antimicrobials (493–495) • For Gustilo type III tibial fractures, prophylaxis given within 1 hr was associated with reduced infection risk (496) | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ OR • I.V. cefuroxime 1.5 g Note: Antimicrobial agents should be completely infused before inflating the tourniquet if applied. • I.V. amoxicillin-clavulanate ± gentamicin⁵ OR • I.V. ceftriaxone 2 g ± I.V. penicillin G⁵ OR • other third generation cephalosporin ± I.V. penicillin G⁵ Note: The duration of prophylactic antibiotic for open fractures depends on the classification: 24 hr (for Gustilo type I and II open fractures) and up to 72 hr (for Gustilo type III open fractures). Antibiotics should not be given for more than 24 hr after soft tissue coverage of the wound, whichever occurs first. |
| Thyroid & parathyroid glands | | <ul style="list-style-type: none"> • Antimicrobial prophylaxis is not indicated |

Table 6.3 Antimicrobial prophylaxis in clean-contaminated operations

| Type of operation | Indications | Recommended drugs ¹ |
|-------------------------------|--|--|
| Oral-pharyngeal/ nasal | <ul style="list-style-type: none"> • Tonsillectomy • Maxillofacial • Rhinoplasty • Turbinate/septoplasty | <ul style="list-style-type: none"> • I.V. amoxicillin-clavulanate 1.2 g⁴ OR If <i>Pseudomonas</i> is suspected: <ul style="list-style-type: none"> • I.V. amoxicillin-clavulanate 1.2 g⁴ + I.V. gentamicin OR • I.V. amoxicillin-clavulanate 1.2 g⁴ + I.V. ceftazidime 1–2 g |
| Ear | <ul style="list-style-type: none"> • Myringotomy • Tympanostomy tube insertion | <ul style="list-style-type: none"> • Quinolone or Sofradex eardrop |
| Upper gastro-intestinal tract | <p>Gastro-duodenal (high risk):</p> <ul style="list-style-type: none"> • Obstruction • Haemorrhage • Gastric ulcer • Malignancy • H₂ blocker • Proton pump inhibitor • Morbid obesity • Gastric bypass • Percutaneous endoscopic gastrostomy <ul style="list-style-type: none"> • Oesophageal operation with manipulation of pharynx | <ul style="list-style-type: none"> • I.V. cefuroxime 1.5 g OR • I.V. amoxicillin-clavulanate 1.2 g⁴ <ul style="list-style-type: none"> • I.V. cefuroxime 1.5 g OR • I.V. ceftazidime 1 g³ ± metronidazole 500 mg |

| Type of operation | Indications | Recommended drugs ¹ |
|--|---|--|
| Hepato-biliary system Laparoscopic gall bladder surgery | High risk: <ul style="list-style-type: none"> • Age more than 70 years • Acute cholecystitis/pancreatitis • Obstructive jaundice • Common bile duct stones • Morbid obesity • Intraoperative cholangiogram • Bile spillage • Pregnancy • Immunosuppression • Insertion of prosthetic devices • Laparoscopic converts to laparotomy | <ul style="list-style-type: none"> • I.V. amoxicillin-clavulanate 1.2 g⁴ OR • I.V. cefuroxime 1.5 g + I.V. metronidazole 500 mg |
| Endoscopic retrograde cholangio-pancreatography (ERCP) | <ul style="list-style-type: none"> • Biliary obstruction | <ul style="list-style-type: none"> • P.O. ciprofloxacin 500–750 mg 2 hours prior to procedure OR • I.V. piperacillin-tazobactam 4.5 g 1 hour prior to procedure |
| Appendectomy | | <ul style="list-style-type: none"> • I.V. amoxicillin-clavulanate 1.2 g⁴ OR • I.V. cefuroxime 1.5 g + I.V. metronidazole 500 mg |
| Colorectal | <ul style="list-style-type: none"> • Most procedures require parenteral ± oral prophylaxis (497–500) | <p><i>Parenteral</i></p> <ul style="list-style-type: none"> • I.V. amoxicillin-clavulanate 1.2 g⁴ OR • I.V. cefuroxime 1.5 g + I.V. metronidazole 500 mg <p><i>Oral</i></p> <ul style="list-style-type: none"> • P.O. neomycin and erythromycin base 1 g each t.d.s. the day before operation |

| Type of operation | Indications | Recommended drugs ¹ |
|---------------------------------------|---|--|
| Abdominal/ vaginal hysterectomy | | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ <li style="text-align: center;">OR When vaginal wound is present: • I.V. cefuroxime 1.5 g + I.V. metronidazole 500 mg <li style="text-align: center;">OR • I.V. amoxicillin-clavulanate 1.2 g⁴ |
| Caesarean section (502) | All caesarean sections are indicated for antibiotic prophylaxis (503) | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ <li style="text-align: center;">OR When vaginal wound is present: • I.V. cefuroxime 1.5 g + I.V. metronidazole 500 mg <li style="text-align: center;">OR • I.V. amoxicillin-clavulanate 1.2 g⁴ <p>Note: For caesarean section, the initial dose of antimicrobial agents should be given before surgical incision instead of after clamping the umbilical cord (501).</p> |
| Abortion | Antimicrobial prophylaxis should be based on individual clinical condition and local epidemiology (504–505) | <ul style="list-style-type: none"> • Refer to footnote 6 |
| Urology ⁷ | <ul style="list-style-type: none"> • Significant bacteriuria • Transurethral resection of the prostate (TURP), transurethral resection of bladder tumour (TURBT) • Stone operations • Nephrectomy • Total cystectomy | <ul style="list-style-type: none"> • Treat according to mid-stream urine culture result prior to elective procedures |

| Type of operation | Indications | Recommended drugs ¹ |
|--|--|---|
| Hernia repair ⁸ | <ul style="list-style-type: none"> • Non mesh hernia repair | Antimicrobial prophylaxis is not indicated |
| | <ul style="list-style-type: none"> • Adult hernia mesh repair | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ OR • I.V. cefuroxime 1.5 g |
| Breast cancer surgery ⁸ (506) | | <ul style="list-style-type: none"> • I.V. cefazolin 1 g³ OR • I.V. cefuroxime 1.5 g |

Footnotes for Tables 6.2–6.4:

¹The dose of antimicrobial agents recommended in the guidelines is based on adult patient with normal renal function. Special attention should be paid to patient with renal impairment, on renal replacement therapy, or if there is potential drug-drug interaction. Consultation to clinical microbiologist, infectious disease physician and clinical pharmacist is required in complicated cases.

²For hospitals or units with a high incidence of postoperative wound infections by MRSA or methicillin-resistant *Staphylococcus epidermidis*, screening for MRSA may be indicated to identify patients for additional preoperative measures such as chlorhexidine bath, 2% mupirocin nasal ointment [Bactroban Nasal] and/or the use of vancomycin as preoperative prophylaxis. Evidence is strongest for cardiothoracic and orthopaedic surgery with implantation (507–508).

³Give cefazolin 2 g for patients with body weight greater than 80 kg. For patients allergic to cefazolin, vancomycin 1 g infused over 1 hour should be given after premedication with an antihistamine. Rapid I.V. administration of vancomycin may cause hypotension, which could be especially dangerous during induction of anaesthesia.

⁴Amoxicillin-clavulanate and ampicillin-sulbactam are similar in spectrum coverage and centres may choose to use ampicillin-sulbactam.

⁵Choice of agent(s) depends on the type of open fractures by the Gustilo classification and the likely organisms contaminating the wound. In general, prophylactic antibiotic should be directed against Gram-positive organisms for Gustilo type I and II open fractures; additional Gram-negative coverage should be added for Gustilo type III open fractures. In the setting of faecal or potential clostrial contamination (e.g. soil exposure), a penicillin should be included in the regimen.

⁶The optimal antibiotic and dosing regimens for abortion are unclear. The antimicrobial prophylaxis for abortion stated in Royal College of Obstetricians and Gynaecologists (United Kingdom) (422) clinical guidelines is Level C recommendations and may be suitable. They include: metronidazole 1 g rectally at the time of abortion plus doxycycline 100 mg orally b.d. for 7 days, commencing on the day of abortion; OR metronidazole 1 g rectally at the time of abortion plus azithromycin 1 g orally on the day of abortion.

⁷For transrectal ultrasound (TRUS)-guided biopsy of the prostate, prophylactic regimen is evolving because of increasing fluoroquinolone resistance in *E. coli*. (509). If a fluoroquinolone is used, administer the drug 1–2 hours before the procedure to allow maximum tissue penetration (510). Ensure adequate drug level in the body by giving a full standard dose (500 mg to 750 mg for levofloxacin and ciprofloxacin). If post-biopsy infection develops, antibiotic treatment regimen should include coverage against ESBL-producing organisms given the high prevalence of this resistance mechanism in Hong Kong (Table 1.3).

⁸Amoxicillin-clavulanate may be used if the operation is such that anaerobic coverage is needed, such as in diabetic foot, hernia repair with bowel strangulation or incarcerated/strangulated hernia or mastectomy with implant or foreign body.

⁹Antimicrobial agents should be considered postoperatively for operations with suppurative, ruptured and gangrenous conditions.