

**NHS Grampian Acute Sector Empirical Antimicrobial
Therapy Prescribing Guidance In Adults**

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Executive Sign-Off

This document has been endorsed by the Director of Pharmacy and Medicines
Management

Signature: *[Signature]*

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Across NHS Boards	Organisation Wide	Directorate	Clinical Service	Sub Department Area

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(Antimicrobial Prescribing Guideline for Acute Care)

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Organisational: Chief Executive and Management Teams
Corporate: Senior Managers
Departmental: Heads of Service/Clinical Leads
Area: Line Managers
Hospital/Interface services: Assistant General Managers and Group Clinical Directors
Operational Management Unit: Unit Operational Managers

Policy statement: It is the responsibility of all staff to ensure that they are working to the most up to date and relevant policies, protocols procedures.

Review: This policy will be reviewed in three years or sooner if current treatment recommendations change

This document is also available in large print and other formats and languages, upon request. Please call NHS Grampian Corporate Communications on (01224) 551116 or (01224) 552245.

Responsibilities for review of this document: Specialist Antibiotic Pharmacists

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Revision Date	Previous Revision Date	Summary of Changes (Descriptive summary of the changes made)	Changes Marked* (Identify page numbers and section heading)
October 2018	September 2015	See version control statements – Appendix 1	

* Changes marked should detail the section(s) of the document that have been amended, i.e. page number and section heading.

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Introduction:

This guidance should be used to determine the choice of initial empirical antimicrobial therapy for adult patients in acute hospitals in NHS Grampian. This guidance does not cover the choice of empirical antimicrobial therapy for all infections and does not replace the need for taking samples to determine the specific causative organism to further direct therapy. Prescribers should review microbiology results promptly and de-escalate to pathogen-directed narrow spectrum treatment where appropriate. Specialist advice will be required for some infections.

The document should not be used to guide therapy if the organism is known and there are specific microbiological sensitivities. If there are other reasons that determine specific antimicrobial therapy, e.g. previous sensitivity testing, Meticillin-Resistant Staphylococcus Aureus (MRSA) status, recent Extended Spectrum Beta Lactamase (ESBL) infection, these must be taken into account. The document does not cover the treatment of infections in patients with some chronic disorders such as cystic fibrosis/bronchiectasis or apply in all cases, for example in patients who are immunosuppressed.

Doses quoted are for patients without renal or hepatic impairment, therefore adjustments may be required depending on patient circumstances. Cautions, contra-indications and drug interactions should also be considered, for example with macrolides, quinolones, rifampicin, etc – refer to [BNF or Stockley's online interaction checker](#).

Co-trimoxazole

Co-trimoxazole is currently restricted by the Committee on Safety of Medicines for a very limited range of indications, however it is being recommended empirically for some indications in this document. This use is off-label, but is supported by the evidence base, local sensitivities, and has been agreed by the NHSG Clinical Governance Committee. Co-trimoxazole has not been restricted in the same way in other countries. It has successfully been used locally since October 2009 to treat urinary, intra-abdominal and severe respiratory infections in inpatient areas which have had a restriction on the high risk for Clostridioides difficile (CDI) antibiotics. Prescribers should be aware of the contra-indications and interactions associated with co-trimoxazole and should consider alternative treatments in patients who take concurrent interacting medication or who are at greater risk of developing side effects. Treatment should be discontinued immediately if blood disorders or rash develop. If creatinine clearance (CrCl) estimated using the Cockcroft-Gault equation is 15 - 30mL/min then half the recommended dose should be used. Avoid if CrCl < 15mL/min.

IV to oral switch therapy (IVOST)

Recommendations for IV to oral switches are included in the guidance and reference should be made to the IVOST policy for more information on suitable criteria and patient assessment - [IVOST policy](#)

Outpatient Parenteral Antibiotic Therapy (OPAT)

Consider referral for OPAT in patients who require long-term IV antibiotics.
<http://nhsgintranet.grampian.scot.nhs.uk/depts/OPAT/Pages/default.aspx>

Penicillin allergy

Options for patients with penicillin allergy are included in the guidance – for further information refer to the Penicillin allergy policy

<http://foi.nhsgrampian.org/globalassets/foidocument/foi-public-documents1---all-documents/nhsgpena.pdf>

Pregnancy and breast-feeding

Some of the empirical antibiotic choices within the guidelines may not be appropriate in patients who are pregnant or breastfeeding – further advice should be sought where necessary.

Consider immune deficiency and testing for HIV

According to the [UK National Guidelines for HIV Testing 2008](#) late diagnosis of HIV infection has been associated with increased mortality and morbidity, impaired response to HAART (highly active anti-retroviral therapy), and increased cost to healthcare services. Therefore, a recommendation to “consider immune status and HIV testing” has been added to ‘indicator infections’ included within these guidelines.

Aztreonam

Aztreonam is being offered as an alternative to gentamicin in sepsis of unknown origin and neutropenic sepsis where the patient has impaired renal function (eGFR<30mL/min, CKD stage \geq 4) and the clinician wishes to avoid further renal toxicity. Aztreonam does not provide the same spectrum of antibacterial cover as gentamicin; it has no gram positive activity and variable cover of pseudomonas aeruginosa. Aztreonam can be used with caution in patients with a history of penicillin hypersensitivity, due to a low risk of cross-sensitivity. See [Guidance on the use of Aztreonam](#) for more information.

Frail elderly patients and avoidance of high risk for CDI antibiotics

The high risk for CDI antibiotics (co-amoxiclav, quinolones, cephalosporins, clindamycin) should be avoided where possible in frail elderly patients. The guidelines include alternatives such as co-trimoxazole.

Consider frailty in patients aged 75 and over, or over 65 and admitted from nursing, residential care or community hospital with any of the following ‘FRAIL’ criteria:

- Functional impairment in context of significant multiple conditions (new or pre-existing)
- Resident in care home
- Acute confusion (Think Delirium) e.g. 4AT screening tool – is there a diagnosis of dementia or history of chronic confusion?
- Immobility or falls in last 3 months
- List of six or more medicines (polypharmacy).

Systemic Fungal Infections

Refer to [NHS Grampian Acute Sector Empirical Therapy Prescribing Guidance for Systemic Fungal Infections in Adults](#)

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

1. Gastro-intestinal Tract and Intra-abdominal

- Collect appropriate specimens for culture before starting treatment. Send faecal samples and blood for culture if pyrexial.
- Seek specialist advice if appropriate.

INFECTION

Infective gastroenteritis

Take infection prevention and control precautions.

Frequently self limiting and may not be bacterial.

Antibacterials are not usually indicated.

If bloody diarrhoea, severe systemic upset, immunocompromised patient or returning traveller discuss with medical microbiology or infectious disease specialist.

Consider immune deficiency and testing for HIV.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

1 Gastro-intestinal Tract and Intra-abdominal				
<ul style="list-style-type: none"> Collect appropriate specimens for culture before starting treatment. Seek specialist advice if appropriate. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Suspected <i>Clostridioides difficile</i> Infection (CDI)	<i>Clostridioides difficile</i>	<ul style="list-style-type: none"> If CDI suspected, start treatment and ensure infection control measures are in place – do not wait for confirmation of diagnosis. Send stool sample. Stop any (non-<i>Clostridioides difficile</i>) antimicrobial treatment in patients with CDI if possible. Review any concurrent gastric acid suppressant therapy and reduce or stop if appropriate. Review and stop any anti-motility agents to reduce the risk of toxic megacolon development. Stop any laxatives for duration of symptoms. Rehydrate patient. Assess symptoms and severity of disease taking into account individual risk factors for patient: <p>Severity Markers</p> <ul style="list-style-type: none"> Temperature >38.5°C Consider severe co-morbidities/immunodeficiency Suspicion of pseudomembranous colitis, toxic megacolon, ileus Evidence of severe colitis on CT scan/ x-ray White blood cell count >15 x 10⁹ cells/L Acute rising creatinine >1.5 x baseline <p>NB: Alcohol gel does not kill <i>C difficile</i> spores – follow hand-washing guidance.</p> <p>For further information refer to local protocol and Refer to Health Protection Network Scottish Guidance Sep2017</p>		
FIRST EPISODE				
Patient has NO severity markers (non-severe)		Metronidazole* 400mg orally 8 hourly for 10 days.		Assess patient daily. Observe bowel movements, symptoms (WBC and hypotension) and fluid balance. If symptoms continue to worsen, refer to surgery, gastroenterology and microbiology. *If patient is pregnant/breast feeding, vancomycin should be used 1 st line.
Patient has ≥1 severity marker(s) (severe) OR if no response after 5 days of metronidazole		If condition does not improve after 5 days, switch to oral vancomycin. Vancomycin 125mg orally 6 hourly for 10 days. Consider adding IV metronidazole 500mg 8 hourly if ileus or hypotension.		
SECOND OR SUBSEQUENT RECURRENCE				
Patient with recurrent CDI		Refer to Health Protection Network Scottish Guidance Sep2017		Discuss treatment options with Medical Microbiologist or Infection Specialist.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

1 Gastro-intestinal Tract and Intra-abdominal				
<ul style="list-style-type: none"> Collect appropriate specimens for culture before starting treatment. Seek specialist advice if appropriate. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Biliary sepsis Cholecystitis, Acute cholangitis (ascending).	Coliforms Enterococci	<p>‡ Gentamicin IV (Hartford Regimen) as per protocol + Amoxicillin 1g IV 8 hourly +/- Metronidazole 500mg IV 8 hourly.</p> <p>Switch to oral: Doxycycline 100-200mg daily +/- Metronidazole 400mg 8 hourly</p> <p>OR</p> <p>Co-trimoxazole 960mg 12 hourly +/- Metronidazole 400mg 8 hourly.</p> <p>Total duration (IV/oral) 7 days.</p>	<p>In penicillin allergy or if gentamicin not appropriate: Co-trimoxazole 960mg IV* 12 hourly +/- Metronidazole 500mg IV 8 Hourly.</p> <p>Switch to oral: Doxycycline 100-200mg daily +/- Metronidazole 400mg 8 hourly</p> <p>OR</p> <p>Co-trimoxazole 960mg 12 hourly +/- Metronidazole 400mg 8 hourly.</p> <p>Total duration (IV/oral) 7 days.</p>	<p>Send blood for culture, 2 sets (20mL per set) if possible prior to starting antibiotics. Send bile sample at operation.</p> <p>Oral switch should be guided by antibiotic sensitivity if any positive microbiology available.</p> <p>‡If > 72 hours IV therapy required replace gentamicin with temocillin IV 2g 12 hourly.</p> <p><i>*If co-trimoxazole IV unavailable and IV route required use ciprofloxacin 400mg IV 12 hourly and switch to oral co-trimoxazole as soon as appropriate.</i></p> <p>The addition of anaerobic cover with metronidazole is not normally required.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

1 Gastro-intestinal Tract and Intra-abdominal				
<ul style="list-style-type: none"> Collect appropriate specimens for culture before starting treatment. Seek specialist advice if appropriate. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Intra-abdominal sepsis Including: appendicitis, diverticulitis, peritonitis, perianal abscess or pilonidal abscess.	Coliforms Anaerobes Enterococci	<p>Gentamicin* IV (Hartford Regimen) IV as per protocol</p> <p>+ Metronidazole 500mg IV 8 hourly + Amoxicillin 1g IV 8 hourly.</p> <p>Switch to oral Doxycycline 100-200mg oral daily + Metronidazole 400mg 8 hourly</p> <p>OR</p> <p>Co-trimoxazole 960mg oral 12 hourly + Metronidazole 400mg 8 hourly.</p> <p>Total duration (IV/oral) 3 - 5 days depending on degree of contamination and established infection.</p>	<p>In penicillin allergy or if gentamicin not appropriate: Co-trimoxazole 960mg IV* 12 hourly + Metronidazole 500mg IV 8 hourly.</p> <p>Switch to oral Doxycycline 100-200mg oral daily + Metronidazole 400mg 8 hourly</p> <p>OR</p> <p>Co-trimoxazole 960mg oral 12 hourly + Metronidazole 400mg 8 hourly.</p> <p>Total duration (IV/oral) 3 – 5 days depending on degree of contamination and established infection.</p>	<p>Send blood for culture, 2 sets (20mL per set) if possible, and pus from operation.</p> <p>¥If > 72 hours IV therapy required replace gentamicin with temocillin IV 2g 12 hourly.</p> <p><i>*If co-trimoxazole IV unavailable and IV route required use ciprofloxacin 400mg IV 12 hourly and switch to oral co-trimoxazole as soon as appropriate.</i></p> <p>Oral switch may not be required depending on duration of IV therapy.</p> <p>Surgical drainage is an important part of managing infected abscesses.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

1 Gastro-intestinal Tract and Intra-abdominal					
<ul style="list-style-type: none"> Collect appropriate specimens for culture before starting treatment. Seek specialist advice if appropriate. 					
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes	
Acute upper gastrointestinal haemorrhage in patients with decompensated liver disease	<i>Escherichia coli</i> , Gram positive cocci, Enterococci	If IV route required: Co-trimoxazole 960mg IV* 12 hourly. Switch to oral Co-trimoxazole 960mg 12 hourly when appropriate to complete 5 days.	If IV route required: Ciprofloxacin 400mg IV 12 hourly Switch to oral Ciprofloxacin 500mg 12 hourly when appropriate to complete 5 days.	*If co-trimoxazole IV unavailable and IV route required use IV ciprofloxacin. Oral switch remains co-trimoxazole.	
Spontaneous bacterial peritonitis (SBP) in patients with chronic liver disease	<i>Escherichia coli</i> , Gram positive cocci, Enterococci	Treat if; <ul style="list-style-type: none"> Ascitic fluid neutrophil count is $>0.25 \times 10^9/L$ OR <ul style="list-style-type: none"> Ascitic fluid white cell count of $>0.5 \times 10^9/L$ 			
		TREATMENT: If IV route required: Co-trimoxazole 960mg IV* 12 hourly Switch to oral Co-trimoxazole 960mg 12 hourly to complete 7 - 10 days.	If IV route required: Ciprofloxacin 400mg IV 12hourly Switch to oral Ciprofloxacin 500mg 12 hourly when appropriate to complete 7 - 10 days.	*If co-trimoxazole IV unavailable & IV route required use: ciprofloxacin 400mg IV 12 hourly. NB: Oral switch remains co-trimoxazole.	
		Prescribe prophylaxis only <ul style="list-style-type: none"> For duration of hospital admission if no signs of infection but ascitic protein fluid concentration is low ($<10 \text{ g/L}$) Long-term prophylaxis following an episode of SBP in patients with chronic liver disease 			
		PROPHYLAXIS: Co-trimoxazole 960mg orally 24 hourly continuously.			

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

2. Cardiovascular				
<ul style="list-style-type: none"> Always take blood for culture before starting treatment for endocarditis – two or three sets over 2 – 24 hours (> 6 hours apart ideally) and as close as possible to peak of pyrexia. Refer to the British Society for Antimicrobial Chemotherapy guidelines for the treatment of endocarditis. Consult with Infectious Diseases specialist and medical microbiologist about organism specific therapy and consider need for urgent surgical intervention. Total course of treatment in endocarditis is 4 to 6 weeks. Duration of treatment depends on organism, patient characteristics, presence of prosthetic valve, etc. 				
INFECTION	Presentation	Antibiotics		Comments
Infective Endocarditis	Indolent presentation	Amoxicillin 2g IV 4 hourly + (optional) Gentamicin IV as per synergistic dosing protocol (low threshold for discontinuing once organism identified – seek microbiology advice).		Check gentamicin levels regularly. Levels for endocarditis: Pre-dose (trough) <1mg/L and peak (1 hour post-dose) 3-5mg/L.
	Severe sepsis/acute presentation or penicillin allergy	Vancomycin IV (see local protocol for vancomycin dosing) + Gentamicin IV as per synergistic dosing protocol .		Check vancomycin levels regularly: Pre-dose (trough) level of 15-20mg/L.
	Intra-cardiac prosthesis	Vancomycin IV (see local protocol for vancomycin dosing) + Gentamicin IV as per synergistic dosing protocol + Rifampicin 300-600mg oral/IV 12 hourly.		Rifampicin helps eradicate bacteria attached to prosthetics.
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments
Infected Central Line	Coagulase-negative Staphylococcus spp, <i>Staphylococcus aureus</i>	Remove or replace catheter wherever possible. Vancomycin IV as per protocol (given via the infected line if not possible to remove the catheter). NB: For Haematology/oncology patients refer to specific local guidance.		Take peripheral and central line cultures before starting empirical antibiotics. If line is removed, send tip for culture. If <i>Staph. aureus</i> is isolated in the blood, the line should be removed and a minimum of 14 days of appropriate antibiotics given – refer to Staph.aureus (SAB) algorithm . NB: Locking lines with antibiotics is not generally recommended – contact microbiology for advice.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

3. Respiratory system				
<ul style="list-style-type: none"> • Collect sputum (AND blood cultures in pneumonia). • For patients with pneumonia, send urine for legionella antigen and a viral throat swab. • Consider diagnosis of influenza and isolate patient according to Patient Placement Tool. • Always consider prior therapy; patients who have not responded to a recent course of antibiotics should receive an alternative agent. • Oral therapy must be considered the norm except in SEVERE pneumonia or in patients unable to take oral therapy. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments
Acute bronchitis	Mostly viral	Antibiotics not usually indicated (little evidence of benefit unless patient has co-morbidities). Symptom resolution can take three weeks.		
Infective exacerbations of COPD or exacerbation of chronic bronchitis.	Only 30-50% infections are bacterial <i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i> , <i>Moraxella catarrhalis</i>	Give antibiotics if patient has a history of COPD and both the following are present; <ul style="list-style-type: none"> • Development of purulent sputum (dark green, not yellow) • WBC is >10 x 10⁹/L and/or CRP is elevated 		
Mild - Moderate		Amoxicillin 1g oral 8 hourly for 5 days.	In true penicillin allergy: Doxycycline 200mg oral stat then 100mg daily for 5 days.	
Severe		Co-trimoxazole 960mg IV 12 hourly until condition improves. Switch to oral Co-trimoxazole 960mg 12 hourly OR Doxycycline 200mg oral stat then 100mg 12 hourly to complete 7 days.	Clarithromycin 500mg oral/IV 12 hourly to complete 7 days.	

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

3 Respiratory system				
<ul style="list-style-type: none"> • Collect sputum (AND blood cultures in pneumonia). • For patients with pneumonia, send urine for legionella antigen and a viral throat swab. • Consider diagnosis of influenza and isolate patient according to Patient Placement Tool. • Always consider prior therapy; patients who have not responded to a recent course of antibiotics should receive an alternative agent. • Oral therapy must be considered the norm except in SEVERE pneumonia or in patients unable to take oral therapy. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments
Community acquired pneumonia (CAP)	<i>Streptococcus pneumoniae</i> (lobar pneumonia) <i>Mycoplasma pneumoniae</i> (atypical pneumonia) <i>Chlamydia pneumoniae</i> (atypical pneumonia)	Assessment of severity should be made using the CURB-65 criteria <ul style="list-style-type: none"> • Confusion • Urea > 7mmol/L • Respiratory rate >30/min • BP systolic <90mmHg or BP diastolic <60mmHg • 65 or more years of age A CURB-65 score of 3 or more of the above criteria denotes severe pneumonia. Also treat as severe if multilobar consolidation or cavitation on chest X-ray. Consider immune deficiency and testing for HIV.		
Low severity (CURB-65: 0-1)		Amoxicillin 1g oral 8 hourly OR Doxycycline 200mg oral stat then 100mg once daily Duration 5 days.		NB: Oral antibiotic therapy must be considered the norm except in patients unable to take oral therapy. Consider extending the course length if symptoms not improved after 3 days.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

3 Respiratory system				
<ul style="list-style-type: none"> • Collect sputum (AND blood cultures in pneumonia). • For patients with pneumonia, send urine for legionella antigen and a viral throat swab. • Consider diagnosis of influenza and isolate patient according to Patient Placement Tool. • Always consider prior therapy; patients who have not responded to a recent course of antibiotics should receive an alternative agent. • Oral therapy must be considered the norm except in SEVERE pneumonia or in patients unable to take oral therapy. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments
Moderate severity (CURB-65 = 2).		Amoxicillin oral or IV 1g 8 hourly + Clarithromycin oral 500mg 12 hourly (until atypical excluded). Total duration 5 -7 days.	In true penicillin allergy: Doxycycline monotherapy oral 100mg 12 hourly. Total duration 5 -7 days. If IV therapy required treat as CURB-65 ≥3.	Consider extending the course length if symptoms not improved after 3 days.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

3 Respiratory system				
<ul style="list-style-type: none"> Collect sputum (AND blood cultures in pneumonia). For patients with pneumonia, send urine for legionella antigen and a viral throat swab. Consider diagnosis of influenza and isolate patient according to Patient Placement Tool. Always consider prior therapy; patients who have not responded to a recent course of antibiotics should receive an alternative agent. Oral therapy must be considered the norm except in SEVERE pneumonia or in patients unable to take oral therapy. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments
High severity (CURB-65: ≥ 3)		<p>No previous antibiotics: Amoxicillin IV 1g 8 hourly + Clarithromycin oral 500mg 12 hourly (until atypical excluded)</p> <p>Switch to oral Doxycycline monotherapy 100mg 12 hourly</p> <p>OR Amoxicillin 1g 8 hourly + Clarithromycin 500mg 12 hourly (until atypical excluded)</p> <p>Previous antibiotics in community: Co-amoxiclav* IV 1.2g 8 hourly + Clarithromycin 500mg oral/IV 12 hourly (until atypical excluded)</p> <p>Switch to oral Doxycycline monotherapy 100mg 12 hourly</p> <p>Total duration (IV + Oral) 7 - 10 days.</p>	<p>In penicillin allergy: Co-trimoxazole 960mg IV 12 hourly</p> <p>OR Levofloxacin* 500mg IV 12 hourly</p> <p>Switch to oral Doxycycline monotherapy 100mg 12 hourly</p> <p>OR Co-trimoxazole 960mg 12 hourly</p> <p>Total duration (IV + oral) 7 - 10 days.</p>	<p>Risk assess for resistant organisms prior to therapy (previous microbiology sensitivities) and rationalise choice once sensitivities on current samples available.</p> <p>*Avoid co-amoxiclav and levofloxacin in frail elderly patients where possible due to CDI risk.</p> <p>If preceding influenza illness consider possibility of staphylococcal pneumonia.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

3 Respiratory system				
<ul style="list-style-type: none"> • Collect sputum (AND blood cultures in pneumonia). • For patients with pneumonia, send urine for legionella antigen and a viral throat swab. • Consider diagnosis of influenza and isolate patient according to Patient Placement Tool. • Always consider prior therapy; patients who have not responded to a recent course of antibiotics should receive an alternative agent. • Oral therapy must be considered the norm except in SEVERE pneumonia or in patients unable to take oral therapy. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments
Lower Respiratory tract infection	Define diagnosis e.g. acute bronchitis, exacerbation of COPD, CAP, etc and treat accordingly.			
Aspiration pneumonia	Mouth flora including anaerobes	<p>If oral appropriate: Amoxicillin 1g 8 hourly + Metronidazole 400mg 8 hourly.</p> <p>If IV required: Amoxicillin 1g IV 8 hourly + Metronidazole 500mg IV 8 hourly.</p> <p>Treat for 7 days.</p>	<p>In penicillin allergy:</p> <p>If oral appropriate: Clarithromycin 500mg 12 hourly + Metronidazole 400mg 8 hourly.</p> <p>If IV required: Clarithromycin 500mg IV 12 hourly + Metronidazole 500mg IV 8 hourly.</p> <p>Treat for 7 days.</p>	Consider chemical pneumonitis as a differential diagnosis – antibiotics would not be indicated
Post-operative chest infection	The most important treatment for post-operative chest infection is physiotherapy, adequate analgesia and mobilisation. If signs of pneumonia, treat as hospital acquired pneumonia, see below.			
EARLY Hospital acquired pneumonia (HAP) within ≤ 4 days of admission		Use CURB-65 score to assess severity and treat as for CAP.	Use CURB-65 score to assess severity and treat as for CAP.	Consider immune deficiency and testing for HIV.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

3 Respiratory system				
<ul style="list-style-type: none"> Collect sputum (AND blood cultures in pneumonia). For patients with pneumonia, send urine for legionella antigen and a viral throat swab. Consider diagnosis of influenza and isolate patient according to Patient Placement Tool. Always consider prior therapy; patients who have not responded to a recent course of antibiotics should receive an alternative agent. Oral therapy must be considered the norm except in SEVERE pneumonia or in patients unable to take oral therapy. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments
LATE HAP ≥ 5 days of admission		<p>NON-SEVERE: Amoxicillin 1g oral 8 hourly for 5 days</p> <p>SEVERE: Co-amoxiclav IV 1.2g 8hrly if life-threatening, ‡ + Gentamicin IV (Hartford Regimen) as per protocol</p> <p>Switch to oral Co-amoxiclav 625mg 8 hourly</p> <p>Total duration: 7 – 10 days.</p>	<p>In penicillin allergy:</p> <p>NON-SEVERE: Doxycycline oral 100mg 12 hourly</p> <p>OR</p> <p>Co-trimoxazole oral 960mg 12 hourly for 5 days</p> <p>SEVERE: Levofloxacin 500mg IV/oral 12 hourly</p> <p>Total duration: 7-10 days.</p>	<p>If MRSA likely add vancomycin IV as per protocol, for 7 - 10 days.</p> <p>‡If > 72 hours IV therapy required replace gentamicin with temocillin IV 2g 12 hourly.</p>
<p>Suspected Pneumocystis jiroveci (carinii) pneumonia in immunocompromised.</p> <p>Consider immune deficiency and testing for HIV.</p>	<i>Pneumocystis jiroveci</i>	<p>Co-trimoxazole 120mg/kg/day IV (in severe cases)</p> <p>OR</p> <p>Orally (non-severe) in 3 or 4 divided doses.</p> <p>In HIV patients reduce on day 4 to 90mg/kg/day for 18 days (in line with BHIVA guidelines).</p>	Seek specialist advice from infection unit.	<p>Refer to infection unit consultant. Consider adding prednisolone 1mg/kg in severe cases (e.g. PO2 <8kPa). (<i>BHIVA guidelines recommend 40mg twice daily for 5 days, 40mg daily for 5 days, then 20mg daily for 11 days.</i>)</p> <p>Send induced sputum or broncho-alveolar lavage for pneumocystis PCR and culture for mycobacteria, fungi and viruses.</p>
Lung abscess	<i>Klebsiella Pneumoniae, Staphylococcus aureus, Mixed infections including anaerobes</i>	<p>Co-amoxiclav 1.2g IV 8 hourly. Seek specialist advice on duration.</p>	<p>In penicillin allergy: Co-trimoxazole 960mg IV* 12 hourly + Metronidazole 500mg IV 8 hourly Seek specialist advice on duration.</p>	<p>Urgent referral to chest physician advised.</p> <p>Send sputum samples for culture. Aspiration or bronchoscopy may be indicated.</p> <p>*If co-trimoxazole IV unavailable use clindamycin IV 600mg 8 hourly +/- ciprofloxacin IV 400mg 12 hourly.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

3 Respiratory system			
<ul style="list-style-type: none"> • Collect sputum (AND blood cultures in pneumonia). • For patients with pneumonia, send urine for legionella antigen and a viral throat swab. • Consider diagnosis of influenza and isolate patient according to Patient Placement Tool. • Always consider prior therapy; patients who have not responded to a recent course of antibiotics should receive an alternative agent. • Oral therapy must be considered the norm except in SEVERE pneumonia or in patients unable to take oral therapy. 			
INFECTION	Likely organisms	Treatment	Comments
Suspected Influenza	<i>Influenza A and B</i> NB: This guidance refers to seasonal influenza and not pandemic strains.	All hospitalised patients with confirmed or suspected influenza should receive treatment regardless of whether they are in a high risk group or duration since exposure. Please refer to: HPS Influenza guidance Antivirals Section .	

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

4. Central nervous System				
<ul style="list-style-type: none"> Send CSF, blood for culture and glucose testing, nose and throat swabs and swab for gram-stain from any purpuric lesions but this should not delay treatment in cases of meningitis. If bacterial meningitis suspected send a ethylenediaminetetraacetic acid (EDTA) blood for Polymerase Chain Reaction (PCR). Specialist advice from medical microbiology is essential. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
<p>Bacterial meningitis</p> <p>Treatment should not be delayed in suspected cases of bacterial meningitis. Blind antimicrobial therapy should be given prior to lumbar puncture if there is any delay.</p> <p>Contact Health Protection Team for advice about contacts.</p>	<p><i>Neisseria Meningitides,</i> <i>Streptococcus pneumoniae</i></p>	<p>Ceftriaxone 2g IV 12 hourly</p> <p>Duration: 7 days for meningococcal, 14 days for pneumococcal.</p> <p>If patient >55 years</p> <p>+</p> <p>Amoxicillin 2g IV 4 hourly to cover Listeria (or vancomycin IV protocol if penicillin allergic).</p> <p>If prolonged or multiple antibiotic use in last 3 months, or travel in last 3 months to areas outside UK, contact ID/ microbiology for further advice.</p>	<p>Chloramphenicol 12.5-25mg/kg IV 6 hourly</p> <p>Seek specialist advice from Infection Unit or Medical Microbiology.</p>	<p>See British Infection Society (BIS) algorithm available from here, or on Meningitis.org.</p> <p>Change ceftriaxone to benzylpenicillin 2.4g IV 4 hourly if organism sensitive.</p> <p>NB: Extra amoxicillin cover not required if receiving benzylpenicillin.</p> <p>Amend antibiotics on the basis of microbiology results.</p> <p>Give dexamethasone base 8.3mg 6 hourly IV for 4 days.</p> <p>NB: 8.3mg dexamethasone base is 2.5ml of dexamethasone base injection 3.3mg/ml. 8.3mg dexamethasone base is equal to 10mg dexamethasone sodium phosphate.</p> <p>If recurrent - consider immune deficiency and testing for HIV.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

4 Central nervous System				
<ul style="list-style-type: none"> Send CSF, blood for culture and glucose testing, nose and throat swabs and swab for gram-stain from any purpuric lesions but this should not delay treatment in cases of meningitis. If bacterial meningitis suspected send a ethylenediaminetetraacetic acid (EDTA) blood for Polymerase Chain Reaction (PCR). Specialist advice from medical microbiology is essential. 				
INFECTION	Likely organisms	1 st Choice Antimicrobial		Comments/changes
Brain abscess	Coliforms, <i>Staphylococcus aureus</i> , <i>Pneumococcus</i> , <i>Streptococcus milleri</i> , oral anaerobes	Ceftriaxone 2g IV 12 hourly + Metronidazole 500mg IV 8 hourly.		Send blood for culture and aspirate abscess. Depending on culture results and response, switch to appropriate oral therapy to complete 4-6 weeks treatment. Consider immune deficiency and testing for HIV.
Encephalitis	Herpes simplex, Herpes zoster	Aciclovir 10mg/kg IV 8 hourly (dose adjustment required in renal impairment). Duration 14-21 days (if confirmed).		Discuss urgently with infection unit or Medical Microbiology. Send CSF and respiratory secretions (or nose and throat swabs in viral transport medium) and faeces.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

5. Urinary Tract				
<ul style="list-style-type: none"> • Samples should be taken prior to starting treatment. • Send blood for culture if pyrexial. • If culture results indicate sensitivity to 'tetracycline' then oxytetracycline (less expensive in primary care) or tetracycline should be considered. • Doxycycline is inappropriate due to low renal excretion. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Uncomplicated Lower UTI in females or Acute cystitis in females.	<i>Enterobacteriaceae</i> spp. <i>Escherichia coli</i> , <i>Staphylococcus saprophyticus</i>	Trimethoprim 200mg oral 12 hourly for 3 days.	Nitrofurantoin oral 100mg Modified Release (M/R) 12 hourly OR 50mg Immediate Release (I/R) 6 hourly for 3 days.	Consider specialist referral for recurrent infection. Send MSSU (carefully collected to avoid contamination.) Results of laboratory cultures and sensitivities usually available after overnight incubation.
Uncomplicated Lower UTI in males		Trimethoprim 200mg oral 12 hourly for 7 days	Nitrofurantoin oral 100mg M/R 12 hourly OR 50mg I/R 6 hourly for 7 days.	In patients with CKD3 or above and/or those at risk of hyperkalaemia these agents may be unsuitable. Please check current prescribing advice as per BNF and seek specialist advice if alternative agent required.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

5 Urinary Tract				
<ul style="list-style-type: none"> • Samples should be taken prior to starting treatment. • Send blood for culture if pyrexial. • If culture results indicate sensitivity to 'tetracycline' then oxytetracycline (less expensive in primary care) or tetracycline should be considered. • Doxycycline is inappropriate due to low renal excretion. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Complicated urinary tract infection i.e.; abnormality of renal tract		Co-trimoxazole 960mg oral 12 hourly for 7-14 days.	Ciprofloxacin* 500mg orally 12 hourly for 7-14 days.	<p>If fever or loin pain, or both, treat as for pyelonephritis (CKS). (For men with uncomplicated UTI see recommendations above).</p> <p>*Avoid ciprofloxacin in frail elderly patients where possible due to CDI risk.</p>
Pyelonephritis, Urosepsis	<i>Escherichia coli</i> <i>Proteus spp</i> <i>Klebsiella spp</i>	<p>‡ Gentamicin IV (Hartford Regimen) as per protocol</p> <p>(NB: if reduced or unstable renal function give single dose only then review with Infectious diseases or microbiology)</p> <p>+</p> <p>Amoxicillin 1g IV 8 hourly.</p> <p>Switch to oral option guided by microbiology sensitivities.</p> <p>Total duration 7 days.</p>	<p>In penicillin allergy:</p> <p>Ciprofloxacin 500mg oral (or 400mg IV) 12 hourly.</p> <p>Switch to alternative oral option if indicated by microbiology sensitivities.</p> <p>Total duration 7 days.</p>	<p>NB: Nitrofurantoin is not suitable for use in pyelonephritis.</p> <p>‡If > 72 hours IV therapy required replace gentamicin with temocillin IV 2g 12 hourly.</p> <p>If abnormality of urinary tract consider longer course of 10 to 14 days.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

5 Urinary Tract				
<ul style="list-style-type: none"> Samples should be taken prior to starting treatment. Send blood for culture if pyrexial. If culture results indicate sensitivity to 'tetracycline' then oxytetracycline (less expensive in primary care) or tetracycline should be considered. Doxycycline is inappropriate due to low renal excretion. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Asymptomatic bacteriuria in pregnancy		See comments.		Start treatment once sensitivity results known. Take urine culture 7 days after completion of therapy as test of cure.
UTI in pregnancy		*Nitrofurantoin oral 100mg M/R 12 hourly OR 50mg I/R oral 6 hourly for 7 days.	**Trimethoprim 200mg oral 12 hourly for 7 days 3 rd choice antibiotic Cefalexin 500mg oral 12 hourly for 7 days	Start treatment while awaiting sample results and review in light of results. *Nitrofurantoin should be avoided in third trimester and in renal impairment. **Trimethoprim should be avoided in the first trimester for all pregnant women. Trimethoprim should be avoided in all trimesters by pregnant women with established folate deficiency, low dietary folate intake or women taking other folate antagonists. Take urine culture 7 days after completion of therapy as test of cure.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

5 Urinary Tract				
<ul style="list-style-type: none"> • Samples should be taken prior to starting treatment. • Send blood for culture if pyrexial. • If culture results indicate sensitivity to 'tetracycline' then oxytetracycline (less expensive in primary care) or tetracycline should be considered. • Doxycycline is inappropriate due to low renal excretion. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Catheter UTI	<i>Escherichia coli</i> , other intestinal aerobes			<p>Bacterial colonisation of long term indwelling catheters is very common.</p> <p>Antimicrobial therapy is not indicated unless the patient has evidence of systemic infection e.g. pyrexia, loin pain, raised white cell count or acute confusion in the elderly.</p> <p>Smelly or cloudy urine, bacteriuria without systemic symptoms, or catheter blockage are not indications for antimicrobials.</p> <p>If systemic infection is likely, treat as for complicated UTI or pyelonephritis depending on clinical symptoms.</p> <p>Take urine sample and commence antibiotic therapy (consider previous microbiology sensitivity results if available).</p> <p>Remove and replace urinary catheter (if still required) following 1st or 2nd dose of antibiotics.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

6. Genital system				
<ul style="list-style-type: none"> For full guidelines see British Association of Sexual Health and HIV - http://www.bashh.org/. Send blood for culture if pyrexial. If STD is suspected patients should be referred to Sexual Health Service (0345 337 9900) for partner notification and advice if required. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Pelvic Inflammatory Disease	<i>Chlamydia trachomatis</i> , <i>Neisseria gonorrhoeae</i> , intestinal aerobes and anaerobes	Outpatient regimen: Ceftriaxone 500mg IM stat, Then Doxycycline oral 100mg 12 hourly + *Metronidazole 400mg oral 12 hourly for 14 days.	Refer to BASHH 2018 guideline.	Samples: self obtained low vaginal swab or endocervical swab. (Ref: BASHH 2018) Consider immune deficiency and testing for HIV. *Metronidazole has been added to cover anaerobes, which have a greater importance in severe PID. Metronidazole can be omitted in mild to moderate PID or if not tolerated. Refer to obstetrics guideline for pregnancy/breast feeding options.
		Inpatient regimen: Ceftriaxone 2g IV stat, Then Doxycycline 100mg oral 12 hourly + Metronidazole 400mg oral 12 hourly for 14 days.	Refer to BASHH 2018 guideline.	If IV therapy is required seek specialist advice. Consider immune deficiency and testing for HIV. Refer to obstetrics guideline for pregnancy/breast feeding options.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

6 Genital system				
<ul style="list-style-type: none"> For full guidelines see British Association of Sexual Health and HIV - http://www.bashh.org/. Send blood for culture if pyrexial. If STD is suspected patients should be referred to Sexual Health Service (0345 337 9900) for partner notification and advice if required. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Vaginal Candidiasis	<i>Candida albicans</i>	Clotrimazole vaginal pessary 500mg as single dose OR If systemic treatment planned, use oral fluconazole 150mg as single dose.		(ref: BASHH 2007) In pregnancy avoid oral azole. Consider immune deficiency and testing for HIV.
Epididymitis	<35yrs or high risk of STD - suspected <i>Neisseria gonorrhoea</i>	Ceftriaxone 500mg IM stat + Doxycycline 100mg oral 12 hourly for 10 - 14 days.	Ciprofloxacin 500mg oral stat + Doxycycline 100mg oral 12 hourly for 10 - 14 days.	Send MSSU or catheter urine sample. Send blood for culture if pyrexial. (Ref: BASHH 2010 with June 2011 update)
	Suspected <i>Chlamydia trachomatis</i>	Doxycycline 100mg 12 hourly for 10 - 14 days.		Send first pass urine sample if suspected gonorrhoea.
	Suspected Gram-negative enteric organisms plus <i>Chlamydia trachomatis</i> (low risk for <i>N. gonorrhoea</i>)	Ofloxacin 200mg 12 hourly for 14 days.		Consider immune deficiency and testing for HIV.
	>35yrs or low risk of STD- suspected gram-negative organisms	Ciprofloxacin 500mg oral 12 hourly for 10 days.		
Prostatitis - Chronic	<i>Escherichia coli</i> <i>Enterococcus spp.</i> <i>Staphylococcus aureus</i>	Ciprofloxacin 500mg oral 12 hourly for 28 days.	Trimethoprim 200mg oral 12 hourly for 28 days OR Doxycycline 100mg oral 12 hourly for 28 days.	Send MSSU or catheter urine sample. Send blood for culture if pyrexial. (Ref: NICE CKS Chronic Prostatitis).

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

6 Genital system				
<ul style="list-style-type: none"> For full guidelines see British Association of Sexual Health and HIV - http://www.bashh.org/. Send blood for culture if pyrexial. If STD is suspected patients should be referred to Sexual Health Service (0345 337 9900) for partner notification and advice if required. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Prostatitis - Acute	<i>Escherichia coli</i> , <i>Proteus</i> , <i>Klebsiella</i> , <i>Pseudomonas</i> , <i>Enterococci</i> , <i>Staphylococcus</i>	<p>If IV required due to sepsis on presentation: Ciprofloxacin 400mg IV 12 hourly</p> <p>Then switch to</p> <p>Ciprofloxacin oral 500mg 12 hourly to complete 28 days.</p> <p>Oral switch should be guided by sensitivity results.</p>		(Ref: NICE CKS – Acute Prostatitis).

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

6 Genital system				
<ul style="list-style-type: none"> For full guidelines see British Association of Sexual Health and HIV - http://www.bashh.org/. Send blood for culture if pyrexial. If STD is suspected patients should be referred to Sexual Health Service (0345 337 9900) for partner notification and advice if required. 				
INFECTION	Likely organisms	1 st Choice Antimicrobial	2 nd Choice Antimicrobial	Comments/changes
Urethritis (non-gonorrhoea)	<i>Chlamydia trachomatis</i> <i>Mycoplasma genitalium</i>	Doxycycline 100mg oral 12 hourly for 7 days OR Azithromycin 1g stat then 500mg daily for 2 days (total treatment is 3 days).	For persistent/recurrent infection if treated with doxycycline regimen first line: Azithromycin 1g stat then 500mg daily for 2 days (total treatment is 3 days). + Metronidazole 400mg oral 12 hourly for 5 days. If treated with azithromycin first line: Doxycycline 100mg oral 12 hourly for 7 days + Metronidazole 400mg 12 hourly for 5 days.	Send exudates or pus for culture; MSSU and urine, endocervical and urethral swabs for chlamydia. (Ref: BASSH Guidelines) Consider immune deficiency and testing for HIV.
Infective balanitis	Candidal	Clotrimazole 1% cream topically 12 hourly until symptoms settle.	For severe symptoms: fluconazole 150mg oral stat.	(Ref: BASHH 2008).
	Anaerobic	Metronidazole 400mg oral 12 hourly for 7 days.	Co-amoxiclav 375mg oral 8 hourly for 7 days.	
	Aerobic	As per sensitivities.		
Bartholin cyst		See Skin section		

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

7. Blood				
<ul style="list-style-type: none"> Take blood (2 sets - 20mL per set) and urine cultures before starting treatment, plus swabs from any other focus of infection, e.g. sputum, wound swabs, etc. Give antibiotics as soon as possible, within 1 hour of diagnosis of sepsis. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Sepsis – source unknown If NEWS ≥ 5 or clinical concern of systemic infection or neutropenia suspected refer to ED Sepsis Screening tool . Life-threatening organ dysfunction caused by a dysregulated host response to infection. For clinical use and measurement, organ dysfunction can be represented by an increase in the SOFA score of 2 points or more. These patients have SEPSIS and an in-hospital mortality >10%. (Ref: The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) . JAMA. 2016;315(8):801-810).		Amoxicillin 1g IV 8 hourly + Gentamicin [#] IV (Hartford Regimen) as per protocol +/- Metronidazole 500mg IV 8 hourly (add if anaerobic cover required). NB: # Consider aztreonam IV as an alternative to gentamicin if eGFR<30mL/min (CKD>4) or known/suspected Acute Kidney Injury (AKI).	In penicillin allergy or known MRSA carrier: Gentamicin [#] IV (Hartford Regimen) as per protocol + Vancomycin IV as per protocol +/- Metronidazole 500mg IV 8 hourly (add if anaerobic cover required). NB: # Consider aztreonam IV as an alternative to gentamicin if eGFR<30mL/min (CKD>4) or known/suspected AKI.	The most common causes of sepsis are urinary or respiratory sources which should be treated according to the relevant sections in this guideline (oral co-trimoxazole will cover both in cases where no IV is required). Seek advice from Medical Microbiology or Infection Unit. Prompt diagnosis is vital to allow early rationalisation of treatment. Sepsis may be masked in immunosuppression, the elderly and in the presence of anti-inflammatory drugs and beta-blockers. Consider immune deficiency and testing for HIV. # Refer to guidance on the use of Aztreonam for more information .

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

7 Blood				
<ul style="list-style-type: none"> Take blood (2 sets - 20mL per set) and urine cultures before starting treatment, plus swabs from any other focus of infection, e.g. sputum, wound swabs, etc. Give antibiotics as soon as possible, within 1 hour of diagnosis of sepsis. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
<p>Neutropenic Sepsis</p> <p>Treat if neutrophil count $<0.5 \times 10^9/L$ or <1.0 and falling</p> <p>Follow local protocols</p>	Wide range of possible pathogens	<p>Standard risk patients Piperacillin/tazobactam 4.5g IV 6 hourly.</p> <p>High risk patients Piperacillin/tazobactam 4.5g IV 6 hourly + Gentamicin[#] IV (Hartford Regimen) as per protocol.</p> <p>NB: # Consider aztreonam IV as an alternative to gentamicin if eGFR$<30\text{mL/min}$ (CKD>4) or known/suspected AKI.</p> <p>Septic Shock Meropenem* 1g 8 hourly.</p>	<p>Standard risk patients In mild penicillin allergy: Ceftazidime 2g IV 8 hourly.</p> <p>High risk patients In mild penicillin allergy: Ceftazidime 2g IV 8 hourly + Gentamicin IV (Hartford Regimen) as per protocol.</p> <p>NB: # Consider aztreonam IV as an alternative to gentamicin if eGFR$<30\text{mL/min}$ (CKD>4) or known/suspected AKI.</p> <p>Standard/High risk patients In severe penicillin allergy: Meropenem* 1g 8 hourly.</p>	<p>Review the need for ongoing gentamicin on a daily basis according to severity.</p> <p>Do not wait for FBC to confirm neutropenia – start treatment if suspected. Patients should be assessed within 15 minutes and antibiotics given within 1 hour of presentation.</p> <p>*Meropenem should only be prescribed for a patient with severe penicillin allergy if the benefits of treatment outweigh the risk of severe allergy.</p> <p># Refer to guidance on the use of Aztreonam for more information.</p>

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8. Musculoskeletal				
• Send blood and if appropriate bone/joint fluid for culture.				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
<p>Acute Osteomyelitis/ Acute septic arthritis *(see note under comments).</p> <p>MRSA should be considered if the patient has been in hospital within the last six months.</p>	<p><i>Staphylococcus aureus</i>, <i>Streptococcus pyogenes</i></p>	<p>Flucloxacillin 2g IV 6 hourly, initially +/- Rifampicin 300-600mg IV or oral 12 hourly.</p> <p>Add rifampicin for prosthetic joints after consultation with specialist.</p>	<p>In penicillin allergy: Vancomycin IV as per protocol.</p>	<p>*Septic arthritis – refer to orthopaedics for emergency drainage prior to initiation of antibiotics where possible.</p> <p>Discuss treatment duration and oral switch with infection specialist.</p> <p>If MRSA likely use: Vancomycin IV as per protocol as 1st choice.</p> <p>If recurrent - consider immune deficiency and testing for HIV.</p>
<p>Diabetic Foot Infection</p>	<p><i>Polymicrobial</i></p>	<p>Please refer to Diabetic foot infection: Antibiotic therapy and good practice recommendations 2017 – Summary table in Diabetes Grampian Guidance.</p>		<p>Contact microbiology for further advice.</p> <p>Refer to orthopaedics/vascular if patient failing to respond to antibiotic therapy or has complex infection.</p>

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9. Eye				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Conjunctivitis, purulent	<i>Staphylococcus aureus</i> , <i>Streptococcus pyogenes</i> , <i>Streptococcus pneumoniae</i> , <i>Haemophilus spp</i>	Chloramphenicol 0.5% eye drops 6 hourly. NB: If significant surface discomfort, consider chloramphenicol 1% eye ointment 8 hourly instead.	Fusidic acid 1% viscous eye drops applied 12 hourly for 7 days or until symptom free for 48 hours.	Treat for 5 - 7 days. Fusidic acid would be preferred treatment in pregnancy. Fusidic acid has less Gram negative activity.
Orbital cellulitis	<i>Streptococcus spp.</i> , <i>Staphylococcus aureus</i>	Ceftriaxone 2g IV 12 hourly + Metronidazole 400mg oral 8 hourly (or 500mg IV 8 hourly if oral route not available). For 10 days total treatment – if intracranial pathology excluded and patient responds well to IV, switch after 3-5 days to: Co-amoxiclav oral 625mg 8 hourly.	In severe penicillin allergy: Co-trimoxazole 960mg IV* 12 hourly + Clindamycin 300mg IV 6 hourly. For 10 days total treatment – if intracranial pathology excluded and patient responds well to IV, switch after 3-5 days to: Co-trimoxazole oral 960mg 12 hourly + Clindamycin oral 300mg 6 hourly.	Serious emergency: Infection of soft tissues behind orbital septum. Contact specialist for advice regarding duration or there is evidence of intracranial extension or if patient has had surgery. <i>*If IV co-trimoxazole not available use ciprofloxacin 400mg IV 12 hourly.</i>
Pre-septal cellulitis (peri-orbital)	<i>Streptococcus spp.</i> , <i>Staphylococcus aureus</i>	Flucloxacillin 1g IV 6 hourly then switch to oral to complete 7-14 days.	In penicillin allergy: Vancomycin IV as per protocol , then switch to oral clarithromycin 500mg 12 hourly to complete 7-14 days.	Infection anterior to the orbital septum.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

10. Ear, nose, and oropharynx				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Otitis externa	<i>Staphylococcus aureus</i>	Mild cases: Aural toilet + Analgesia.	More serious cases: Betnesol-N® [*betamethasone 0.1% and neomycin 0.5%] ear drops apply 2-3 drops into ear 6-8 hourly for 3 - 5 days.	Send aspirate or swab. *Betnesol-N is contra-indicated in patients with a perforated tympanic membrane. Products to consider in mild cases (in addition to aural toilet) include Sofradex®, Locorten-Vioform®. Consider systemic antibacterial if spreading cellulitis or patient systemically unwell (flucloxacillin or erythromycin).
	<i>Pseudomonas aeruginosa</i>	Aural toilet + *Gentamicin 0.3% ear drops apply 2-3 drops into the ear 6 to 8 hourly and at night for 3 - 5 days.	More serious infection: + Ciprofloxacin 750mg orally 12 hourly.	Seek ENT, medical microbiology advice. *Gentamicin is contra-indicated in patients with a perforated tympanic membrane.
	Fungal: Candida spp, airborne fungi	Aural toilet + Clotrimazole 1% solution instil 2-3 drops into the ear 8-12 hourly, for at least 14 days after disappearance of infection.		Seek specialist advice if required
Tonsillitis	75% viral	No antimicrobial treatment.		
	<i>Streptococcus pyogenes</i>	Benzympenicillin 1.2g IV 6 hourly (if unable to swallow) Then switch to Phenoxymethylpenicillin 500mg oral 6 hourly for total of 5 days.	In penicillin allergy: Clarithromycin 500mg IV 12 hourly, if unable to swallow, Then switch to oral for total of 5 days.	Avoid amoxicillin, co-amoxiclav and ampicillin due to probable reactions if glandular fever present. Send bacterial throat swab and blood for Epstein Barr Virus (EBV). Send nose and throat swabs in viral transport medium if testing for other viruses is required.
Quinsy (peritonsillar abscess)	Polymicrobial	As for tonsillitis.	As for tonsillitis.	Send aspirate or swab.
Acute otitis media *(see note under comments)	<i>Streptococcus pneumoniae</i> <i>Haemophilus influenzae</i> <i>Moraxella catarrhalis</i> Group A Streptococcus	Amoxicillin 500mg -1g oral 8 hourly for 5 days.	In penicillin allergy: Clarithromycin 500mg oral 12 hourly for 5 days.	*Avoid antibiotics as 60% of patients are better in 24 hours without; they only reduce pain at 2 days (NNT15) and do not prevent deafness.** Send aspirate or exudates if drum is perforated. Optimise analgesia.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

10 Ear, nose, and oropharynx				
INFECTION	Likely organisms	1 st Choice Antimicrobial	2 nd Choice Antimicrobial	Comments/changes
Acute sinusitis (Many are viral)	<i>Streptococcus pneumoniae</i> <i>Haemophilus influenzae</i> <i>Moraxella catarrhalis</i> Group A Streptococcus	Amoxicillin 500mg oral 8 hourly for 7 days. Use IV initially in severe/febrile cases.	In penicillin allergy: Doxycycline 100mg oral 12 hourly for 5 days. Use IV initially in severe/febrile cases.	In acute sinusitis prescribe Xylometazoline 0.1% 2-3 drops to each nostril 2-3 times daily for 5 days. Send aspirate, discharge or antral washings. Consider saline douches.
Chronic sinusitis	<i>Streptococcus pneumoniae</i> <i>Haemophilus influenzae</i> <i>Staphylococcus aureus</i> <i>Anaerobes</i>	Base treatment on culture Results.	Consult medical microbiology and ENT surgeon.	Take nasopharyngeal swab if no other samples obtained. Also consider intranasal steroids +/- decongestant and saline douches.
Oral thrush	<i>Candida albicans</i>	Nystatin oral suspension, use 1mL as a mouthwash (then swallow) 6 hourly, usually for 7 days OR Fluconazole* 50mg oral once daily for 3-7 days. Continue for 48 hours after lesions have resolved. Immunocompromised: Fluconazole* 100mg oral once daily for 7 - 14 days OR if interactions with other medication use nystatin.	Miconazole* oral gel 2.5mL 6 hourly after food - continue for 7 days after lesions resolve. NB: Interaction with Warfarin.	Send scrapings for culture. Consider immune deficiency and testing for HIV. *Significant drug interactions with fluconazole and miconazole – check BNF.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

10 Ear, nose, and oropharynx				
INFECTION	Likely organisms	1 st Choice Antimicrobial	2 nd Choice Antimicrobial	Comments/changes
Dental abscess	<i>Streptococcus spp</i> Anaerobes	Phenoxymethylpenicillin 1g oral 6 hourly OR Amoxicillin 500mg oral 8 hourly for 5 days. If spreading infection or pyrexia: + Metronidazole 400mg oral 8 hourly.	Metronidazole 400mg oral 8 hourly for 5 days.	(Ref: SDCEP Drug Prescribing in Dentistry but higher metronidazole dosing).
Parotitis (bacterial)	<i>Staph. aureus</i>	Mild to moderate cases: Rehydration, analgesia and stimulation of saliva production recommended. If moderate to severe and antibiotic required: Flucloxacillin oral 500mg 6 hourly + Metronidazole oral 400mg 8 hourly daily if anaerobic infection suspected or poor dentition. If systemic signs of sepsis: Flucloxacillin IV 2g 6 hourly. Duration for 5 days.	In penicillin allergy or MRSA: Doxycycline 200mg oral daily + Metronidazole oral 400mg 8 hourly if anaerobic infection suspected or poor dentition. Duration for 5 days.	

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

11. Skin				
<ul style="list-style-type: none"> Take appropriate specimens before starting therapy, consult dermatologist and medical microbiologist for patients with severe or recurrent infections. Consider the necessity for surgical intervention, tetanus prophylaxis and topical cleaning. Chronic wounds such as pressure sores and leg ulcers do not require antibiotics unless there is clinical evidence of infection, e.g. cellulitis, discharge or acute pain. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Cellulitis	<i>Staphylococcus aureus</i> <i>Streptococcus pyogenes</i>	<p>Mild: Flucloxacillin* oral 1g 6 hourly for 7 - 14 day</p> <p>Moderate / severe: Flucloxacillin* 1-2g IV 6 hourly (use 2g if BMI>30),</p> <p>Then switch to Flucloxacillin oral 1g 6 hourly for 7-14 days.</p>	<p>In penicillin allergy:</p> <p>Mild: Clarithromycin 500mg oral 12 hourly for 7 - 14 days</p> <p>Moderate/severe: Vancomycin IV as per protocol,</p> <p>Then switch to Doxycycline oral 100mg 12 hourly for 7 - 14 days.</p>	<p>Longer courses may be required in severe infections.</p> <p>If MRSA is likely use: Vancomycin IV as 1st choice, see protocol for dosing.</p> <p>Send blood for culture.</p> <p>* If <i>Strep. pyogenes</i> isolated rationalise therapy i.e. <i>change to or add</i> benzylpenicillin IV or amoxicillin oral.</p>
Impetigo	<i>Staphylococcus aureus</i>	Flucloxacillin 500mg or 1g oral 6 hourly for 7 days.	<p>In penicillin allergy: Clarithromycin 500mg oral 12 hourly for 7 days.</p>	<p>Send swabs or scrapings for culture.</p> <p>Topical and oral treatments produce similar results, but as resistance is increasing reserve topical antibiotics for very localised lesions: Fusidic acid 2% cream, or (if MRSA) mupirocin 2% ointment.</p>

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

11 Skin				
<ul style="list-style-type: none"> Take appropriate specimens before starting therapy, consult dermatologist and medical microbiologist for patients with severe or recurrent infections. Consider the necessity for surgical intervention, tetanus prophylaxis and topical cleaning. Chronic wounds such as pressure sores and leg ulcers do not require antibiotics unless there is clinical evidence of infection, e.g. cellulitis, discharge or acute pain. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Bites – Animal	<i>Pasteurella multocida</i>	Co-amoxiclav 625mg oral 8 hourly for 7 days.	In penicillin allergy: Doxycycline 100mg oral 12 hourly + Metronidazole 400mg 8 hourly for 7 days.	Send blood and swabs for culture.
Bites – Human	<i>Streptococcus pyogenes</i> <i>Staphylococcus aureus</i> Oral anaerobes	Co-amoxiclav 625mg oral 8 hourly for 7 days.	Alternative option: Doxycycline 100mg oral 12 hourly + Metronidazole 400mg oral 8 hourly for 7 days.	
Lacerations (most will not require antibiotic prophylaxis – see comments)		Flucloxacillin IV or oral 1g stat dose. NB: If contaminated follow recommendations for traumatic digit amputation below.	In penicillin allergy: Clarithromycin IV or oral 500mg stat dose. NB: If contaminated follow recommendations for traumatic digit amputation below.	Antibiotic only indicated if contaminated wound or patient has a risk factor according to A&E guidance and should be balanced against clinical judgement. NB: Maximum duration of prophylaxis 24 hours.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

11 Skin				
<ul style="list-style-type: none"> Take appropriate specimens before starting therapy, consult dermatologist and medical microbiologist for patients with severe or recurrent infections. Consider the necessity for surgical intervention, tetanus prophylaxis and topical cleaning. Chronic wounds such as pressure sores and leg ulcers do not require antibiotics unless there is clinical evidence of infection, e.g. cellulitis, discharge or acute pain. 				
INFECTION	Likely organisms	1 st Choice Antimicrobial	2 nd Choice Antimicrobial	Comments/changes
Traumatic digit amputation		Co-amoxiclav IV 1.2g (or 625mg oral) 8 hourly for up to 24 hours (max 3 doses).	<p>In penicillin allergy: Cefuroxime IV 1.5g then 750mg 8 hourly + Metronidazole IV 500mg 8 hourly for up to 24 hours</p> <p>OR</p> <p>Clindamycin IV 600mg 8 hourly for up to 24 hours + Gentamicin IV 1.5mg/kg stat.</p> <p>Oral options: Doxycycline 100mg 12 hourly + Metronidazole 400mg 8 hourly</p> <p>OR</p> <p>Co-trimoxazole 960mg 12 hourly + Metronidazole 400mg 8 hourly For up to 24 hours.</p>	NB: Maximum duration of prophylaxis 24 hours.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

11 Skin				
<ul style="list-style-type: none"> Take appropriate specimens before starting therapy, consult dermatologist and medical microbiologist for patients with severe or recurrent infections. Consider the necessity for surgical intervention, tetanus prophylaxis and topical cleaning. Chronic wounds such as pressure sores and leg ulcers do not require antibiotics unless there is clinical evidence of infection, e.g. cellulitis, discharge or acute pain. 				
INFECTION	Likely organisms	1 st Choice Antimicrobial	2 nd Choice Antimicrobial	Comments/changes
Post-operative wound infections – excluding abdominal, female genital tract, head and neck ‘clean sites’	<i>Staphylococcus aureus</i>	Flucloxacillin IV/oral 500mg – 1g 6 hourly for 10-14 days.	<p>In penicillin allergy: Vancomycin IV as per protocol.</p> <p>Switch to oral: Co-trimoxazole 960mg 12 hourly for 10 – 14 days.</p>	
Post- operative wound infections - abdominal, female genital tract, head and neck “Dirty sites”	<i>Staphylococcus aureus</i> <i>Anaerobes</i>	<p>If IV required: Co-trimoxazole 960mg IV 12 hourly +/- Metronidazole 500mg IV 8 hourly</p> <p>Switch to oral Co-trimoxazole 960mg 12 hourly +/- Metronidazole 400mg 8 hourly for 10 - 14 days.</p>	<p>If co-trimoxazole IV unavailable or unsuitable: Co-amoxiclav 1.2g IV 8 hourly</p> <p>OR</p> <p>In penicillin allergy: Clindamycin 600mg IV 8 hourly.</p>	<p>If collection present will require surgical drainage.</p> <p>Route of administration is dependent on the severity of infection and ability of patient to take medication orally.</p>
Diabetic Foot Infection	<i>Polymicrobial</i>	Please refer to Diabetic foot infection: Antibiotic therapy and good practice recommendations 2017 – Summary table in Diabetes Grampian Guidance .		Contact microbiology for further advice. Refer to orthopaedics/vascular if patient failing to respond to antibiotic therapy or has complex infection.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

11 Skin				
<ul style="list-style-type: none"> Take appropriate specimens before starting therapy, consult dermatologist and medical microbiologist for patients with severe or recurrent infections. Consider the necessity for surgical intervention, tetanus prophylaxis and topical cleaning. Chronic wounds such as pressure sores and leg ulcers do not require antibiotics unless there is clinical evidence of infection, e.g. cellulitis, discharge or acute pain. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Necrotising fasciitis or Severe or rapidly progressing skin infection in an Intravenous Drug User (IVDU).	<i>Staphylococcus aureus</i> <i>Streptococcus pyogenes</i> <i>Mixed coliforms</i> <i>Anaerobes</i>	Flucloxacillin 2g IV 6 hourly, switch to oral 500mg -1g 6 hourly + Benzylpenicillin 2.4g IV 6 hourly, switch to oral amoxicillin 500mg-1g 8 hourly + Clindamycin 600mg-1.2g IV 6-8 hourly, switch to oral 600mg 8 hourly + Gentamicin IV (Hartford Regimen) as per protocol . For advice on duration of treatment please contact microbiology.	In penicillin allergy: vancomycin IV as per protocol + Clindamycin 600mg-1.2g IV 6 - 8 hourly, + Gentamicin IV (Hartford Regimen) as per protocol . Oral switch options depend on sensitivities. For advice on duration of treatment please contact microbiology.	A medical and surgical emergency – seek urgent medical microbiology and surgical advice. Send blood and tissue for culture.

NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance In Adults

11 Skin				
<ul style="list-style-type: none"> • Take appropriate specimens before starting therapy, consult dermatologist and medical microbiologist for patients with severe or recurrent infections. • Consider the necessity for surgical intervention, tetanus prophylaxis and topical cleaning. • Chronic wounds such as pressure sores and leg ulcers do not require antibiotics unless there is clinical evidence of infection, e.g. cellulitis, discharge or acute pain. 				
INFECTION	Likely organisms	1 st Choice Antibiotics	2 nd Choice Antibiotics	Comments/changes
Bartholin cyst	Polymicrobial	Conservative management should be used first line (hot baths for 10-20mins 3-4 times daily to encourage abscess to discharge), plus analgesia. If an antibiotic is indicated, doxycycline oral 100mg 12 hourly for 7 days would be recommended.		
Shingles	<i>Herpes Zoster</i>	Aciclovir 800mg oral five times daily for 7 days.	Valaciclovir oral 1g 8 hourly for 7 days.	If pregnant/immunocompromised/neonate seek urgent specialist advice. Treat if >50 yrs and within 72 hours of onset of rash (post-herpetic neuralgia rare in <50 yrs); or if active ophthalmic, or Ramsey Hunt.

Consultation List

Dr Lindsay McLennan	Consultant - Gastroenterology and Hepatology
Dr Rona Patey	Consultant - Anaesthetist
Dr Ben Dobbs	Consultant - AMIA
Dr Clare Bostock	Consultant - Geriatric Medicine
Dr Daniella Brawley	Consultant - Sexual Health
Dr Shona Methven	Consultant - Renal Medicine

This policy has been reviewed and agreed by:

- NHS Grampian Medicines Guidelines and Policies Group
- NHS Grampian Antimicrobial Management Team

Appendix 1: Version Control Statements - Changes from Version 5 (September 2015)

Title: Change to NHS Grampian Acute Sector Empirical Antimicrobial Therapy Prescribing Guidance in Adults (remove 'for some common infections'; 'antimicrobial' added)

General Notes Section

Minor amendments including link to interaction checker, deletion of statement on HIV status, deletion of statement on Nitrofurantoin in reduced renal function, addition of statements about referral to Outpatient Parenteral Antibiotic Therapy (OPAT), systemic antifungal infections and temocillin.

Section 1: Gastrointestinal

1. Infective Gastroenteritis – removal of organism specific advice
2. CDI – addition of 'suspected' CDI. Recurrent treatment – link to HPS guideline.
3. Biliary sepsis. Additional comments: oral switch should be guided by antibiotic sensitivities if available; anaerobic cover not normally required. Temocillin added as an alternative to gentamicin if > 72 hours IV therapy required.
4. Intra-abdominal sepsis – overall term added. Oral switch regimes made clearer. Duration changed to 3 – 5 days (from 3 – 7 days). Temocillin added as an alternative to gentamicin if > 72 hours IV therapy required.
5. Pancreatitis – removed (antibiotic prescribing should be based on specialist advice)
6. Helicobacter pylori eradication- removed
7. Acute upper gastrointestinal haemorrhage in patients with decompensated liver disease – 2nd line now ciprofloxacin
8. Spontaneous bacterial peritonitis in patients with chronic liver disease – 1st line IV co-trimoxazole instead of IV piperacillin/tazobactam +/- IV vancomycin. 2nd line now ciprofloxacin.
9. Inflammatory bowel disease - removed

Section 2: Cardiovascular

1. Infective endocarditis: change gentamicin dosing advice to link to new protocol. Vancomycin trough levels changed to 15-20mg/L.

Section 3: Respiratory

1. Added statement to header: Consider diagnosis of flu and isolate patient according to patient placement tool. Remove: If viral pneumonia suspected, samples required are nasopharyngeal secretions (or nose and throat swabs in viral transport medium).
2. Infective exac of COPD – mild/moderate – amoxicillin dose changed to 1g 8 hourly (was 500mg – 1g 8h); penicillin allergy choice changed from clarithromycin to doxycycline;. doxycycline dose amended to 100mg daily (was 100 – 200mg daily)
3. Infective exac of COPD – severe – added oral route for clarithromycin; doxycycline dose amended to 200mg daily (was 100 – 200mg daily)
4. Bronchiectasis, suspected pulmonary tuberculosis, cystic fibrosis, legionella, staphylococcal pneumonia - removed
5. Community acquired pneumonia (CAP) – categories changed from mild/moderate/severe to low/moderate/high severity in line with BTS.
6. Low severity CURB 0-1– amoxicillin dose amended to 1g 8 hourly (was 500mg – 1g); doxycycline included as an alternative 1st line option. IV route removed. Penicillin allergy options removed as doxycycline included. Advice to treat for 10 days if atypical organism removed.
7. Moderate severity (CURB 2) – new category – amoxicillin + clarithromycin or doxycycline (based on BTS/NICE guidelines)
8. High severity (CURB65≥3) – new option for patients who have had no previous antibiotics – IV amoxicillin + clarithromycin with doxycycline oral switch. Patients with previous antibiotics: co-amoxiclav + clarithromycin (+/- in previous guideline) in line with BTS and advice to switch to oral doxycycline. Penicillin allergy – co-trimoxazole IV 1st line in preference to IV levofloxacin. Added comment: If preceding influenza illness consider possibility of staphylococcal pneumonia. Duration changed to 7 – 10 days as per NICE (was 10 days).
9. Influenza – changed to 'suspected' influenza – detailed information removed – refer to HPS guideline
10. Aspiration pneumonia – IV benzylpenicillin changed to IV amoxicillin based on ID advice. Oral amoxicillin dose changed to 1g (was 500mg).
11. Hospital-acquired pneumonia – amoxicillin dose amended to 1g 8 hourly (was 500mg – 1g) Moderate/severe changed to severe. Oral switch to co-amoxiclav added. Temocillin added as an alternative to gentamicin if > 72 hours IV therapy required.

Section 4: Central Nervous System

1. Meningitis – dexamethasone dosing changed to reflect BNF dosing advice given as dexamethasone base (not dexamethasone sodium phosphate – salt).
2. Encephalitis – herpes zoster added to likely organisms; advice to reduce dose in renal impairment; remove advice to send acute and convalescent blood samples (red top).

Section 5: Urinary Tract

1. Asymptomatic bacteriuria – remove
2. Nitrofurantoin – include option to prescribe 100mg modified release tablets twice daily.
3. Uncomplicated UTI – comment added to consider CKD and hyperkalaemia risk.
4. Complicated UTI – remove co-amoxiclav as 1st line option – co-trimoxazole remains.
5. UTI in Pregnancy – 1st line changed to nitrofurantoin in line with obstetric empirical guideline.
6. Catheter UTI – advice changed to remove and replace urinary catheter following 1st or 2nd dose of antibiotic rather than prior to antibiotics. Based on risk of bacteraemia following a traumatic catheter change.
7. Prophylaxis of UTI – removed
8. Pyelonephritis/urosepsis – Duration changed to 10-14 days if abnormality of urinary tract (previously up to 14 days). Temocillin added as an alternative to gentamicin if > 72 hours IV therapy required.

Section 6: Genital system

1. Pelvic inflammatory disease – note added to refer to obstetric guideline for pregnancy/breastfeeding options
2. Indications removed: trichomoniasis, chancroid, genital herpes, genital chlamydia, bacterial vaginosis, gonorrhoea
3. Prostatitis acute – trimethoprim removed as 1st line choice due to change in [European Urology \(Uroweb\) guideline](#).
4. Urethritis (non-gonorrhoea) – azithromycin dosing changed to 1g stat then 500mg once daily for the next 2 days. For persistent/recurrent infection if treated with azithromycin 1st line – new recommendation to treat with doxycycline + metronidazole – [BASSH guideline](#) update Dec 2018.

Section 7: Blood

1. Remove systemic infection – no obvious source – mild/no IV required – not felt to be helpful. Removal of SIRS criteria and addition of NEWS scoring. Severe sepsis/septic shock criteria removed and addition of new sepsis definition and reference. Link to ED Sepsis screening tool added.
2. Neutropenic sepsis – add aztreonam as an alternative to gentamicin if eGFR<30ml/min
3. Remove systemic candidiasis

Section 8: Musculoskeletal

1. Acute osteomyelitis – remove oral switch options. Add ‘Discuss treatment duration and oral switch with infection specialist.’
2. Diabetic Foot Infection – remove treatment recommendations; replace with link to national consensus guideline.

Section 9: Eye

1. Remove ophthalmic zoster, endophthalmitis, dacrocystitis, dacrodenitis

Section 10: Ear, Nose & oropharynx

1. Tonsillitis – duration changed from 10 days to 5 days – in line with PHE Infection Management Guideline for primary care
2. Acute sinusitis – penicillin allergy option changed from clarithromycin to doxycycline – micro advice to move to lower risk of CDI antibiotic
3. Oral thrush – oral fluconazole added as an alternative to nystatin oral suspension. Warning added about interactions with fluconazole and miconazole.
4. Dental abscess – metronidazole dosing increased - [PHE Antibiotic Guidance for Primary Care](#)

Section 11: Skin

1. Cellulitis – mild – IV option removed. Now oral flucloxacillin 1g 6 hourly 1st line.
2. PVL advice removed – already advice to discuss persistent/recurrent infection with specialist
3. Bites – Human – 1st line changed to co-amoxiclav (was doxycycline + metronidazole) – in line with CKS/PHE; 2nd line changed to doxycycline + metronidazole (was clarithromycin + metronidazole)
4. Necrotising fasciitis – duration changed from 4 – 6 weeks to ‘For advice on duration of treatment please contact microbiology’
5. Hand infections, scabies, crab lice and head lice – removed

Appendix 2: Guidance on the use of aztreonam.

Appendix removed.