Clinical Guideline for Surgical and Procedural Antibiotic Prophylaxis in Adults

NHS Dumfries and Galloway

Guideline intended to assist healthcare professionals on the choice of disease-specific treatments.

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Principles of Policy for NHS Dumfries and Galloway

(These guidelines refer to prophylaxis only. In-patients with surgical infection please follow treatment guidelines.)

- The aim of surgical prophylaxis is to reduce rates of surgical site and health-care associated infections and so reduce surgical morbidity and mortality.
- There is however growing evidence that aspects of prescribing practice may themselves be associated with health-care associated infections, notably *Clostridiodes difficile* infection.
- In conjunction with the surgical specialties and anaesthetists within NHS Dumfries and Galloway the Antimicrobial Management Team (AMT) has undertaken to review local prophylaxis policy and to formulate a uniform policy.
- These guidelines are based on SIGN 104 Antibiotic prophylaxis in surgery 2008 (now withdrawn) and the Scottish Antimicrobial Prescribing Group Antibiotic Prescribing in Surgery antibiotic choice guidance.
- Guidance emphasises that virtually all surgery **requires only one dose** of each antimicrobial and that it should be prescribed on the medication chart. If further doses are required it should be considered treatment and prescribed in the medication chart as such and a treatment plan included in the operation or medical notes.
- Each surgical speciality is required to measure their compliance with prophylaxis guidelines on a weekly basis (5 patients per week) as prescribing indicators which are linked to the HEAT target of reducing *Clostridiodes difficile* by 30%.

Detailed Recommendations (as per SAPG):

1. Surgical/Procedural Prophylaxis Guidelines should be readily accessible to prescribers at the point of care (via NHS board intranet, therapeutic handbook, posters in clinical areas, app) and include interventional procedures requiring antibiotic prophylaxis within the following clinical areas: Breast surgery; Cardiology; Cardiothoracic; Ear, nose & throat, Maxillofacial and oral surgery; Endoscopy; General, including upper and lower gastrointestinal; Gynaecology; Interventional radiology; Neurosurgery; Obstetrics; Ophthalmic surgery; Orthopaedics; Plastic surgery; Transplant surgery; Urology; Vascular.

2. Surgical/Procedural Prophylaxis Guidelines should include guidance on administration of antibiotics:
    a. **Timing**
        - Optimum timing is within 60 minutes prior to the start of the procedure/skin incision, usually at induction of anaesthesia.
        - In Caesarean section, antibiotic prophylaxis to reduce maternal infectious complications should be given pre-incision within 60 minutes prior to the start of the procedure/skin incision.
    b. **Route**
        - Intravenous route of administration preferred except for some specific procedures.
        - Antibiotics should be administered in Theatre and given as a bolus injection where possible.
    c. **Documentation**
        - The "once only" section of drug Kardex or electronic prescription chart is recommended for prescribing prophylaxis to avoid multiple dosing and facilitate collection of audit data.
        - In addition the antibiotic used, dose and time of administration may also be recorded on the Anaesthetic Record Sheet.
    d. **Duration/ repeat doses**
        - A single dose of antibiotic with a long enough half-life to achieve activity throughout the procedure is recommended. Exceptions to single dose are in orthopaedic arthroplasty when up to 24 hours of prophylaxis is acceptable and cardiothoracic surgery where up to 48 hours is acceptable.
        - Repeat dosing may be required if the procedure lasts more than 4 hours or intra-operative blood loss >1.5 litre (re-dose following fluid replacement). [2]

3. **Surgical/ Procedural Prophylaxis Guidelines should provide details of antibiotic choice considering the following key points:**
    - Choice and dose of antibiotic to be agreed by relevant specialties and the AMT, taking into account risk factors for surgical site infection and unintended consequences. The use of larger doses in obese patients should be considered.
    - Use of narrow spectrum agent(s) with activity against likely organisms causing surgical site infections when possible.
    - Restrict use of agents with increased capacity for promoting C. difficile infection and protected antibiotics **(cephalosporins, clindamycin, co-amoxiclav, piperacillin-tazobactam, quinolones and carbapenems)** where possible and consider benefits and risks of use.
    - Avoid gentamicin in orthopaedic implant surgery and caution also advised with high dose flucloxacillin (2g dose) due to potential for impairment of renal function
    - Alternative agents for patients with penicillin or beta-lactam allergy with choice of agent based on the surgical procedure and the patient's risk factors. It is important

to assess patients labelled as penicillin allergic appropriately and consider de-labelling where indicated.

- Patients with complex issues including multi-drug resistance carriage to be discussed with a Consultant Microbiologist pre-operatively.
- Use of antibiotics indicated for treatment of specific serious infections should be minimised in surgical prophylaxis regimens to avoid local development of resistance

4. **Surgical/ Procedural Prophylaxis Guidelines should provide recommendations for prophylaxis in patients who are colonized with methicillin resistant Staph aureus (MRSA) and carbapenemase producing enterobacteriaceae (CPE)**

   For patients colonised with MRSA decolonisation therapy following local policy should be used prior to surgery when possible and antimicrobial prophylaxis should include cover for MRSA. For patients colonised with CPE consult local microbiologist for advice on prophylaxis.

Summary of Good Practice Recommendations

1	Guidance should be readily accessible to prescribers and should give recommendations for interventional procedures requiring antibiotic prophylaxis
2	Guidance should include recommendations on choice and mode administration of antibiotics including timing, route and duration
3	Guidance should highlight need for careful assessment of pre-operative penicillin allergy and should include alternatives for those with true penicillin allergy
4	Guidance should provide recommendations for prophylaxis in patients who are colonized with MRSA and CPE
5	Guidance should incorporate specific local dose recommendations for the prophylactic use of gentamicin and glycopeptides
6	Guidance should be subject to regular review by the Antimicrobial Management Team and formal update every 2 or 3 years (following local process) in conjunction with the relevant specialties
7	Compliance with guidance should be monitored
8	Selected unintended consequences of guidance should be monitored
9	Guidance should be supported by training on use of guidance for all medical and where appropriate non-medical prescribers and other associated clinical/theatre staff
10	AMTs should have systems in place to respond to poor compliance with guidance and/or the development of unintended consequences of antibiotic prophylaxis

Recommendations for Re-Dosing in Surgical Prophylaxis

https://www.sapg.scot/media/7247/20221121-gprs-for-redosing-antibiotics-for-surgical-prophylaxis.pdf

These recommendations have been developed based on current practice in NHS boards, international guidance and information on antibiotic half-lives. Recommendations for re-dosing after 4 or 8 hours are intended to promote safe and effective surgical prophylaxis for procedures lasting > 4 hour and are also applicable to situations where there is intra-operative blood loss of > 1500ml.
While these recommendations will cover the majority of surgical procedures, in cases of extensive blood loss (>3000ml), decisions around re-dosing should be made on an individual patient basis taking account of the risks and benefits of repeat dosing. It is not recommended to give a repeat dose after every subsequent 1500ml blood loss.

Drug	During the procedure		If there is blood loss above 1,500 mL (after giving fluid replacement)	Drug half-life
	After 4 hours	After 8 hours		
Amoxicillin*	Repeat original dose	Repeat original dose (again)	Repeat original dose	1 hour
Co-amoxiclav* (Amoxicillin + clavulanic acid)	Repeat original dose	Repeat original dose (again)	Repeat original dose	1 hour
Cefuroxime	Repeat original dose	Repeat original dose (again)	Repeat original dose	70 minutes
Clarithromycin	Not required	Repeat original dose	Repeat original dose	3-7 hours
Clindamycin	Repeat original dose	Repeat original dose (again)	Repeat original dose	3 hours
Gentamicin**	Not required	*For patients with creatinine clearance (CrCl) over 60 mL/min* Redosing required when less than or equal to 4 mg/kg dosing only. Give half original dose or alternative antibiotic. For 5 mg/kg dosing, do not redose with gentamicin. As an alternative to gentamicin consider co-amoxiclav 1200 mg or if penicillin allergy give ciprofloxacin 400 mg. Patients undergoing colorectal surgery over 6 hours may require additional antibiotic prophylaxis.[6]	Give half original dose or consider co-amoxiclav 1,200 mg or if penicillin allergy give ciprofloxacin 400 mg	3 hours (if normal renal function)

Drug	During the procedure		If there is blood loss above 1,500 mL (after giving fluid replacement)	Drug half-life
	Over 4 hours	Over 8 hours		
Flucloxacillin	Repeat original dose	Repeat original dose (again)	Repeat original dose	1 hour
Metronidazole	Not required	Repeat original dose	Repeat original dose	8-10 hours
Teicoplanin	Not required	Not required	Give half original dose if 1,500 mL or more blood loss within first hour of operation	100-170 hours

***Amoxicillin and co-amoxiclav** The American Society of Health-System Pharmacists, Infectious Diseases Society of America, Surgical Infection Society, and Society for Healthcare Epidemiology of America recommend redosing ampicillin after 2 hours (note: amoxicillin and ampicillin have similar pharmacokinetic profiles). 3 Consider redosing interval reflecting on local current practice and postoperative infection rates.

****Gentamicin** Literature suggests redosing of gentamicin is not required when a single dose of 5 mg/kg is used. A lower dose or alternative antibiotic is recommended in patients with reduced renal function (CrCl less than 20 mL/min). A pharmacokinetic evaluation of gentamicin dosing regimens in abdominal surgery found 3 mg/kg was comparable to 5 mg/kg at 6 hours from prophylactic dose; 2 however, longer surgeries, eg over 8 hours, may require redosing if the 3 mg/kg dose is used. Consider redosing with 2.5 mg/kg after 6 hours in patients with CrCl over 50 mL/min undergoing colorectal surgery.4 Renal toxicity has been observed in patients receiving flucloxacillin and gentamicin for surgical prophylaxis in orthopaedic surgery; therefore, in these instances consider lower doses or alternative antibiotics.

Summary of Evidence Review:

A large cohort study1 emphasised the importance of redosing in long-duration surgery to prevent the occurrence of SSIs, which are significantly more common in this patient group when redosing is omitted. The National Institute of Health and Care Excellence (NICE) and Stanford Surgical Antimicrobial Prophylaxis Guidelines have been updated since 2018. The NICE guideline restates the 2008 guidance to give a repeat dose of antibiotic prophylaxis when the operation is longer than the half-life of the antibiotic given. United States guidance advises the use of antibiotics that are not commonly recommended in the United Kingdom and recommends redosing after two half-lives; however overall the redosing advice is generally consistent with current Scottish Antimicrobial Prescribing Group guidelines. Canadian guidance (2016) adds that weight-based dosing should be used but does not provide full dosing regimens.

A small study (n=20) conducted in Glasgow investigated prophylactic antibiotic dosage regimens that would maintain plasma concentrations of amoxicillin, metronidazole and gentamicin above the minimum inhibitory concentration (MIC) values for common organisms associated with SSIs in colorectal surgery. The study authors proposed a change to dosing and redosing guidance for patients weighing more than 85 kg or at high risk of infective endocarditis.

A pharmacokinetic evaluation of gentamicin dosing regimens in abdominal surgery found that 3 mg/kg was comparable to 5 mg/kg at 6 hours from prophylactic dose.2 The article shows reducing levels from 5 hours; therefore, longer surgeries, eg over 8 hours, may require redosing if the 3 mg/kg dose is used

please see full document for references 20221121-gprs-for-redosing-antibiotics-for-surgical-prophylaxis.pdf (sapg.scot)

Specific local guidance in surgical prophylaxis:

a. Gentamicin

Do not use in Myasthenia Gravis

Please use the gentamicin dose banding table in Appendix 1.

Dosage recommendations – height/weight based dose (usual range 2mg/kg to 5mg/kg) with patients who are overweight dosed according to ideal body weight.

Doses of up to 300mg gentamicin can be given by slow IV injection over 3 – 5minutes

Advice on repeat dosing – a single dose of gentamicin will provide cover for 8 hours in patients with normal renal function and is very unlikely to result in renal toxicity even in patients with impaired renal function. A second dose of gentamicin may be given in situations of high blood loss or a prolonged procedure (>8 hours) if eGFR > 60.

If subsequent treatment using gentamicin is required, measure gentamicin concentrations 6-14 hours post theatre gentamicin dose and follow guidance on re-dosing for gentamicin dosing. Calculate the dose using the online calculator. Discuss with pharmacy if further advice required (or if out of hours on call pharmacist).

Teicoplanin and gentamicin are incompatible when mixed directly and must not be mixed before injection

b. Glycopeptides

Indications for use – prophylaxis in patients with or at high risk of MRSA or in penicillin allergic patients undergoing major implant surgery or when flucloxacillin is recommended first line.

Advice on administration - teicoplanin can be administered as a bolus injection and can be prepared and given in theatre. Vancomycin is a suitable alternative but requires to be administered as an infusion therefore needs to be prepared and administration started by ward staff approximately 2 hours prior to the planned operating time.

Local policies should highlight the potential for allergic reactions to teicoplanin. Risk is low (16.4 per 100,000) but reactions are severe.

Teicoplanin

- If patient's weight is less than or equal to 40kg give teicoplanin 400mg
- Give 400 – 800mg teicoplanin by slow IV injection over 3-5 minutes

If **>1.5L blood loss:** replace fluid and repeat antibiotic dose intra-operatively: benzyl penicillin, clindamycin, co-amoxiclav (with amoxicillin for weight >100kg). Gentamicin should be re-dosed at half prophylaxis dose. Give half the original teicoplanin dose if ≥ 1.5L blood loss within the first hour of operation.

If **surgery prolonged >4hrs post first antibiotic dose:** repeat amoxicillin, benzyl penicillin, clindamycin, co-amoxiclav (with added amoxicillin if weight > 100kg); **>8hrs post first antibiotic dose -** repeat amoxicillin, benzyl penicillin, clindamycin, co-amoxiclav, (with added amoxicillin if weight > 100kg), and if eGFR > 60ml/min/ 1.73m^2 gentamicin (full prophylactic dose). No repeat dosing of **teicoplanin** if surgery prolonged

CPE carriers: For those patients who have been identified as CPE (carbapenemase producing enterobacteriaceae) carriers, contact microbiology.

****High BMI dosing**

Co-amoxiclav, clindamycin and metronidazole.

- Pregnant : use booking in weight
- Non-pregnant : use current weight

Weight > 80 Kg and >100kg
Increase the dose of antibiotic as below:

	>100kg	
Co-amoxiclav	Add 1g IV amoxicillin to 1.2g IV Co-amoxiclav	
	>80kg	**>160kg**
Clindamycin	900mg	1200mg
Metronidazole	1000mg	1500mg

Obstetric and Gynaecology Procedures

Single dose, IV prophylaxis **≤ 60mins** prior to skin incision/ intervention**.**
Obstetric surgery: Dosing based on booking weight – please see appendix for additional dosing in high BMI

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
Caesarean Section	*Single dose* Co-Amoxiclav** 1.2g I.V	<60 mins prior to skin incision
	PENICILLIN ALLERGY *Single dose* Gentamicin* IV and Clindamycin** IV 600mg IV	
Manual Removal of Placenta	*Single dose* Co-Amoxiclav** 1.2g I.V	<60 mins prior to skin incision
	PENICILLIN ALLERGY *Single dose* Gentamicin* IV and Clindamycin** IV 600mg	
3rd degree tear	*Single dose* Co-Amoxiclav** 1.2g I.V	<60 mins prior to skin incision Second dose 6 hours later: Co-Amoxiclav** 1.2g I.V
	PENICILLIN ALLERGY *Single dose* Clindamycin** 600mg IV and Gentamicin* IV	*Or in penicillin allergy* Clindamyci**n IV 600mg No repeat dosing of gentamicin
4th degree tear (Obstetric Anal Sphincter Injury)	*Single dose* Co-Amoxiclav** 1.2g I.V	<60 mins prior to skin incision Second dose 6 hours later: Co-Amoxiclav** 1.2g I.V
	PENICILLIN ALLERGY *Single dose* Clindamycin** 600mg IV and Gentamicin* IV	*Or in penicillin allergy* Clindamycin** IV 600mg Then oral Co-amoxiclav 625mg (or clindamycin 600mg) 8 hourly for total duration (IV/oral) of 5 days
Assisted Vaginal Delivery (Ventouse/Forceps)	*Single dose* Co-Amoxiclav** 1.2g I.V	Within three hours of procedure.
	PENICILLIN ALLERGY *Single dose* Clindamycin** 600mg IV and Gentamicin* IV	
Pre-term, pre-labour rupture of membranes	Erythromycin PO 250mg 6 hourly for 10 days	Prophylaxis only required if no evidence of chorioamnionitis Erythromycin has significant drug interactions and can cause QTc prolongation

Gynaecology Procedures Cont'd

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
Hysterectomy (abdominal, vaginal) Laparotomy Pelvic floor repair (non-mesh) Endometrial resection Operative laparoscopy (treatment of endometriosis, adnexal surgery and subtotal/TAH	Co-amoxiclav IV 1.2g** *Or in penicillin allergy* Clindamycin** 600mg IV and Gentamicin* IV **MRSA POSITIVE** Gentamicin* IV and Metronidazole 500mg IV and Teicoplanin 400mg IV	Given immediately prior to skin incision. Teicoplanin and gentamicin are incompatible when mixed directly and must not be mixed before injection
Cystoscopy Hysteroscopy Endometrial ablation Diagnostic laparoscopy Laparoscopic sterilisation	**Not recommended**	
Surgical Management of Miscarriage/Surgical termination of pregnancy	Metronidazole 1g PR or 800mg PO.	2 hours before surgery For women who test positive for Chlamydia and the abortion has occurred, first line treatment is Doxycycline PO 100mg 12 hourly for 7 days For women who test positive for Chlamydia and the abortion has yet to occur, the treatment is Azithromycin 1g on day 1, 500mg on day 2 and 500mg on day 3 (total 2g)
Any gynaecology procedure requiring laparotomy	Co-amoxiclav** IV 1.2g *Or in penicillin allergy* Clindamycin** 600mg IV and Gentamicin* IV **MRSA POSITIVE** Gentamicin* IV and Metronidazole 500mg IV and Teicoplanin 400mg IV	Given immediately prior to procedure Teicoplanin and gentamicin are incompatible when mixed directly and must not be mixed before injection
For women undergoing laparotomy where risk of bowel entry is anticipated, consider as an alternative	Amoxicillin IV 1g AND Gentamicin* IV AND Metronidazole IV 500mg	

Urological Surgery and Procedures

Single dose, IV prophylaxis **≤ 60mins** prior to skin incision/ intervention**.**
Single dose, oral ciprofloxacin **1 hour** prior to the procedure

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
ALWAYS review previous microbiology results. Ensure that prophylaxis covers recent urinary tract isolates If patient colonised or infected with resistant pathogens, please contact on-call microbiologist INCREASING levels of ciprofloxacin resistance in Dumfries and Galloway		
Transrectal prostate biopsy	Gentamicin* IV OR ***(If resistant isolate OR contraindication to gent)*** *Ciprofloxacin 750mg PO*	Given immediately prior to skin incision. oral ciprofloxacin **1 hour** prior to the procedure
Endo-Urological procedure: Endoscopic ureteric stone fragmentation/removal Ureteric Stent insertion/change TURP	Gentamicin* IV OR ***(If resistant isolate OR contraindication to gent)*** *Ciprofloxacin 750mg PO*	
TURBT Cystoscoy Urodynamic examination Cystoscopic Stent Removal Urethral Catheter Change	Not routinely recommended For TURBT if patient is high risk (tumour size/necrosis), consider **Gentamicin* IV**	
Percutaneous procedures: Percutaneous nephrolithotomy (PCNL) Extracorporeal shock wave lithotripsy (ESWL) Removal of Cystectomy Ureteric Stents	Gentamicin* IV OR ***(If resistant isolate OR contraindication to gent)*** *Ciprofloxacin 750mg PO*	
Open, laparoscopic & robotic assisted operations: Open operation or laparoscopic surgery involving opening the urinary tract with bowel segments Prostatectomy Cystectomy	Amoxicillin IV 1g AND Gentamicin* IV AND Metronidazole IV 500mg If true penicillin allergy, replace IV Amoxicillin with IV Teicoplanin 800mg	

Orthopaedic Surgery

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
Elective Arthroplasty **and** primary surgery involving insertion of implant Revision surgery: joint infection **not** suspected	IV Cefuroxime 1.5g *If true penicillin allergy or high MRSA risk* IV teicoplanin 800mg	Given immediately prior to skin incision. Includes use of antibiotic impregnated cement
Revision surgery: joint infection suspected	Ensure microbiology results are interpreted Withhold antibiotics ideally until >5 specimens have been taken Intra-operatively give: IV gentamicin AND IV Teicoplanin 800mg single intraoperative dose, followed by IV vancomycin on the ward	Post-operative Gentamicin and Vancomycin are to be used unless otherwise advised Gent is to be prescribed post-op as a treatment dose (take into account intra-operative dose) 1) For subsequent gentamicin dosing on the ward, use the gent calculator and prescribe on chart 2) Vancomycin loading dose should be given 6-12 hours post intra-operative teicoplanin. Use vanc calculator and prescribe on chart 3) Discuss antibiotic choice with microbiology at 72 hours post surgery
Elective Surgery without implant (clean) Soft tissue surgery of hand Arthroscopy Open reduction internal fixation Hemiarthroplasty	Not recommended Not recommended Not routinely recommended IV Cefuroxime 1.5g *If true penicillin allergy or high MRSA risk* IV teicoplanin 800mg	

Trauma **Open fracture** 1) At presentation Antibiotics within 3 hours of injury (Continue until first debridement) 2) At time of first debridement (Continue until soft tissue closure or for max 72 hours) 3) At surgery for skeletal stabilisation and definitive tissue closure (Single dose only)	If high MRSA risk, discuss with microbiology 1) IV Co-Amoxiclav** 1.2g 8 hourly *Or in penicillin allergy* Clindamycin** 600mg IV 6 hourly If grossly contaminated, ADD Gentamicin* IV 2) IV Co-Amoxiclav** 1.2g *Or in penicillin allergy* Clindamycin** 600mg IV 3) IV Co-Amoxiclav** 1.2g *Or in penicillin allergy* Clindamycin** 600mg IV	
Trauma Surgery without implant (clean)	Not recommended	
Trauma **Contaminated hand trauma (without bite)**		

Vascular

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
Lower limb amputation Arterial Reconstructions/Vascular surgery (abdominal and lower limbs)	Flucloxacillin IV 1g + Gentamicin IV* Penicillin allergy/MRSA positive Teicoplanin 400mg IV + Gentamicin IV	

ENT Surgery

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
Head and neck surgery, contaminated	Co-amoxiclav** IV 1.2g Penicillin allergy: 1. Clarithromycin 500mg + metronidazole 500mg	Single dose IV prophylaxis <60 minutes prior to skin incision/intervention
Grommet Insertion Ear Surgery (clean) Head and Neck Surgery (Clean) Nose and Sinus surgery Tonsillectomy Adenoidectomy (by curettage)	Not recommended	

Ophthalmology

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
Cataract Surgery Glaucoma or corneal grafts Penetrating eye injury	Cefuroxime Injected into anterior chamber	
Lacrimal surgery	Co-amoxiclav **IV 1.2g	

General Surgery

OPERATION	ANTIBIOTIC	TIMING OF ADMINSTRATION AND ADDITIONAL DOSES
Colorectal surgery Appendectomy with risk of ruptured viscus/peritoneal contamination Biliary surgery (open and laparoscopic) Percutaneous drainage Biliary drainage/ stenting Percutaneous endoscopic gastrostomy (PEG) Gastroduodenal surgery Oesophageal surgery Small bowel surgery Liver surgery Pancreatic surgery	Gentamicin* IV AND IV Metronidazole 500mg AND IV Amoxicillin 1g **PENICILLIN ALLERGY** Gentamicin* IV AND IV Metronidazole 500mg AND Teicoplanin 400mg	<60 mins prior to skin incision
INTERVENTIONAL PROCEDURE	**ANTIBIOTIC**	**TIMING OF ADMINSTRATION AND ADDITIONAL DOSES**
Percutaneous drainage Biliary drainage/stenting Biopsy	Gentamicin IV*	
ERCP	Gentamicin IV*	No change
Upper GI Haemorrhage	Co-Amoxiclav** 1.2g 8 hourly Or if penicillin allergy Ciprofloxacin 400mg IV 12 hourly	Continue antibiotics for 48 hours after cessation of bleeding (Observe IV to oral switch)

Appendix 1

Gentamicin* Surgical Prophylaxis

Dosing Guidelines

• **Prophylactic gentamicin dosing** is based on **patient height** and approximates to 5mg/kg/ideal body weight, capped at 400mg.
• Doses of gentamicin can be given by slow IV injection over 3-5 minutes.
• Patients receiving aminoglycosides as a slow IV bolus should be closely monitored for other signs of extravasation or infiltration e.g. swelling, redness, coolness or blanching at the cannula insertion site.
• Avoid gentamicin if eGFR< 20ml/min/1.73m^2: seek advice on alternative from microbiology. In renal transplant patients avoid gentamicin and seek advice from microbiology or renal team.

Height ranges (cm)	Gentamicin Dose (mg)	
	Males	Females
142 – 146	240	200
147 – 154	280	240
155 – 164	320	280
165 – 174	360	320
≥175	400	400