

ANTIBIOTIC GUIDELINES

Designed for use at UCLH and affiliated hospitals
While the principles of antimicrobial therapy are universally accepted, individual hospitals and personal choices may differ slightly

LEGEND
1st first-line treatment 2nd second-line treatment 3rd third-line treatment
pen penicillin allergy MRSA antibiotic resistance

Prophylaxis Treatment Special Guideline

PRINCIPLES OF PROPHYLAXIS

1. Prophylaxis is designed to reduce risk of post-operative infection and morbidity.
2. No infection is present. If it is then treatment must be continued post-operatively.
3. Effective dosing leads to a high concentration of antimicrobial in tissues at the time of procedure.
4. Usually, a single dose is sufficient. Continuation is rarely indicated.
5. Because unexpected allergy is a risk, antimicrobials should be given after initial induction of anaesthesia.
6. If infection is suspected, wait until specimens have been taken before giving antibiotics.

CARDIAC PROCEDURES

- Preoperative screening for MRSA is essential and if detected, surgery should be delayed until topical suppression has been used for at least 3 days (see MRSA decontamination policy in Infection Control Manual). If an emergency procedure, use suppression procedure for 24 hours before surgery if possible and continue after surgery to complete 5 days.

ALL CARDIAC AND THORACIC SURGERY PROCEDURES

- Flucloxacillin PLUS gentamicin
- Clarithromycin OR cefuroxime PLUS gentamicin

IF MRSA POSITIVE

- Teicoplanin PLUS gentamicin

PACEMAKER INSERTION

- Flucloxacillin
- Clarithromycin

HIGH RISK PATIENTS

Previous pacemaker insertion, previous endocarditis, prosthetic valves and diabetes, previous MRSA

- Teicoplanin PLUS gentamicin

ENDOCARDITIS

DENTAL PROCEDURES

There is no definitive evidence that dental treatment increases the risk of endocarditis. Antibiotic prophylaxis, for dental procedures is only suggested for:

- previous infective endocarditis
- abnormal heart or valve structure
- previous valve surgery

Adult & Child > 10 years

- Amoxicillin 3 g PO single 1 hour before procedure
- OR Amoxicillin 1 g IV single dose after induction
- Clindamycin 600 mg PO single 1 hour before procedure
- OR clindamycin 300 mg IV single dose at induction (over 10 minutes)

Child >=5 to < 10 years

Halve the above doses

Child < 5 years

See Paediatric Guidelines

FLEXIBLE CYSTOSCOPY

PRE-PROCEDURE ASSESSMENT

Send an MSU to the lab and perform urinalysis (nitrites)
Delay procedure if patient is at risk of sepsis or its complications, particularly if nitrites and leucocyte esterase are positive.

HIGH RISK

- positive dipstick for nitrites, known bacteriuria or recurrent UTIs
- additional procedures (e.g. biopsy, diverticulum)
- urinary retention or large diverticulum
- neobladder
- anatomical abnormality of urinary tract
- immunosuppression
- diabetes mellitus
- renal impairment (creatinine >120)
- foreign bodies in urinary tract (stones, JJ stent, urethral catheter, prosthesis)
- pregnancy (use cefuroxime 750 mg IV / IM prior to procedure)

GIVE

- Gentamicin
- (e.g. pregnancy) cefuroxime 1.5 g IM single dose

POST-PROCEDURE ANTIBIOTICS

Consider in cardiac patients who have history of previous endocarditis, prosthetic heart valves, surgically constructed complex LV outflow abnormalities, including aortic stenosis and bicuspid aortic valves shunt / conduit:

- Trimethoprim 200 mg 12 hourly for 5 days
- Nitrofurantoin 100 mg 12 hourly for 5 days (avoid if CrCl < 50 ml/min)
- Ciprofloxacin 250 mg 12 hourly for 5 days

VASCULAR PROCEDURES

- Cefuroxime (repeat up to a max of 3 doses)
- Clarithromycin

IF MRSA POSITIVE

- Teicoplanin PLUS gentamicin (up to 3 doses)

SUGGESTED DOSING OF COMMON ANTIMICROBIALS IN PROPHYLAXIS

Amoxicillin 1 g IV bolus
Cefuroxime 1.5 mg IV bolus (repeats 750 mg for 8 hourly x 2 if necessary)
Ciprofloxacin 400 mg IV infusion over 30 min
Clarithromycin 500 mg IV infusion over 60 minutes and once at 12 hours
Clindamycin 600 mg IV infuse at 30 mg/min
Co-amoxiclav 1.2 g IV bolus

Flucloxacillin 1 g IV bolus then 3 doses of 500 mg 6 hourly (cardiac)
Gentamicin 1.5 mg/kg IV bolus then 80 mg IV 8 hourly 2 doses (cardiac, etc.)
Metronidazole 500 mg IV bolus (repeats 8 hourly 500 mg IV or 1 g reduction or 400 mg PO)
Teicoplanin 800 mg IV infusion over 30 min

GASTROINTESTINAL PROCEDURES

APPENDICECTOMY

- Cefuroxime PLUS metronidazole
- Ciprofloxacin PLUS metronidazole

If appendix acutely inflamed or pus found: continue with cefuroxime PLUS metronidazole for 5 days.

COLORECTAL SURGERY

- Cefuroxime PLUS metronidazole (continue for three doses; try to complete infusion before starting procedure)

BILIARY TRACT SURGERY

Cholecystectomy or if biliary tree surgery involved or common duct stones present:

- Cefuroxime
- Ciprofloxacin (infuse ciprofloxacin over 30-60 minutes; try to complete infusion before starting procedure)

If previous biliary surgery / stents

ADD gentamicin

If anaerobes suspected (e.g. achlorhydric or carcinoma patients)

ADD metronidazole (infuse metronidazole over 20 minutes; try to complete infusion before starting procedure; courses should be extended for 24 hours or longer if infection is suspected)

UPPER GASTROINTESTINAL SURGERY

- Cefuroxime
- For achlorhydric patients or those with gastro-oesophageal cancer
- ADD metronidazole (infuse metronidazole over 20 min; try to complete infusion before starting procedure)

PEG INSERTION

- Cefuroxime

UROLOGICAL PROCEDURES

Mid-stream urine culture must be sent before surgery

TRANSRECTAL PROSTATIC BIOPSY

- Gentamicin PLUS metronidazole
- Ciprofloxacin

PROSTHETIC IMPLANTS, RECONSTRUCTIVE SURGERY INVOLVING PENILE TISSUE, URETHROPLASTY, BLADDER RECONSTRUCTION

- Cefuroxime OR co-amoxiclav (continue 3 doses)

If intestinal material is to be used:

- Add metronidazole
- Ciprofloxacin PLUS metronidazole

INGUINO-SCROTAL SURGERY

- Cefuroxime OR flucloxacillin
- Clarithromycin PLUS metronidazole

MINOR INTERVENTIONS UNDER LOCAL ANAESTHETIC (e.g. urodynamics, catheterisation, when presence of infection known or high risk, changing indwelling catheter)

ADD metronidazole

ENDOSCOPIC UROLOGY (e.g. transurethral resection of prostate-TURP, percutaneous nephro-lithotripsy-PCNL)

- Gentamicin 120 mg IV as a single dose at induction
 - Nephrolithotomy may require longer courses of prophylaxis if significant bacteraemia is likely following the procedure.
- Continue gentamicin if infection or stones present and review results of culture.

OBSTETRIC & GYNAECOLOGICAL PROCEDURES

HYSTERECTOMY / EMERGENCY CAESAREAN SECTION

- Co-amoxiclav
- Clindamycin

TERMINATION OF PREGNANCY

Uncomplicated

No prophylactic antibiotics

History of Pelvic Inflammatory Disease (PID)

Pre-emptive treatment doxycycline 100 mg PO 12 hourly for 10 days pre-operatively

EVACUATION OF RETAINED TISSUE

- Co-amoxiclav
- Clarithromycin PLUS metronidazole

OR clindamycin

IN SACROCOLOPOPEXY - IN VIEW OF MESH IMPLANTATION

After Induction

- Co-amoxiclav PLUS gentamicin

Post-operative

- Co-amoxiclav may be continued for up to 5 days if high risk of mesh infection
- Clindamycin (continue orally if indicated)

ADULTS ONCE DAILY GENTAMICIN (7 mg/kg) DOSING

Prescribing gentamicin as a single daily dose at 7mg/kg dose will ensure that target peak concentrations are achieved in all patients. Once daily dosing (7mg/kg) is at least as effective and less nephrotoxic than multiple daily dosing. However, once daily (7mg/kg) dosing is not always appropriate and is NOT used for:

- Creatinine clearance < 20ml/min
- Cystic fibrosis
- Endocarditis (consult Microbiology)
- Major burns
- Patients with ascites/severe liver disease/jaundice (bilirubin > 50 micromol/L)
- Pregnancy
- Prophylaxis

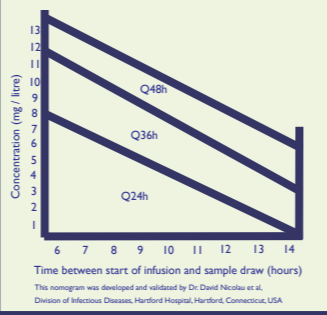
After first dose, take a clotted blood sample at specified time between 6 and 14 hours after start of infusion. (Important: the time between start of infusion and blood taken must be recorded on the assay request form.)

Interpretation of measured level

The gentamicin level is evaluated via the Hartford nomogram. If the level falls in the area designated Q24h, Q36h or Q48h, the dosing interval will be recommended as 24, 36 or 48 hours respectively.

- If the level falls on the line, the longer dosing interval will be recommended.
- If the level is off the nomogram at the given time, the scheduled therapy should be stopped and serial levels followed to determine the appropriate time of the next dose (when the level falls below 1 mg/L).

HARTFORD NOMOGRAM



NEONATAL ONCE DAILY GENTAMICIN (4 mg/kg) DOSING

- Babies of corrected gestational age 30 weeks or more and >1.5kg have a dose every 24 hours
- Babies of corrected gestational age 29 weeks or less and/or <1.5kg have a dose every 36 hours

Levels:

- Take levels immediately before the third dose.
- Levels should be <2mg/L
- If levels are >2mg/L increase interval by 12 hours. (i.e. babies who were on 24 hourly dosing are now on 36 hourly dosing and those who were on 36 hourly dosing are now on 48 hourly dosing.)
- If there are no changes in dose or renal function, then the levels should be rechecked every three days.

FEBRILE NEUTROPENIA GUIDELINES

Adults (13 + years) (IBW = ideal body weight)

- Tazocin: 4.5 g IV TDS
- Gentamicin: 7 mg/kg (IBW) OD
- For multiple myeloma substitute for Gentamicin: Ciprofloxacin: 400 mg BD
- AND (if line sepsis possible or proven): Teicoplanin: 400 mg IV BD for 3 doses then OD
- Ceftazidime: 2 g IV TDS OR Meropenem*: 500 mg IV TDS AND/OR Amikacin: 20 mg/kg IV (IBW) OD

Paediatric (1 month to 12 years)

- Tazocin: 90 mg/kg (max 4.5 g) TDS
- Gentamicin: 7 mg/kg (IBW) OD (see separate protocol if patient is less than 6 months)
- For multiple myeloma substitute for Gentamicin: Ciprofloxacin: 15 mg/kg (max 500 mg) PO BD
- AND (if line sepsis possible or proven): Teicoplanin: 10 mg/kg (max 400 mg) for 3 doses then OD
- Ceftazidime: 50 mg/kg (max 2g) TDS OR Meropenem*: 500 mg IV TDS AND/OR Amikacin: 20 mg/kg IV (IBW) OD

T Should be discussed with microbiology as antifungal therapy may be indicated
* Meropenem should only be initiated after microbiology advice sought

NEONATAL UNIT GUIDELINES

NEW BORN INFANTS FOLLOWING SEPTIC SCREEN AND FOR 1st WEEK OF LIFE

- Benzylpenicillin PLUS gentamicin (See neonatal Gentamicin guidelines for dosing information)

Infants below 1 week of age already on Penicillin and Gentamicin with indwelling catheters, if possible, remove catheters and re-culture. Commence on therapy as below:

- Flucloxacillin PLUS gentamicin (see neonatal gentamicin guidelines for dosing information)
- Ceftazidime plus teicoplanin

If unwell or if catheter cannot be removed:

- Ceftazidime plus teicoplanin

INFANTS MORE THAN 1 WEEK OF AGE

- Flucloxacillin plus gentamicin (see neonatal gentamicin guidelines for dosing information)

For those with indwelling catheters:

- Ceftazidime PLUS teicoplanin

Meropenem should be reserved for babies in whom there is infection with an organism known to be resistant to any of the antibiotics above.

FUNGAL INFECTION

May be difficult to prove. Perform blood cultures, request urine microscopy to look for hyphae (use an SPA to avoid skin contamination). Obtain ultrasound scans of heart, brain, liver and kidneys.

- Empirical treatment: 3mg/kg IV 24 hourly
- Proven fungal infection: 5mg/kg IV 24 hourly

NECROTISING ENTEROCOLITIS

- Benzylpenicillin PLUS gentamicin (see neonatal gentamicin guidelines for dosing information)
- PLUS metronidazole 15mg/kg IV loading, then after 24 hours 7.5mg/kg IV 12 hourly if less than 7 days or 8 hourly if more than 7 days old

OPHTHALMIA NEONATORUM

Do not use chloramphenicol or tetracyclines. Exclude gonorrhoea and chlamydia.

While waiting for result swabs:

- Neomycin eye ointment / drops (refer to Childrens BNF for doses)

Proven chlamydia:

- Local eye toilet until discharge stops

PLUS erythromycin 12.5mg/kg IV/PO 6 hourly for 3 weeks

Proven gonorrhoea:

Benzyl penicillin

PAEDIATRIC GUIDELINES

SKIN AND SOFT TISSUE

Likely Pathogens: *Staphylococcus aureus*, *Streptococcus pyogenes*

OTITIS MEDIA

Likely Pathogens: viruses, *Streptococcus pneumoniae*, *H. influenzae*, *Moraxella catarrhalis*

PHARYNGITIS/TONSILLITIS

Likely Pathogens: viruses, *Streptococcus pyogenes*

- Co-amoxiclav
- Clarithromycin

PNEUMONIA

Likely Pathogens: *Streptococcus pneumoniae*, *H. influenzae*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, viruses

- Clarithromycin (oral)
- Cefuroxime (IV)

BONE AND JOINT

Likely Pathogens: *Staphylococcus aureus*, *H. influenzae*

- Flucloxacillin IV AND fusidic acid PO
- Clindamycin PO

SEPSIS

Older neonates and babies presenting with "fever no focus" including meningitis

Likely Pathogens: Group B *Streptococcus*, *E. coli*, *Listeria* spp.

Older child presenting with "fever no focus" including meningitis

Likely Pathogens: *Neisseria meningitidis*, *Streptococcus pneumoniae*, *H. influenzae type b (Hib)*, *E. coli*, and other coliforms

- Ceftriaxone

URINARY TRACT INFECTIONS

Likely Pathogens: coliforms, enterococci, staphylococci

If well over 1 yr and no upper tract symptoms:

- Trimethoprim OR nitrofurantoin

If ill under 1 yr and with upper tract symptoms:

- Cefuroxime

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For full guidelines and policies: www.infectioncontrolservices.co.uk

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SOFT TISSUE INFECTIONS

CHRONIC SKIN ULCERS

Are often colonised with Gram-negative organisms including *Pseudomonas* and require nothing more than local debridement and dressing.

CELLULITIS

Likely pathogens: *S. aureus*, beta-haemolytic Streptococci

- Benzylpenicillin 1.2 g IV 6 hourly PLUS flucloxacillin 500 mg IV 6 hourly for 7-10 days
- Clindamycin 300-450 mg IV 6 hourly

IMPETIGO

Likely Pathogens: *S. aureus*, beta-haemolytic Streptococci

- Amoxicillin 500 mg PO 8 hourly PLUS flucloxacillin 500 mg PO 6 hourly for 7 days
- Clarithromycin 500 mg PO 12 hourly for 7 days

INFECTED BITES

Likely pathogens: oral streptococci, anaerobic bacteria

Dog / cat bites

- Co-amoxiclav 375 mg PO 8 hourly for 5 days
- Doxycycline 200 mg PO stat. then 100 mg PO daily
- PLUS metronidazole 400 mg PO 8 hourly for 5 days

Human bites

- Co-amoxiclav 375 mg PO 8 hourly for 5 days
- Clindamycin 500 mg PO 12 hourly for 5 days

NECROTISING FASCIITIS

Likely Pathogen: beta-haemolytic Streptococci

Surgical debridement is essential. Discuss ALL cases with Microbiologists.

- Benzylpenicillin 1.2 g IV 6 hourly PLUS clindamycin 600 mg IV 6 hourly
- Teicoplanin 400 mg (6 mg/kg) IV 12 hourly for 3 doses then 400 mg daily
- PLUS clindamycin 600 mg IV 6 hourly

GAS GANGRENE

Likely pathogens: polymicrobial including Gram-negative organisms, enterococci and anaerobes

Surgical debridement is essential.

- Benzylpenicillin 2.4 g IV 6 hourly PLUS metronidazole 500 mg IV 8 hourly PLUS ciprofloxacin 200 mg IV 12 hourly

POST OPERATIVE & HOSPITAL ACQUIRED INFECTIONS

WOUND INFECTIONS

Likely Pathogens: *S. aureus* (including MRSA) or beta-haemolytic Streptococci, Gram-negatives

Empirical Treatment

- Teicoplanin 400 mg (6 mg/kg) IV 12 hourly for 3 doses then 400 mg daily

De-escalate to flucloxacillin 1 g IV 6 hourly / 500 mg PO 6 hourly once culture results known (i.e. MSSA)

POST-OPERATIVE SEPSIS (focus unknown, ?UTI)

Likely Pathogens:

1. Enterococci

- Amoxicillin 500 mg IV/PO 8 hourly

If serious infection

- Amoxicillin 500 mg IV/PO 8 hourly PLUS gentamicin 7 mg/kg IV 24 hourly

(refer to gentamicin dosing guideline for further information on monitoring)

- Teicoplanin 400 mg (6 mg/kg) IV 12 hourly for 3 doses then 400 mg daily

2. Gram-negative infections (other than pseudomonas)

- Cefuroxime 750 mg IV 8 hourly PLUS gentamicin 7 mg/kg IV 24 hourly if haemodynamically unstable
- Ciprofloxacin 500 mg PO 12 hourly (discuss with microbiology) PLUS gentamicin 7 mg/kg IV 24 hourly if haemodynamically unstable