

# African Antibiotic Treatment Guidelines for Common Bacterial Infections and Syndromes

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Related research and additional information are available at [www.africacdc.org](http://www.africacdc.org) and [www.cddep.org](http://www.cddep.org).

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## Foreword

Although they can be manufactured with virtually no limit, antimicrobials are, in fact, a scarce resource. Excessive antimicrobial use selects for microorganisms that evade treatment, rendering antimicrobials potentially useless. Recognizing the urgent threat that antimicrobial resistance (AMR) poses to the continent, the Africa Centres for Disease Control (CDC) prioritized AMR control as part of its first five - year strategy, with a focus on improving monitoring, delaying emergence, limiting transmission, and mitigating harm from AMR pathogens.

Global and national AMR action plans uniformly reference the need for clinicians to use antimicrobials “appropriately,” but what does this mean? When a person presents with an illness that may require antimicrobials, where should the clinician turn to decide the right drug, dosage, and duration?

Too often African clinicians have had to turn to guidance written far from the continent, guidance that does not reflect the epidemiology and susceptibility of infectious diseases in their own communities. This document represents a first attempt by the African continent to take ownership of what “appropriate” antimicrobial use means for Africans. Africa CDC convened experts from across the continent to review data and make recommendations for a wide range of conditions that may require antimicrobial treatment.

Through this process, Africa CDC and its partners learned three critical lessons. First, there is an urgent need for Member States to increase surveillance for antimicrobial resistance to ensure recommendations are based on timely, comprehensive, and representative analysis of pathogens. Second, this document should be considered a first draft that requires continuous updating based on new data emerging from Africa. And, finally, the continent is vast and diverse, and this document should be considered a template for national and sub - national entities to ultimately develop and continuously update their own guidance based on the needs of clinicians and patients in their communities.



A handwritten signature in black ink that reads "J. Nkengasong".

**Dr. John Nkengasong**

Director, Africa Centres for Disease Control and Prevention

## List of Acronyms

### Pathogens

<i>A. baumannii</i>	<i>Acinetobacter baumannii</i>
<i>C. difficile</i>	<i>Clostridioides difficile</i>
<i>C. diphtheriae</i>	<i>Corynebacterium diphtheriae</i>
<i>C. trachomatis</i>	<i>Chlamydia trachomatis</i>
<i>E. coli</i>	<i>Escherichia coli</i>
<i>H. influenzae</i>	<i>Haemophilus influenzae</i>
<i>K. pneumoniae</i>	<i>Klebsiella pneumoniae</i>
<i>L. monocytogenes</i>	<i>Listeria monocytogenes</i>
<i>L. pneumophila</i>	<i>Legionella pneumophila</i>
<i>M. catarrhalis</i>	<i>Moraxella catarrhalis</i>
<i>N. gonorrhoeae</i>	<i>Neisseria gonorrhoeae</i>
<i>N. meningitidis</i>	<i>Neisseria meningitidis</i>
<i>P. aeruginosa</i>	<i>Pseudomonas aeruginosa</i>
<i>S. aureus</i>	<i>Staphylococcus aureus</i>
<i>S. enterica</i>	<i>Salmonella enterica</i>
<i>S. epidermidis</i>	<i>Staphylococcus epidermidis</i>
<i>S. marcescens</i>	<i>Serratia marcescens</i>
<i>S. pneumoniae</i>	<i>Streptococcus pneumoniae</i>
<i>S. pyogenes</i>	<i>Streptococcus pyogenes</i>
<i>S. saprophyticus</i>	<i>Staphylococcus saprophyticus</i>

### Clinical

CAP	Community - acquired pneumonia
cIAI	Complicated intra - abdominal infections
CMV	Cytomegalovirus
COPD	Chronic obstructive pulmonary disease
CRP	C - reactive protein
CSF	Cerebrospinal fluid
HAP	Hospital - acquired (nosocomial) pneumonia
HIV	Human immunodeficiency virus
IV	Intravenous
IM	Intramuscular

MU	Million units
PCT	Procalcitonin
PO	Oral/by mouth
SSTI	Skin and soft tissue infection
TB	Tuberculosis
UTI	Urinary tract infection
VP	Ventriculoperitoneal

### Units of Measure

g	Gram
IU	International unit
kg	Kilogram
mg	Milligram
mL	Milliliter

### Other

Africa CDC	Africa Centres for Disease Prevention and Control
ASP	Antibiotic stewardship program(s)
AST	Antibiotic susceptibility testing
AU	African Union
AWaRe	Access, Watch, and Reserve
CDDEP	Center for Disease Dynamics, Economics & Policy
COI	Conflicts of interest
MLEM	Model List of Essential Medicines
MoH	Ministry of Health
STG(s)	Standard Treatment Guideline(s)
WHO	World Health Organization

## Part I. Introduction

Antimicrobial resistance poses a significant public health challenge, threatening the ability to cure many common infectious diseases. Across Africa, antimicrobial resistance is a documented challenge for many bacterial infections, particularly those associated with healthcare.

In 2018, the Africa Centres for Disease Control and Prevention (Africa CDC) released its strategy to mitigate the emergence and spread of antimicrobial - resistant pathogens in Africa. At a workshop in April 2018, Africa Union (AU) Member States and stakeholders identified priority activities for implementing Africa CDC's Framework for antimicrobial resistance control. For mitigating harm, participants noted that many countries in Africa currently lack guidelines that define when to treat infections and what appropriate antimicrobial agents to use. Except for selected diseases, such as HIV, TB, and malaria, healthcare providers must use their individual judgment or rely on guidelines developed outside of Africa.

As a first step to encourage the appropriate use of antibiotics in the human health sector, Africa CDC and the Center for Disease Dynamics, Economics & Policy (CDDEP) developed the following African Antibiotic Treatment Guidelines for Common Bacterial Infections and Syndromes, First Edition.

The first edition of the guidelines focuses on common bacterial infections and clinical syndromes that reflect AU member states' priority health areas. The purpose of these guidelines is to provide healthcare workers with expert recommendations for antibiotic selection, dosage, and duration of treatment for common bacterial infections and syndromes among neonatal, pediatric, and adult patient populations in Africa and to promote the appropriate use of antibiotics to prevent transmission and reduce the prevalence of antibiotic - resistant pathogens. The guidelines are based on a systematic review of existing national standard or clinical treatment guidelines, available antibiotic resistance data, and clinical expertise from international expert panels composed of physicians, pharmacists, and other clinicians involved in the treatment of infectious diseases. The treatment recommendations are intended to complement existing national and international clinical treatment guidelines, where available, and to provide a template for local adaptation in their absence. The guidelines are intended for use by clinicians, nurses, pharmacists, and other personnel involved in the treatment of infectious diseases or dispensing of antibiotics in Africa.

It is anticipated that some countries, sub - national areas, and/or facilities already have or will develop antibiotic treatment guidelines, based on local data, epidemiology, and clinical expertise. In those situations, Africa CDC anticipates healthcare workers will rely on the most locally relevant standards or recommendations, informed by their clinical judgment, when selecting an antibiotic agent and determining the dosage and duration of therapy.

Africa CDC aspires to have its guidelines also serve as a standardized model for other jurisdictions or facilities in Africa that develop their own guidelines. This document also describes the methodologies employed to develop the first edition guidelines and a protocol for continuously updating the guidelines. This protocol was informed by the Infectious Diseases Society of America's 2018 Handbook for Clinical Practice Guidelines Development (2018) and by the World Health Organization Handbook for Guideline Development (2014)<sup>1,2</sup>. The protocol was further reviewed and agreed upon by the expert panels.

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- 1 **Infectious Disease Society of America. Handbook for Clinical Practice Guidelines Development. 2018. Available from: <https://www.idsociety.org/practice-guideline/clinical-practice-guidelines-development-training-and-resources/>**
  - 2 **World Health Organization. Handbook for Guideline Development, 2nd Edition. 2014. Available from: <https://apps.who.int/iris/handle/10665/145714>**

## Part 2. Methodologies

### Review of Existing National Standard Treatment Guidelines and Antibiotic Resistance Data

We conducted a review to identify and obtain existing national or standard treatment guidelines (STGs) for the treatment of common infectious diseases across AU member states. We reviewed AU member states' Ministry of Health (MoH) or equivalent national government agency websites for relevant STGs published in any language before March 2019 and contacted in-country focal points for assistance identifying any existing STGs that were not readily or apparently available.

Guidelines were included for final review only if they contained disease- or pathogen-specific treatment recommendations and if antibiotic regimen recommendations included specific name or type of antibiotic, dosage, and duration of antibiotic therapy. Guidelines exclusively covering HIV, malaria, TB, and other infections or syndromes addressed by national or vertical disease control programs in Africa were excluded.

A total of 28 relevant STGs from 17 countries were identified and met our inclusion criteria; several countries had more than one published STG (Figure 1).

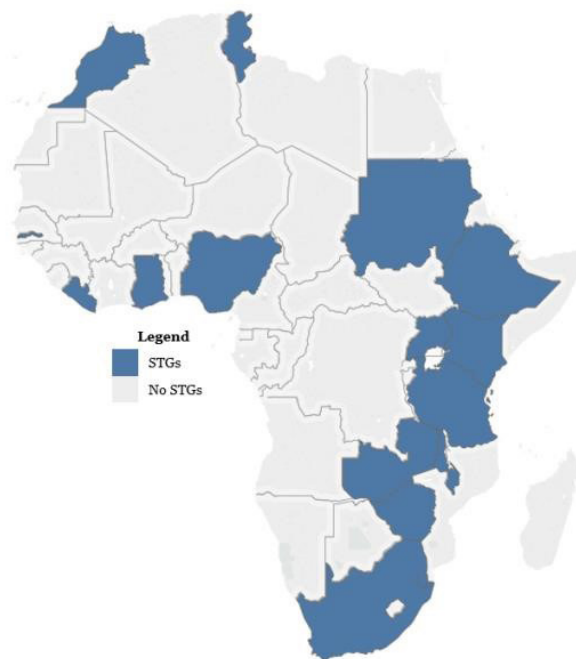


Figure 1. Geographic distribution of 17 countries with existing standard treatment guidelines (STGs) that met inclusion criteria

Of the 28 guidelines, 24 were published in English and 4 were published in French. Year of publication (or last update) ranged from 2001 to 2018/19. Twenty guidelines provided treatment recommendations for both adult and pediatric patient populations, 5 provided only adult-specific guidelines, and 3 provided pediatric-only recommendations (Table 1).

We reviewed each of the 28 guidelines and compiled information on the types of infections and clinical syndromes included and on antibiotic therapy recommendations for each including first- and second-line drug selection and dosage, duration of therapy, and principles of stewardship. Antibiotic agent selections from the World Health Organization (WHO) Model List of Essential Medicines

(MLEM, 21<sup>st</sup> List, 2019) and MLEM for Children (7<sup>th</sup> List; 2019) were also compiled and used to aid in the assessment of drug availability across the continent<sup>3,4</sup>.

Similarly, we conducted a review to identify all available antibiotic resistance data, collected between January 2010 and July 2020, in neonatal, pediatric, and adult patient populations across AU member states. Antibiotic resistance prevalence rates for all organism - antibiotic combinations, disease manifestations, and specimen types were considered as were data collected from various settings including clinical wards, outbreak investigations, and individual health facilities.

All treatment recommendations from existing STGs and available antibiotic resistance data were compiled and presented to two panels of experts who developed the guidelines contained in this document.

Overall, there was a severe paucity of available antibiotic resistance data which prevented this data from heavy consideration during the development of antibiotic treatment recommendations. In the future, with a more robust evidence - base, resistance prevalence and trends over time at the facility, regional, and national level must be considered when developing treatment guidelines.

**Table 1. Summary of identified standard treatment guidelines (n=28) that met the inclusion criteria**

Country	Title	Year Published	Source/Publisher	Adult	Ped.
Eswatini	Standard Treatment Guidelines & Essential Medicines List of Common Medical Conditions in the Kingdom of Swaziland 1st Edition	2012	Ministry of Health (MoH)	X	X
Ethiopia	Guideline on Cholera Outbreak Management	2011	Ethiopian Health and Nutrition Research Institute	X	X
Ethiopia	National Guidelines for the Management of Sexually Transmitted Infections Using Syndromic Approach	2015	MoH	X	X
The Gambia	The Gambia Standard Drug Treatment Guide	2001	Department of State for Health and Social Welfare	X	X
Ghana	Standard Treatment Guidelines Sixth Edition	2010	MoH	X	X
Kenya	Clinical Guidelines for Management and Referral of Common Conditions at Levels 4 - 6: Hospitals	2009	Ministry of Medical Services & Ministry of Public Health & Sanitation	X	X

<sup>3</sup> **World Health Organization Model List of Essential Medicines, 21st List, 2019. Geneva: World Health Organization; 2019. Available from: <https://apps.who.int/iris/bitstream/handle/10665/325771/WHO - MVP - EMP - IAU - 2019.06 - eng.pdf?ua=1>**

<sup>4</sup> **World Health Organization Model List of Essential Medicines for Children, 7th List, 2019. Geneva: World Health Organization; 2019. Available from: <https://www.who.int/publications/i/item/WHOMVPEMPIAU201907>**

Country	Title	Year Published	Source/Publisher	Adult	Ped.
Kenya	Guidelines on Cholera Control	2002	MoH Division of Disease Surveillance and Response	X	X
Liberia	2nd Edition National Standard Therapeutic Guidelines and Essential Medicines List - 2017	2017	MoH	X	X
Malawi	Malawi Standard Treatment Guidelines 5th Edition 2015	2015	MoH	X	X
Morocco	Directives de Prise en Charge de L'Enfant Malade de Moins de Cinq Ans	2016	MoH		X
Nigeria	Nigeria Standard Treatment Guidelines Second Edition	2016	MoH	X	X
Seychelles	Antibiotic Guidelines for Management of Infections in Hospitals	2018 - 2019	MoH Health Care Agency	X	X
Seychelles	Guidelines for Antibiotic Prescribing in the Primary Health Care Services	2017 - 2018	MoH Health Care Agency	X	X
South Africa	Standard Treatment Guidelines and Essential Medicines List for South Africa - Hospital Level Pediatrics	2017	National Department of Health		X
South Africa	Standard Treatment Guidelines and Essential Medicines List for South Africa - Hospital Level Adults	2015	National Department of Health	X	X
South Africa	Standard Treatment Guidelines and Essential Medicines List for South Africa - Primary Healthcare Level	2018	National Department of Health	X	X
South Africa	Guidelines on Leprosy Control in South Africa	2011	National Department of Health	X	
South Africa	Listeriosis: Clinical recommendations for diagnosis and treatment	2017	National Institute for Communicable Diseases	X	
Sudan	Sudan National Standard Treatment Guidelines	2014	MoH	X	X
Tanzania	Standard Treatment Guidelines & National Essential Medicines List	2017	Ministry of Health, Community Development, Gender, Elderly and Children	X	X
Tunisia	Antibiotherapie des Infectious Osteo - Articulaires Aigues Communautaires a Pyogenes - Recommandations Nationales Fevrier 2006	2006	Ministry of Public Health	X	



Country	Title	Year Published	Source/Publisher	Adult	Ped.
Tunisia	Antibiotherapie des Pyelonephrities Aigues Communautaires de L'Adulte	Not stated	Ministry of Scientific Research, Department of Pharmacy, Tunisian Society of Medical Sciences, etc.	X	
Tunisia	L'Antibiotherapie dans les Infections Respiratoires Basses Acquises de L'Adulte Traitee en Ville	Not stated	Not stated	X	
Uganda	Prevention and Control of Cholera	2017	MoH	X	X
Uganda	Uganda Clinical Guidelines 2016: National Guidelines for the Management of Common Conditions	2016	MoH	X	X
Zambia	Standard Treatment Guidelines, Essential Medicines List and Essential Laboratory Supplies List for Zambia	2013	MoH	X	X
Zambia	Essential Newborn Care Guidelines	2014	Ministry of Community Development, Mother and Child Health		X
Zimbabwe	7th Essential Medicines List and Standard Treatment Guidelines for Zimbabwe	2015	Ministry of Health and Child Care	X	X

### Convening a Guidelines Development Group

Two expert panel groups were formed to develop treatment recommendations for adult and neonatal/pediatric patient populations, respectively. In selecting panelists, we strived to achieve a gender balance, to include a broad range of clinical specialties and occupations, and to ensure the group was representative of each African region. All participating panelists were asked to report any potential conflicts of interest (COI) including intellectual property and financial ties to pharmaceutical companies. No such COIs were identified.

The first panel, consisting of nine clinicians, convened in August 2019 at AU headquarters in Addis Ababa, Ethiopia to develop treatment recommendations for adult patient populations. A subsequent panel, consisting of 19 experts, was held via virtual webinar in October 2020 to develop treatment recommendations for pediatric patients. Each panel reviewed compiled antibiotic resistance data and treatment recommendations from existing STGs, selected the bacterial infections and syndromes for inclusion in the first edition guidelines, and developed consensus treatment recommendations. Following the initial meeting, panelists were given the opportunity to review drafts of the guidelines and provide further input before the guidelines were released for external review. Panelists also provided input on the methodologies used to develop these guidelines and the protocol described to continually update these guidelines.



## **Disseminating the Guidelines**

Africa CDC, supported by CDDEP will host and maintain a user - friendly, web - based platform that displays the antibiotic selection, dosage, and duration of treatment recommendations developed by the expert panels. The website displaying a database of STGs and the first edition treatment guidelines are available at the following locations:

- [africaguidelines.cddep.org](http://africaguidelines.cddep.org)
- [africacdc.org/african - antibiotic - treatment - guidelines - for - common - bacterial - infections - and - syndromes/](http://africacdc.org/african - antibiotic - treatment - guidelines - for - common - bacterial - infections - and - syndromes/)

## **Protocol for Continuously Updating the Guidelines**

To ensure that the African Antibiotic Treatment Guidelines continue to reflect AU member states' priority health areas and existing, newly published, or updated STGs, CDDEP and Africa CDC will conduct an annual systematic review, according to methodologies approved by the expert panels, to identify guidelines that meet the project's inclusion criteria. New or updated guidelines will be reviewed and information on methodologies and recommended antibiotic therapies will be added to an existing electronic database. In addition, available antibiotic resistance data will be continually compiled and analyzed. Finally, a multi - disciplinary expert panel will convene every five years to review newly available national antibiotic resistance data and antibiotic treatment recommendations and to update these guidelines as needed.

## Part 3. Principles of Stewardship

Antibiotics are scarce resources and must be used judiciously for management of infectious diseases. Unfortunately, the lack of regulations and guidance for the appropriate use of antibiotics has contributed to the rise of antibiotic consumption in human and animal health sectors. The misuse and overuse of antibiotics in these sectors are major drivers of antibiotic resistance. Previous studies have found that clinically inappropriate antibiotics are prescribed in a large number of cases<sup>5,6,7</sup>. Moreover, consumption is higher among African countries, which may reflect the higher infectious disease burden<sup>8</sup>.

There is an urgent need to implement successful facility - based and national antibiotic stewardship programs (ASP) which integrate infection prevention and control, clinical diagnostics, and disease management.

The development and implementation of STGs is valuable for institutionalizing a hospital ASP. Important considerations for the use of antibiotics include drug selection considering antibiotic spectrum of activity, adverse effect profile and availability of specific formulations (including those applicable to young children), likelihood of antibiotic resistance, route of administration, dosage, and duration of therapy. The decision to start and continue antibiotic therapy must be based on clear indications including laboratory and clinical diagnostic and monitoring results.

Overall, prescribers should first consider treatment with clinically appropriate antibiotics on the WHO's Access list and resort to treatment with Watch and Reserve antibiotics only in cases with documented resistance or drug unavailability<sup>9</sup>. Use of fixed - dose combination therapies should only be used when they are clinically appropriate and necessary. Re - evaluation of therapy is essential once available laboratory results are obtained, and options for de - escalation from broad - spectrum to narrower spectrum antibiotics must be considered if microbiological culture and antibiotic susceptibility testing results allow. Antibiotic therapies should be used alongside other appropriate interventions such as early and effective source control.

Alongside other antibiotic stewardship interventions, the development and implementation of the guidelines, particularly when informed by local data, offer an opportunity to reduce the use of antibiotics. Previous studies have reported that clinical guidelines that provide explicit recommendations for the treatment of infectious diseases and aid in clinical decision making, not only reduce inappropriate antibiotic prescribing but also improve the quality of care<sup>10,11</sup>.

5 Grijalva CG, Nuorti JP, Griffin MR. Antibiotic prescription rates for acute respiratory tract infections in US ambulatory settings. *JAMA*; 2009; 302(7):758 - 66. Doi: 10.1001/jama.2009.1163

6 Milani R V., Wilt JK, Entwisle J, Hand J, Cazabon P, Bohan JG. Reducing inappropriate outpatient antibiotic prescribing: Normative comparison using unblinded provider reports. *BMJ Open Quality*. 2019; 8(1):e000351. Doi: 10.1136/bmjopen-2018-000351

7 Fleming - Dutra KE, Hersh AL, Shapiro DJ, Bartoces M, Enns EA, File TM, Finkelstein JA, Gerber JS, Hyun DY, Linder JA, Lynfield R. Prevalence of inappropriate antibiotic prescriptions among US ambulatory care visits, 2010 - 2011. *Jama*. 2016 May 3;315(17):1864 - 73.

8 Versporten A, Zarb P, Caniaux I, Gros MF, Drapier N, Miller M, et al. Antibiotic consumption and resistance in adult hospital inpatients in 53 countries: Results of an internet - based global point prevalence survey. *The Lancet Global Health*. 2018; 6(6):e619 - 629. Doi: [https://doi.org/10.1016/S2214-109X\(18\)30186-4](https://doi.org/10.1016/S2214-109X(18)30186-4).

9 World Health Organization. AWaRe. Available from: <https://adoptaware.org/>

10 Fernández González F, Detrés J, Torrellas P, Balleste CR. Comparison of the appropriate use of antibiotics based on clinical guidelines between physicians in - training versus practicing physicians. *Boletín de la Asociación Médica de Puerto Rico*. 2013; 105(3):21 - 24.

11 de With K, Allerberger F, Amann S, Apfalter P, Brodt HR, Eckmanns T, et al. Strategies to enhance rational use of antibiotics in hospital: a guideline by the German Society for Infectious Diseases. *Infection*. 2016; 44(3): 395 - 439. Doi: 10.1007/s15010-016-0885-z.

Relevant disease - or infection - specific stewardship principles are described throughout the treatment recommendations. Whenever possible, clinicians should seek to obtain relevant patient specimen cultures prior to treatment commencement and conduct microbiological diagnosis, pathogen identification, and antibiotic susceptibility testing (AST). However, in situations where a patient presents with a clinically diagnosed serious infection, treatment should not be delayed until those results become available.

If laboratory testing services are not available and clinical presentation indicates a viral etiology, clinicians may consider practicing watchful waiting and delay starting treatment with antibiotics. However, the guidelines do not intend to overrule clinical judgement and prompt treatment must be initiated in severe infections or suspected sepsis. Whenever possible empiric treatment of clinically diagnosed infection should be informed by existing antibiotic susceptibility data and patterns. Finally, clinicians should consider a clinical diagnosis of other infections (e.g. TB, HIV, malaria etc.) in endemic or high - burden areas.

## Part 4. How to Use these Guidelines

The following treatment guidelines provide recommendations for empiric antibiotic therapy for common bacterial infections and syndromes. Empiric antibiotic therapy refers to an appropriate choice of one or more antibiotics to treat an infection for which a specific aetiological diagnosis (identification of a pathogen on an appropriate patient specimen and AST) has not been made. Empiric antibiotic therapy targets the most likely pathogen(s) for the site(s) of infection, ideally matches the narrowest - spectrum, single antibiotic with the likely pathogen(s), assesses the likelihood of antibiotic resistance (e.g. recent antibiotic exposure or hospitalization), takes into account potential contraindications including drug allergies and toxicities, and selects an antibiotic with adequate target tissue penetration.

Clinical definitions including common presenting symptoms and causative bacteria are provided for each syndrome or infection, as are relevant stewardship principles and other clinical notes; however, these notes are not meant to be exhaustive. Importantly, complete clinical diagnostic guidance is not provided given the guidelines scope of empiric therapy, and medical therapies and treatment outside of antibiotic therapy (e.g. pain management or surgical intervention) are excluded.

Preferred antibiotic choice, dosage, and duration should be followed when possible. Only defer to alternative treatments if preferred antibiotic choice is not available or there are other compelling reasons precluding the use of the preferred antibiotic.

When step down therapy is recommended, the duration is the total treatment duration including intravenous (IV) therapy.

Unless otherwise specified, all antibiotic formulations described throughout the treatment recommendations follow those in the WHO MLEM and WHO MLEM for Children<sup>12,13</sup>.

For neonatal and pediatric age groups, the following definitions are generally followed unless otherwise specified; for patients 20 years and older, refer to the adult treatment recommendations:

Neonate	Less than 28 days old or if born prematurely, less than 42 weeks corrected gestational age
Infant	Less than 1 year of age
Child	Less than 10 years of age
Adolescent	10 – 19 years of age

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<sup>12</sup> World Health Organization Model List of Essential Medicines, 21st List, 2019. Geneva: World Health Organization; 2019. Available from: <https://apps.who.int/iris/bitstream/handle/10665/325771/WHO-MVP-EMP-IAU-2019.06-eng.pdf?ua=1>

<sup>13</sup> World Health Organization Model List of Essential Medicines for Children, 7th List, 2019. Geneva: World Health Organization; 2019. Available from: <https://www.who.int/publications/i/item/WHOMVPEMPIAU201907>

## Part 5. Recommended Antibiotic Treatments for Common Bacterial Infections & Syndromes in Neonatal and Pediatric Patients

### Central Nervous System

Suspected Acute Bacterial Meningitis (Community - Acquired)			
<p><u>Clinical definition:</u> Inflammation of meninges of the brain and spinal cord. Clinical features may be non-specific in neonates and young infants (e.g. poor feeding, apathy, jaundice, apnoea, full fontanelle, fever, hypothermia) and in older infants may include irritability, drowsiness, poor feeding, high fever, and/or vomiting. Older children may present similarly to adults with headache, fever, photophobia, vomiting, neck stiffness, and/or altered level of consciousness. Common bacterial pathogens in neonates and young infants include <i>Streptococcus agalactiae</i> (Group B streptococcus), <i>E. coli</i>, <i>Klebsiella</i> species, <i>L. monocytogenes</i>, and in older infants and children: <i>S. pneumoniae</i>, <i>H. influenzae</i>, and <i>N. meningitidis</i>.</p>			
Neonate			
Preferred antibiotic choice			
Drug(s)	Formulation	Dosage	Duration
Combination therapy with:  Cefotaxime (IV)  PLUS  Ampicillin (IV)	Cefotaxime - Powder for injection: 250 or 500 mg per vial (as sodium salt)  Ampicillin - Powder for injection: 500mg, 1g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul> <ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 mg/kg/dose 8 hourly</li> <li>○ 8 days of age and older: 100 mg/kg/dose 6 hourly</li> </ul>	Treat with ampicillin (for Listeria coverage) until CSF culture results confirm aetiology. If CSF culture is not available, treat with cefotaxime plus ampicillin for 14 – 21 days.
If cefotaxime is not available, use			
Combination therapy with:  Ceftriaxone (IV)  PLUS  Ampicillin (IV)  (Except in neonates with jaundice and neonates receiving calcium - containing IV fluids)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial  Ampicillin - Powder for injection: 500mg, 1g (as sodium salt) in vial	50 mg/kg/dose 12 hourly  <ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 mg/kg/dose 8 hourly</li> <li>○ 8 days of age and older: 100 mg/kg/dose 6 hourly</li> </ul>	Treat with ampicillin (for Listeria coverage) until CSF culture results confirm aetiology. If CSF culture is not available, treat with ceftriaxone plus ampicillin for 14 - 21 days.

Infant (Older than 28 days), Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly, maximum dose 2 g 12 hourly	10 – 14 days
Alternative antibiotic choice only if cefotaxime/ceftriaxone is not available			
Ampicillin (IV)	Powder for injection: 500 mg; 1 g (as sodium salt) in vial	50 mg/kg/dose 6 hourly, maximum dose: 2 g 6 hourly	10 – 14 days
<p>Principles of Stewardship:</p> <ul style="list-style-type: none"> <li>Acute meningitis may be caused by a range of pathogens, some of which are not bacteria. Microbiologic diagnosis, including CSF gram stain/microscopy, bacterial culture and AST should be obtained as soon as possible, if available, as this may allow empiric antibiotic treatment to be adjusted to target the specific pathogen identified and inform the duration of treatment. In the absence of a positive CSF culture or PCR result, a positive blood culture result together with a CSF cell count and chemistry suggestive of bacterial meningitis may be useful in guiding antibiotic selection and duration of treatment. Although guidelines differ in treatment duration recommendations for specific pathogens, a general recommendation for uncomplicated meningitis is Gram negative organisms and <i>Listeria</i> 21 days, Group B <i>Streptococcus</i> 14 - 21 days, <i>S. pneumoniae</i> 10 - 14 days, <i>H. influenzae</i> 7 - 10 days, <i>N. meningitidis</i> 5 - 7 days.</li> <li>In patients with a positive CSF culture, repeat lumbar puncture 24 - 48 hours after initiation of antimicrobial treatment to document CSF sterilization is useful (particularly in neonates) as delayed sterilization may be an indication of complications such as a purulent focus requiring intervention or antibiotic resistance.</li> <li>If CSF is obtained and is not consistent with meningitis (e.g. absence of cells and normal chemistry), antibiotics should be stopped or adjusted depending on whether an alternative diagnosis has been reached.</li> <li>Consider diagnostic tests for tuberculous and cryptococcal meningitis, particularly in high HIV - burden areas.</li> </ul>			
<p>Other Notes:</p> <ul style="list-style-type: none"> <li>Complications include subdural empyema and brain abscess which may require neurosurgical intervention in addition to treatment with the above - mentioned antimicrobial therapy.</li> <li>In children and adolescents with a ventriculoperitoneal (VP) shunt presenting with meningitis, seek expert opinion and refer patient to a specialist where possible.</li> </ul>			

## Head, Eye, Ear, Nose & Throat

<b>Acute Purulent Neonatal Conjunctivitis</b>			
<u>Clinical definition:</u> Inflammation of the conjunctivae commonly caused by <i>N. gonorrhoeae</i> .			
Neonate			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Ceftriaxone (IM)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	50 mg/kg STAT as a single dose	Single dose
Principles of Stewardship: <ul style="list-style-type: none"> <li>• None</li> </ul>			
Other Notes: <ul style="list-style-type: none"> <li>• Irrigate frequently with saline and treat with topical therapy as needed.</li> </ul>			

<b>Acute Otitis Media</b>			
<u>Clinical definition:</u> Acute infection with inflammation of the middle ear. Common symptoms include fever, ear pain, ear discharge and difficulty hearing. Common bacterial pathogens include <i>S. pneumoniae</i> , <i>H. influenzae</i> , and <i>M. catarrhalis</i> .			
Infant, Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Amoxicillin (PO) <sup>A</sup>	Powder for oral liquid: 125 mg (as trihydrate) /5 mL; 250 mg (as trihydrate) /5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate)	40 - 45 mg/kg/dose 12 hourly, maximum dose 1.5 g 12 hourly	5 – 10 days
For patients who received amoxicillin in the previous 30 days or for those who are non - responsive to first - line treatment with amoxicillin after 48 – 72 hours			



Amoxicillin + clavulanic acid (PO) <sup>A</sup>	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL; 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt).	40 – 45 mg/kg of amoxicillin component per dose 12 hourly, maximum dose of amoxicillin component: 875 mg 12 hourly.  (Refer to Other Notes <sup>B</sup> below for guidance on dosing accurately.)	5 – 10 days
In case of confirmed drug allergy or medical contraindication			
Azithromycin <sup>C</sup>	Oral liquid: 200 mg/5 mL; Capsule: 250 mg; 500 mg (anhydrous).	10 mg/kg once daily, maximum daily dose 500 mg	3 – 5 days
<p>Principles of Stewardship:</p> <ul style="list-style-type: none"> <li>• Practice watchful waiting and withhold antibiotics except for patients with severe symptoms, those less than 2 years of age, and patients with bilateral disease.</li> <li>• Repeated courses of antibiotics in children with chronic otitis media and/or otorrhoea are ineffective and should be avoided. Expert advice or referral to an ENT specialist and audiologist if available should be considered.</li> </ul>			
<p>Other Notes:</p> <p>A. If a patient cannot tolerate oral antibiotics (e.g. persistent vomiting), IV or IM antibiotics may be considered:</p> <p style="padding-left: 40px;">Ampicillin (25 mg/kg/dose 6 hourly, Maximum dose: 500 mg 6 hourly), or Ceftriaxone (50 mg/kg/dose once daily, Maximum dose: 1 g daily)</p> <p>B. Current widely available oral liquid formulations contain amoxicillin + clavulanic acid in a 4:1 ratio. To achieve 40 - 45 mg/kg/dose of amoxicillin component, when using the 4:1 formulation, prescribe amoxicillin + clavulanic acid 10 - 15 mg/kg/dose of amoxicillin component 12 hourly and separately prescribe amoxicillin 30 - 35 mg/kg/dose 12 hourly in order not to exceed the maximum recommended dose of clavulanic acid (10 mg/kg/day) thereby reducing the risk of antibiotic - associated diarrhoea.</p> <p>If oral liquid formulations with a higher dose of amoxicillin are available (7:1 ratio – 400 mg amoxicillin + 57.5 mg clavulanic acid/5 mL, or 14:1 ratio – 600 mg amoxicillin + 42.9 mg clavulanic acid/5 mL), these may be dosed at 40 - 45 mg/kg dose of amoxicillin component 12 hourly without a separate amoxicillin prescription (the clavulanic acid dose will not be exceeded). If the 7:1 ratio tablet formulation is available (875 mg amoxicillin + 125 mg clavulanic acid clavulanic acid) it may be prescribed 12 hourly for children weighing 25 kg or more.</p> <p>C. If a patient fails macrolide therapy, consider ceftriaxone or refer to a specialist.</p>			



Pharyngotonsillitis			
<p><u>Clinical definition:</u> Acute inflammation of the pharyngeal wall and tonsils commonly caused by viral pathogens including respiratory viruses and Epstein - Barr virus. Common bacterial etiologies include group A beta - haemolytic Streptococci (<i>S. pyogenes</i>). Common symptoms include sore throat and fever.</p>			
Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Amoxicillin (PO) <sup>A</sup>	Powder for oral liquid: 125 mg (as trihydrate)/ 5 mL; 250 mg (as trihydrate)/5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate).	50 mg/kg once daily, maximum dose 2 g	10 days
Alternative antibiotic choice(s)			
Benzathine benzylpenicillin (IM) <sup>B</sup>	Powder for injection: 900 mg benzylpenicillin (=1.2 million units) in 5 mL vial; 1.44 g benzylpenicillin (=2.4 million units) in 5 mL vial	By weight: <ul style="list-style-type: none"> <li>• &lt;27 kg: 600 000 units (375 mg) as a single dose</li> <li>• 27 kg and above: 1.2 million units (750 mg) as a single dose</li> </ul>	Single dose
In case of confirmed drug allergy or medical contraindication			
Azithromycin (PO) <sup>C</sup>	Oral liquid: 200 mg/5 mL. Capsule: 250 mg; 500 mg (anhydrous).	10 mg/kg once daily, maximum dose 500 mg daily	5 days

Principles of Stewardship:

- Viral and bacterial acute pharyngitis usually resolve without antibiotic treatment but the primary reason for considering antibiotic treatment is to prevent acute rheumatic fever (and to a lesser extent local suppurative complications)
- Clinical features that suggest a viral rather than a bacterial cause of pharyngotonsillitis include runny nose, hoarse voice or cry, cough, conjunctivitis, discrete oral ulcerative lesions, and diarrhoea. In these cases, avoid antibiotic use.
- Children less than 3 years of age should not receive antibiotics as part of treatment for pharyngotonsillitis as they are not at significant risk for acute rheumatic fever.

Other Notes:

- A. If a patient cannot tolerate oral antibiotics (e.g. persistent vomiting), IV or IM antibiotics may be considered:
- Ampicillin (25 mg/kg/dose 6 hourly, Maximum dose: 500 mg 6 hourly), or  
Ceftriaxone (50 mg/kg/dose once daily, Maximum dose: 1 g daily)
- B. Painful IM administration of benzathine benzylpenicillin may be reduced by dissolving benzathine benzylpenicillin 1.2 million units in 3.2 mL lidocaine 1% without adrenaline (epinephrine) and bringing the preparation to room temperature before injection.
- C. Significant rates of resistance of Group A Streptococcus strains to macrolides (azithromycin) and azalides (clarithromycin) have been reported in many parts of the world. If patient fails treatment with a macrolide or azalide, consider ceftriaxone or refer to a specialist.

**Suspected Acute Bacterial Sinusitis**

Clinical definition: Acute bacterial infection of para - nasal sinuses. Common bacterial pathogens include *S. pneumoniae*, *H. influenzae*, and *M. catarrhalis*. Symptoms include a preceding upper respiratory tract infection, fever, nasal congestion, nasal discharge, facial pain and tenderness. Uncommon in children, particularly in young children in whom sinuses are not fully developed.

Infant, Child & Adolescent

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
Amoxicillin (PO) <sup>A</sup>	Powder for oral liquid: 125 mg (as trihydrate) /5 mL; 250 mg (as trihydrate) /5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate)	40 – 45 mg/kg/dose 12 hourly, maximum dose 1.5 g 12 hourly	5 – 7 days

For patients who received amoxicillin in the previous 30 days, or for those who are non - responsive to first - line treatment with amoxicillin after 48 – 72 hours.

Amoxicillin + clavulanic acid (PO) <sup>A</sup>	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL; 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt).	40 – 45 mg/kg of amoxicillin component per dose 12 hourly, maximum dose of amoxicillin component: 875 mg 12 hourly. (Refer to Other Notes <sup>B</sup> below for guidance on dosing accurately)	5 – 7 days
In case of confirmed drug allergy or medical contraindication			
Azithromycin (PO) <sup>C</sup>	Oral liquid: 200 mg/5 mL; Capsule: 250 mg; 500 mg (anhydrous).	10 mg/kg once daily, maximum dose 500 mg daily	5 days
<p>Principles of Stewardship:</p> <ul style="list-style-type: none"> <li>Practice watchful waiting and withhold antibiotics except for patients with severe symptoms. For severe cases or poor response to initial therapy, expert advice and radiological imaging may be required to exclude intracranial extension.</li> </ul>			
<p>Other Notes:</p> <p>A. If a patient cannot tolerate oral antibiotics (e.g. persistent vomiting), IV or IM antibiotics may be considered:</p> <ul style="list-style-type: none"> <li>Ampicillin (25 mg/kg/dose 6 hourly, Maximum dose: 500 mg 6 hourly), or</li> <li>Ceftriaxone (50 mg/kg/dose once daily, Maximum dose: 1 g)</li> </ul> <p>B. Current widely available oral liquid formulations contain amoxicillin + clavulanic acid in a 4:1 ratio. To achieve 40 - 45 mg/kg/dose of amoxicillin component, when using the 4:1 formulation, prescribe amoxicillin + clavulanic acid 10 - 15 mg/kg/dose of amoxicillin component 12 hourly and separately prescribe amoxicillin 30 - 35 mg/kg/dose 12 hourly in order not to exceed the maximum recommended dose of clavulanic acid (10 mg/kg/day) thereby reducing the risk of antibiotic - associated diarrhoea.</p> <p>If oral liquid formulations with a higher dose of amoxicillin are available (7:1 ratio – 400 mg amoxicillin + 57.5 mg clavulanic acid/5 mL, or 14:1 ratio – 600 mg amoxicillin + 42.9 mg clavulanic acid/5 mL), these may be dosed at 40 - 45 mg/kg dose of amoxicillin component 12 hourly without a separate amoxicillin prescription (the clavulanic acid dose will not be exceeded). If the 7:1 ratio tablet formulation is available (875 mg amoxicillin + 125 mg clavulanic acid) it may be prescribed 12 hourly for children weighing 25 kg or more.</p> <p>C. If patient fails macrolide therapy, consider ceftriaxone or refer to a specialist.</p>			

<b>Dental Abscess (Including Acute Necrotising Gingivitis/Periodontitis)</b>			
<p>Clinical definition: A dental abscess refers to acute or chronic suppurative infection related to the teeth. Symptoms include severe pain, tooth sensitivity, inflammation, and swelling of the gums and face. Acute necrotizing gingivitis/periodontitis refers to acute very painful infection of the gingival margin. Clinical features include foul - smelling breath, necrosis and sloughing of gum margin, loss of gingiva and supporting bone around teeth. It may be associated with underlying illness (e.g. malnutrition, HIV) and may extend to the lips and cheeks without adequate treatment. Infections are usually caused by multiple oral bacteria including anaerobic organisms.</p>			
Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Combination therapy with: Amoxicillin (PO) PLUS Metronidazole (PO) <sup>A</sup>	Amoxicillin - Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate).	40 - 45 mg/kg/dose 12 hourly, maximum dose: 1.5 g 12 hourly	5 – 7 days
	Metronidazole - Oral liquid: 200 mg (as benzoate)/5 mL. Tablet: 200 mg to 500 mg. Injection: 500 mg in 100 - mL vial.	7.5 mg/kg/dose 8 hourly, maximum dose 300 mg 8 hourly	
Alternative antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
Clindamycin (PO)	Capsule: 150 mg (as hydrochloride). Injection: 150 mg (as phosphate)/ mL; Oral liquid: 75 mg/5 mL (as palmitate).	6 mg/kg/dose 6 hourly, maximum dose 450 mg 6 hourly	5 days
In case of confirmed drug allergy or medical contraindication			
Drug	Formulation	Dosage	Duration
Azithromycin (PO)	Oral liquid: 200 mg/5 mL. Capsule: 250 mg; 500 mg (anhydrous).	10 mg/kg once daily, maximum dose 500 mg	3 – 5 days

Principles of Stewardship:

- Referral to a dentist is recommended in all cases.
- If the abscess is drained and the patient is improving, consider stopping antibiotics after 5 days of treatment.
- For gingivitis alone without necrosis or abscess, do not treat with antibiotics.

Other Notes:

- If a patient cannot tolerate oral antibiotics or for severe disease, IV/IM antibiotics may be considered. Treat with:
  - Ampicillin (25 mg/kg/dose 6 hourly IV or IM, Maximum dose: 500 mg 6 hourly) PLUS metronidazole (7.5 mg/kg/dose 8 hourly IV, Maximum dose: 400 mg 8 hourly), or
  - Ceftriaxone (50 mg/kg/dose once daily IV or IM, Maximum dose: 1 g daily) PLUS metronidazole (7.5 mg/kg/dose 8 hourly IV, Maximum dose: 300 mg 8 hourly)

**Cardiac**

**Acute Rheumatic Fever**

Clinical definition: An inflammatory condition that may follow a throat infection with group A streptococci and an important cause of acquired heart disease in the acute phase of the disease and as a result of chronic valvular complications. Acute rheumatic fever is predominantly a disease of children (not infants), adolescents and young adults

Child & Adolescent

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
Amoxicillin (PO)	Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL, Solid oral dosage form: 250 mg; 500 mg (as trihydrate).	50 mg/kg once daily, maximum dose 2 g	10 days

Alternative antibiotic choice(s)

Benzathine benzylpenicillin (IM) <sup>A</sup>	Powder for injection: 900 mg benzylpenicillin (=1.2 million units) in 5 mL vial; 1.44 g benzylpenicillin (=2.4 million units) in 5 mL vial	By weight: <ul style="list-style-type: none"> <li>○ &lt;27 kg: 600 000 units (375 mg) as a single dose</li> <li>○ 27 kg and above: 1.2 million units (750 mg) as a single dose</li> </ul>	Single dose
In case of confirmed drug allergy or medical contraindication			
Azithromycin (PO) <sup>B</sup>	Oral liquid: 200 mg/5 mL; Capsule: 250 mg; 500 mg (anhydrous).	10 mg/kg once daily, maximum dose 500 mg daily	3 – 5 days
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>• None</li> </ul>			
Other Notes:			
<p>A. Painful intramuscular administration of benzathine benzylpenicillin may be reduced by dissolving benzathine benzylpenicillin 1.2 million units in 3.2 mL lidocaine 1% without adrenaline (epinephrine) and bringing the preparation to room temperature before injection</p> <p>B. Significant rates of resistance of Group A Streptococcus strains to macrolides (azithromycin) and azalides (clarithromycin) have been reported in many parts of the world. Use of these antibiotics may result in treatment failure.</p> <ul style="list-style-type: none"> <li>• Prophylaxis: administer to all patients with documented rheumatic fever. Continue prophylaxis for 10 years or until 21 years of age (whichever is longer) if no rheumatic valvular disease, and until 35 years of age in patients with rheumatic valvular disease. <ul style="list-style-type: none"> <li>○ Benzathine benzylpenicillin (IM) 600,000 IU every 21 - 28 days for children weighing &lt;30 kg or 1.2 MU every 21 - 28 days for children weighing 30 kg or more, OR Phenoxyethylpenicillin (PO) 125 mg 12 hourly OR amoxicillin (PO) 125 mg daily for children weighing &lt;30kg and 250 mg daily for children weighing 30 kg or more.</li> <li>○ For patients with severe penicillin allergies, give prophylaxis with: <ul style="list-style-type: none"> <li>▪ For children &lt;11 years: Macrolide e.g. azithromycin (PO) 10mg/kg/dose (maximum dose 500 mg) 3 times weekly</li> <li>▪ For children 11 years or older: Macrolide e.g. azithromycin (PO) 250 mg daily)</li> </ul> </li> </ul> </li> </ul>			

Infective Endocarditis (Native Valve)			
Clinical definition: Infection of the endothelial surface of the heart. Symptoms may be variable and non-specific. Ideally, the diagnosis should be confirmed and an organism identified on blood culture before commencing treatment. However, if the patient presents with severe disease, empiric treatment should be started and directed at staphylococci and streptococci.			
Neonate, Infant, Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Combination therapy with:  Benzylpenicillin (IV)  PLUS  Cloxacillin (IV)  PLUS  Gentamicin (IV)	Benzylpenicillin - Powder for injection: 600 mg (= 1 million IU); 3 g (= 5 million IU) (sodium or potassium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 000 IU/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 125 000 IU/kg/dose 6 hourly, maximum dose 5 million IU 6 hourly</li> </ul>	4 – 6 weeks
	Cloxacillin - Powder for injection: 500 mg (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 – 28 days: 50 mg/kg/dose 8 hourly</li> <li>○ 28 days &amp; older: 50 mg/kg/dose 6 hourly, maximum dose 3 g 6 hourly</li> </ul>	
	Gentamicin - Injection: 10 mg, 40 mg (as sulfate) / mL in 2 mL vial	3 mg/kg/dose once daily, maximum dose 360 mg	First 2 weeks of therapy

Alternative antibiotic choice(s)			
<p>If Benzylpenicillin is not available, substitute with:</p> <p>Ampicillin (IV)</p> <p>Treat in combination with</p> <p>Cloxacillin (IV)</p> <p>PLUS</p> <p>Gentamicin (IV), as above.</p>	<p>Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial</p>	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 6 hourly, maximum dose 2 g 6 hourly</li> </ul>	<p>4 – 6 weeks</p>
<p>If Cloxacillin is not available, substitute with:</p> <p>Cefazolin (IV)</p> <p>Treat in combination with Benzylpenicillin (IV) (Or Ampicillin (IV))</p> <p>PLUS</p> <p>Gentamicin (IV), as above.</p>	<p>Cefazolin - Powder for injection: 1 g (as sodium salt) in vial</p>	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 8 hourly, maximum dose 4 g 8 hourly</li> </ul>	<p>4 – 6 weeks</p>
In case of confirmed drug allergy or medical contraindication			
Drug	Formulation	Dosage	Duration
<p>Vancomycin (IV)</p> <p>PLUS</p> <p>Gentamicin (IV)</p>	<p>Vancomycin - Injection: 500 mg, 1 g vial (as hydrochloride)</p> <p>Gentamicin - Injection: 10 mg, 40 mg (as sulfate) / mL in 2 mL vial</p>	<p>15 mg/kg/dose 6 hourly</p> <p>1.5 mg/kg/dose 12 hourly</p>	<p>4 – 6 weeks</p> <p>First 2 weeks of therapy</p>
<p>Principles of Stewardship:</p> <ul style="list-style-type: none"> <li>• For suspected infective endocarditis cases, 3 blood cultures should be obtained in rapid succession from 3 anatomic sites within 6 hours before initiation of antibiotic therapy.</li> <li>• If a pathogen is identified in blood culture, antibiotic treatment should be tailored to that pathogen, in line with appropriate guidelines. The pathogen and anatomical site may affect the duration of therapy.</li> <li>• Therapeutic drug monitoring and renal function monitoring on patients treated with vancomycin and/or gentamicin.</li> </ul>			



Other Notes:

- Obtain expert advice from a cardiologist and/or infectious diseases specialist (if available) in all cases of endocarditis (native valve or prosthetic valve endocarditis)

## Respiratory

### Acute Lower Respiratory Tract Infection: Mild - Moderate/Ambulatory (Community - Acquired)

Clinical definition: Acute lower respiratory tract infection includes acute viral bronchiolitis, and acute viral and bacterial pneumonia. Antibiotics are indicated in the empiric treatment of pneumonia and are not usually indicated for the treatment of bronchiolitis. However, the decision to prescribe or withhold antibiotics is influenced by several factors: the ability to clinically distinguish acute viral bronchiolitis from pneumonia, laboratory and radiological findings may not provide confident differentiation of viral bronchiolitis from bacterial pneumonia, the knowledge that bacterial co-infection may be present in a variable proportion of children with features of bronchiolitis, the ability of the caregiver to monitor the child and re-access health care urgently in the event of clinical deterioration. WHO recommends that antibiotics should be prescribed for young children with acute onset of cough associated with wheeze, fast breathing and chest indrawing. Antibiotic selection is based on assessment of severity and likely aetiology. Common bacterial causes of pneumonia include: neonates – Group B Streptococci, Klebsiella species, *E. coli*, *C. trachomatis*, *S. aureus*; older infants and children – *S. pneumoniae*, *H. influenzae*, *S. aureus*, *M. catarrhalis*, *M. pneumoniae*.

#### Neonate

All children younger than 1 month with mild/moderate or severe Acute Lower Respiratory Tract Infection should be admitted to hospital. See guidelines for severe Acute Lower Respiratory Infections.

#### Infant, Child & Adolescent

#### Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
Amoxicillin (PO)	Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL. Solid oral dosage form: 250 mg; 500 mg (as trihydrate).	40 - 45 mg/kg/dose 12 hourly, maximum dose: 1.5 g 12 hourly	5 days

In case of poor response to preferred antibiotic choice			
Amoxicillin + clavulanic Acid (PO)	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL; 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL . Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt).	40 – 45 mg/kg of amoxicillin component per dose 12 hourly, maximum dose of amoxicillin component: 875 mg 12 hourly.  (Refer to Other Notes <sup>A</sup> below for guidance on dosing accurately)	5 days
In case of confirmed drug allergy or medical contraindication			
Azithromycin (PO) <sup>B</sup>	Capsule: 250 mg; 500 mg (anhydrous). Oral liquid: 200 mg/5 mL	10 mg/kg once daily, maximum dose 500 mg	3 – 5 days
Principles of Stewardship:			
> None			
Other Notes:			
<p>A. Current widely available oral liquid formulations contain amoxicillin + clavulanic acid in a 4:1 ratio. To achieve 40 - 45 mg/kg/dose of amoxicillin component, when using the 4:1 formulation, prescribe amoxicillin + clavulanic acid 10 - 15 mg/kg/dose of amoxicillin component 12 hourly and separately prescribe amoxicillin 30 - 35 mg/kg/dose 12 hourly in order not to exceed the maximum recommended dose of clavulanic acid (10 mg/kg/day) thereby reducing the risk of antibiotic - associated diarrhoea.</p> <p>If oral liquid formulations with a higher dose of amoxicillin are available (7:1 ratio – 400 mg amoxicillin + 57.5 mg clavulanic acid/5 mL, or 14:1 ratio – 600 mg amoxicillin + 42.9 mg clavulanic acid/5 mL), these may be dosed at 40 - 45 mg/kg dose of amoxicillin component 12 hourly without a separate amoxicillin prescription (the clavulanic acid dose will not be exceeded). If the 7:1 ratio tablet formulation is available (875 mg amoxicillin + 125 mg clavulanic acid) it may be prescribed 12 hourly for children weighing 25 kg or more.</p> <p>B. In case of treatment failure with azithromycin, treat with clindamycin (6 mg/kg/dose 6 hourly, Maximum dose: 450 mg 6 hourly).</p> <ul style="list-style-type: none"> <li>• <i>S. pneumoniae</i> should be suspected if there is empyema, pulmonary cavitation or pneumatocele formation, or the presence of extrapulmonary pyogenic infections. Treatment should follow Acute Lower Respiratory Tract Infection: Severe/inpatient guidelines.</li> <li>• Consider screening for HIV and TB in all patients presenting with Lower Respiratory Tract Infection.</li> </ul>			

**Acute Lower Respiratory Tract Infection: Severe/Inpatient (Community - acquired)**

Neonate

Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Combination therapy with: Cefotaxime (IV) <sup>A</sup> PLUS Ampicillin (IV)	Cefotaxime - Powder for injection: 250 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	5 – 7 days
	Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 100 mg/kg/dose 6 hourly</li> </ul>	
Infant, Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Ampicillin (IV)	Powder for injection: 500 mg; 1 g (as sodium salt) in vial.	50 mg/kg/dose 6 hourly, maximum dose 2 g 6 hourly	5 – 7 days
If poor response to treatment or Staphylococcal pneumonia is suspected (empyema, pulmonary cavitation, pneumatocele formation or the presence of extrapulmonary pyogenic infections), escalate to:			
Amoxicillin + clavulanic acid (IV) OR Ceftriaxone (IV)	Amoxicillin + clavulanic acid - Powder for injection: 500 mg (as sodium) + 100 mg (as potassium salt); 1000 mg (as sodium) + 200 mg (as potassium salt) in vial.	30 mg/kg/dose of amoxicillin component 8 hourly, maximum dose 1.2 g 8 hourly	10 –14 days
	Ceftriaxone - Powder for injection: 250 mg; 1 g (as sodium salt) in vial.	50 mg/kg once daily, maximum dose 1 g	10 – 14 days
Step down therapy to:			

Amoxicillin (PO) OR, if treated with Amoxicillin + clavulanic acid (IV) or Ceftriaxone (IV), then Amoxicillin + clavulanic acid (PO) <sup>B</sup>	Amoxicillin - Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate).	40 - 45 mg/kg/dose 12 hourly, 1.5 g 12 hourly	10 – 14 days  <i>(Total treatment duration including IV therapy.)</i>
	Amoxicillin + clavulanic acid - Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL; 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL . Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt).	40 – 45 mg/kg of amoxicillin component per dose 12 hourly, maximum dose of amoxicillin component: 875 mg 12 hourly.  (Refer to Other Notes <sup>B</sup> below for guidance on dosing accurately)	
In case of confirmed drug allergy or medical contraindication			
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial.	50 mg/kg/dose once daily, maximum dose 1 g	10 – 14 days
<p>Principles of Stewardship:</p> <ul style="list-style-type: none"> <li>• Continue with IV antibiotics until there is evidence of good clinical response and/or laboratory markers of infection improve, and then consider switching to oral antibiotic therapy.</li> <li>• For suspected or confirmed Staphylococcal pneumonia or empyema with or without microbiological confirmation, adequate drainage of pus and prolonged treatment duration is recommended (minimum 10 – 14 days).</li> </ul>			

Other Notes:

- A. If cefotaxime is not available, use ceftriaxone (50 mg/kg/dose 12 hourly in neonates) in combination with benzylpenicillin or ampicillin except in neonates with jaundice and neonates receiving calcium - containing IV fluids.
- B. Current widely available oral liquid formulations contain amoxicillin + clavulanic acid in a 4:1 ratio. To achieve 40 - 45 mg/kg/dose of amoxicillin component, when using the 4:1 formulation, prescribe amoxicillin + clavulanic acid 10 - 15 mg/kg/dose of amoxicillin component 12 hourly and separately prescribe amoxicillin 30 - 35 mg/kg/dose 12 hourly in order not to exceed the maximum recommended dose of clavulanic acid (10 mg/kg/day) thereby reducing the risk of antibiotic - associated diarrhoea.

If oral liquid formulations with a higher dose of amoxicillin are available (7:1 ratio – 400 mg amoxicillin + 57.5 mg clavulanic acid/5 mL, or 14:1 ratio – 600 mg amoxicillin + 42.9 mg clavulanic acid/5 mL), these may be dosed at 40 - 45 mg/kg dose of amoxicillin component 12 hourly without a separate amoxicillin prescription (the clavulanic acid dose will not be exceeded). If the 7:1 ratio tablet formulation is available (875 mg amoxicillin + 125 mg clavulanic acid) it may be prescribed 12 hourly for children weighing 25 kg or more.

- If pertussis is suspected, add treatment with a macrolide e.g. azithromycin 10 mg/kg once daily for 3 – 5 days, maximum dose 500 mg.
- Screen all patients for HIV and TB.
- Add empiric treatment for pneumocystis pneumonia (PCP) in HIV - exposed or HIV - infected infants and children:
  - Trimethoprim + sulfamethoxazole (1:5) dosed according to trimethoprim component (Loading dose: 10 mg/kg IV followed by 5 mg/kg/dose IV or PO 6 hourly for 21 days.)
  - The addition of corticosteroids, usually prednisone 1 – 2 mg/kg once daily PO for 7 days, tapered over the next 7 days may be beneficial.

## Gastrointestinal

### Acute Diarrhoeal Disease: Viral Gastroenteritis, Dysentery

Clinical definition: Acute diarrhoea is a serious common childhood illness evidenced by the passing of frequent profuse loose watery stools. Vomiting may or may not be present. Often caused by viral infection but may be due to bacterial infection, dietary or other causes. Antibiotics should not be routinely used for diarrhoeal disease other than when dysentery is present. Features include fever, blood and mucous in stool, leucocytes on stool microscopy, culture of Shigella, Salmonella, pathogenic *E. coli* or Campylobacter species.

Neonate

Diarrhoeal disease is uncommon in neonates. See section on Possible Serious Bacterial Infection for treatment guidance.

Infant, Child & Adolescent

Preferred antibiotic choice for suspected or confirmed dysentery			
Drug	Formulation	Dosage	Duration
For mild/ moderate illness & ambulatory therapy:  Ciprofloxacin (PO)	Oral liquid: 250 mg/5 mL (anhydrous) ; Tablet: 250 mg (as hydrochloride)	15 mg/kg/dose 12 hourly, maximum dose 500 mg 12 hourly	3 – 5 days
For moderate/ severe illness requiring hospital admission:  Ceftriaxone (IV)	Powder for injection: 250 mg, 1 g (as sodium salt) in vial	50 mg/kg/dose once daily, maximum dose 1 g	
Alternative antibiotic choice(s) for suspected or confirmed dysentery			
Azithromycin (PO)	Oral liquid: 200 mg/5 mL; Capsule: 250 mg. 500 mg (anhydrous)	10 mg/kg/dose daily, maximum dose 500 mg	3 – 5 days
In regions where amoebiasis is common			
Metronidazole (PO)	Oral liquid: 200 mg (as benzoate) / 5 mL; Tablet: 200 mg to 500 mg	15 mg/kg/dose 8 hourly, maximum dose 800 mg 8 hourly	7 – 10 days
In regions where cholera is endemic or where outbreaks are occurring			
Azithromycin (PO)	Oral liquid: 200 mg/5 mL. Capsule: 250 mg. 500 mg (anhydrous)	10 mg/kg/dose daily, maximum dose 500 mg	3 – 5 days
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>In an epidemic context and where stool culture and AST is available, adjust treatment according to current susceptibility of the organism.</li> </ul>			
Other Notes:			
<ul style="list-style-type: none"> <li>For immunocompromised patients with Salmonella infections (e.g. patients with sickle cell disease), increase duration of therapy to 14 days.</li> <li>Prevention and treatment of dehydration and/or hypovolaemic shock with careful fluid management is essential.</li> </ul>			

Typhoid/Enteric Fever			
Clinical definition: A systemic disease caused by Salmonella species. Clinical features include fever, anorexia, headache, vomiting, constipation or diarrhoea, abdominal pain or tenderness, cough, delirium / altered level of consciousness, hepatomegaly or splenomegaly. Where available, the organism may be cultured from blood (first week of illness) or stool (after first week), urine or bone marrow. A chronic carrier state may occur with ongoing shedding of the organism in stool which may result in transmission to others via contaminated food or water.			
Infant, Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
For patients with severe disease: Ceftriaxone (IV)	Powder for injection: 250 mg, 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly, maximum dose 2 g 12 hourly	10 – 14 days
For mild/moderate disease or as step down therapy for severe disease based on clinical response and antibiotic susceptibility results, if available: Ciprofloxacin (PO)	Oral liquid: 250 mg/5 mL (anhydrous); Tablet: 250 mg (as hydrochloride)	15 mg/kg/dose 12 hourly, maximum dose 500 mg 12 hourly	10 – 14 days <i>(Total treatment duration including IV therapy, if applicable.)</i>
Alternative antibiotic choice(s) or for confirmed drug allergy or medical contraindication			
Drug	Formulation	Dosage	Duration
Ciprofloxacin (IV)	Solution for IV infusion: 2 mg/mL (as hydrochloride)	10 mg/kg/dose 8 - 12 hourly, maximum dose 400 mg 8 - 12 hourly	10 – 14 days
Azithromycin (PO)	Capsule: 250 mg; 500 mg (anhydrous). Oral liquid: 200 mg/5 mL	10 mg/kg/dose daily, maximum dose 500 mg	5 days

Principles of Stewardship:

- The patient should ideally be isolated with contact precautions maintained until eradication of the organism from the stool is confirmed on 3 stool samples taken 1 week after completion of antibiotic treatment and every 48 hours thereafter to detect chronic carriage and excretion of the organism.

Other Notes:

- Prolonged therapy (4 – 6 weeks) is recommended in invasive disease, including bone infections, and in immunocompromised patients (including HIV infection)

**Complicated Intra - Abdominal Infection (Community - Acquired)**

Clinical definition: Suspected or confirmed peritonitis including perforation or leakage of intestinal contents into peritoneum

Neonate

Preferred antibiotic choice

Drug	Formulation	Dosage <sup>14</sup>	Duration
Combination therapy with: Cefotaxime (IV) PLUS Metronidazole (IV)	Cefotaxime - Powder for injection: 250 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>8 - 20 days: 50 mg/kg/dose 8 hourly</li> <li>21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	5 – 10 days depending on response to clinical and surgical treatment
	Metronidazole - Injection: 500 mg in 100 - mL vial.	<ul style="list-style-type: none"> <li>First week of life (7 days or less): 7.5 mg/kg/dose 12 hourly</li> <li>8 days of age &amp; older: 7.5 mg/kg/dose 8 hourly, maximum dose 400 mg 8 hourly</li> </ul>	

Alternative antibiotic choice(s)

<sup>14</sup> Neonatal Guidelines and Drug Doses Fifth Edition. Cape Town Neonatal Consultancy Ltd. Available from: <https://play.google.com/store/apps/details?id=com.neonatalguide>



Combination therapy with: Benzylpenicillin (IV) PLUS Gentamicin (IV) PLUS Metronidazole (IV)	Benzylpenicillin - Powder for injection: 600 mg (= 1 million IU); 3 g (= 5 million IU) (sodium or potassium salt) in vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 000 IU/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 125 000 IU/kg/dose 6 hourly, maximum dose 5 million IU 6 hourly</li> </ul>	5 – 10 days depending on response to clinical and surgical treatment
	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.	4 mg/kg/dose once daily	
	Metronidazole - Injection: 500 mg in 100 - mL vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 7.5 mg/kg/dose 12 hourly</li> <li>○ 8 days of age &amp; older: 7.5 mg/kg/dose 8 hourly, maximum dose 400 mg 8 hourly</li> </ul>	
If Benzylpenicillin (IV) unavailable, substitute with: Ampicillin (IV) Treat with Gentamicin (IV) PLUS Metronidazole (IV), as above.	Ampicillin - Powder for injection: 500 mg; 1 g (as sodium salt) in vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	
Infant, Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Combination therapy with: Ceftriaxone (IV) PLUS Metronidazole (IV)	Ceftriaxone - Powder for injection: 250 mg, 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly, maximum dose 2 g 12 hourly	5 days if source control has been achieved (e.g. laparotomy, washout, repair). Longer durations may be required if source control is delayed
	Metronidazole - Injection: 500 mg in 100 - mL vial.	7.5 mg/kg/dose 8 hourly, maximum dose 400 mg 8 hourly	

Alternative antibiotic choice(s)			
Amoxicillin + clavulanic acid (IV)	Powder for injection: 500 mg (as sodium) + 100 mg (as potassium salt); 1000 mg (as sodium) + 200 mg (as potassium salt) in vial.	30 mg/kg/dose of amoxicillin component 8 hourly, maximum dose 1.2 g 8 hourly	5 days if source control has been achieved (e.g. laparotomy, washout, repair). Longer durations may be required if source control is delayed
If poor response to treatment			
Combination therapy with:  Piperacillin/tazobactam (IV)  PLUS  Amikacin (IV)	Piperacillin/tazobactam Powder for injection: 2 g (as sodium salt) + 250 mg (as sodium salt); 4 g (as sodium salt) + 500 mg (as sodium salt) in vial	100 mg/kg of piperacillin component/dose 8 hourly, maximum dose 4 g of piperacillin component 8 hourly	5 days if source control has been achieved (e.g. laparotomy, washout, repair). Longer durations may be required if source control is delayed
	Amikacin - Injection: 250 mg (as sulfate)/mL in 2 - mL vial	15 mg/kg/dose once daily, maximum dose 1.5 g	
If piperacillin - tazobactam (IV) is not available or in case of confirmed drug allergy or medical contraindication			
Ciprofloxacin (IV)  PLUS  Metronidazole (IV)  PLUS  Amikacin (IV)	Ciprofloxacin - Solution for IV infusion: 2 mg/mL (as hyclate)	10 mg/kg/dose 8 - 12 hourly, maximum dose 400 mg 8 - 12 hourly	5 days if source control has been achieved (e.g. laparotomy, washout, repair). Longer durations may be required if source control is delayed
	Metronidazole - Injection: 500 mg in 100 - mL vial.	7.5 mg/kg/dose 8 hourly, maximum dose 400 mg 8 hourly	
	Amikacin - Injection: 250 mg (as sulfate)/mL in 2 - mL vial	15 mg/kg/dose once daily, maximum dose 1.5 g	
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>• Obtain a blood culture prior to starting antibiotic therapy.</li> <li>• Investigate TB as a cause in endemic areas.</li> </ul>			

Other Notes:

- Consultation with a surgeon is frequently required in patients with complicated intra - abdominal infections.
- Once the patient is improving clinically and tolerating oral feeds, consider switching to an oral antibiotic such as amoxicillin + clavulanic acid.

## Genitourinary

### Urinary Tract Infection (UTI)

Clinical definition: Uncomplicated UTI is an infection limited to the lower urinary tract with no associated urological anomalies. It is seen most in girls older than 2 years of age. Complicated UTI is an infection involving the renal parenchyma (acute pyelonephritis) or which is associated with underlying congenital anomalies of the kidneys and urinary tract. Differentiating uncomplicated from complicated UTI is often not feasible in neonates and infants and they should be treated as for complicated UTI. UTI may result in significant short - term morbidity, including septic shock and acute renal failure, especially in infants. Permanent renal damage may occur in children who have recurrent episodes of pyelonephritis. Common aetiologies include Enterobacterales (*E. coli*, *Klebsiella species*, *Proteus species*, *Enterobacter species*) and *Enterococcus species*. For UTI in pregnant adolescents, refer to adult guidelines.

Neonate (Treat all UTIs in neonates as complicated UTIs)

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
Cefotaxime (IV)	Powder for injection: 250 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 – 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	10 – 14 days <sup>A</sup>

Infant, Child & Adolescent

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
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<p>If oral route suitable:</p> <p>Amoxicillin + clavulanic acid (PO)</p> <p>OR</p> <p>Nitrofurantoin (PO)</p>	<p>Amoxicillin + clavulanic acid - Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL; 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt).</p>	<p>10 - 15 mg/kg of amoxicillin component/dose 8 hourly, maximum dose 250 mg of amoxicillin component 8 hourly</p> <p>If the formulation containing 875 mg amoxicillin + 125 mg clavulanic acid is available, this may be prescribed twice a day for children weighing 25 kg or more</p>	<p>Uncomplicated UTI: 5 –7 days</p> <p>Complicated UTI: 10 days</p>
	<p>Nitrofurantoin - Oral liquid: 25 mg/5 mL. Tablet: 100 mg.</p>	<p>1 – 2 mg/kg/dose 6 hourly, maximum dose 100 mg 6 hourly</p>	
<p>If oral route not suitable or for complicated UTI, treat with:</p> <p>Ceftriaxone (IV)</p> <p>OR</p> <p>Gentamicin (IV)</p>	<p>Ceftriaxone - Powder for injection: 250 mg; 1 g (as sodium salt) in vial.</p>	<p>50 mg/kg/dose once daily, maximum dose 1 g</p>	
	<p>Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.</p>	<p>5 – 7.5 mg/kg/dose once daily, maximum dose 360 mg</p>	
<p>Alternative antibiotic choice, guided by culture results, or in case of poor response to preferred antibiotic choice</p>			
Drug	Formulation	Dosage	Duration
<p>Ciprofloxacin (PO for uncomplicated, IV for complicated UTI)</p>	<p>Oral liquid: 250 mg/5 mL (anhydrous) ; Tablet: 250 mg (as hydrochloride); Solution for IV infusion: 2 mg/ mL (as hyclate).</p>	<p>Oral therapy:</p> <p>10 - 15 mg/kg/dose 12 hourly, maximum dose 500 mg 12 hourly</p> <p>IV therapy:</p> <p>10 mg/kg/dose 8 - 12 hourly, maximum dose 400 mg 8 - 12 hourly</p>	<p>Uncomplicated UTI: 5 – 7 days</p> <p>Complicated UTI: 7 days</p>

Principles of Stewardship:

- A. After 5 - 7 days, or sooner if there is a good clinical response to treatment, consider switching to an oral antibiotic to complete a total treatment duration of 10 days. Oral antibiotic selection should be guided by urine culture and antibiotic susceptibility results or use amoxicillin/clavulanic acid if urine culture is not available.
- Avoid the use of fluoroquinolones whenever possible.
  - Do not treat asymptomatic patients outside of pregnancy.
  - The choice of route of therapy should be determined by the ability to tolerate oral therapy and/or the presence of significant systemic illness.

Other Notes:

- Children younger than 5 years of age with a confirmed UTI and children with recurrent or persistent UTIs should have an ultrasound scan of the kidneys, ureter and bladder to screen for abnormalities of the urinary tract and/or be referred to a specialist for further investigations.

**Syphilis (including congenital syphilis)**

Clinical definition: Multi - organ infection caused by *T. pallidum*. Congenital infection is acquired by vertical transmission via the transplacental route during pregnancy. Signs that may be present at birth or within the first 3 months of life include jaundice, pallor, oedema, generalised erythematous maculopapular rash that may desquamate, hepatosplenomegaly, lymphadenopathy, rhinitis, pseudoparalysis of one or more limbs. Acquired syphilis is transmitted via sexual contact including sexual abuse. For treatment of syphilis in pregnant adolescents, refer to separate guidelines.

Neonate

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
For patients with symptomatic infection: Benzylpenicillin (IV) <sup>A</sup>	Powder for injection: 600 mg (= 1 million IU); 3 g (= 5 million IU) (sodium or potassium salt) in vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 000 units/kg/dose 12 hourly</li> <li>○ 8 – 28 days: 50 000 units/kg/dose 8 hourly</li> </ul>	10 days

For patients with asymptomatic infection & mother seropositive or result unknown & mother has not been treated or was only partially treated during pregnancy:  Benzathine benzylpenicillin (IM) <sup>A</sup>	Powder for injection: 900 mg benzylpenicillin (= 1.2 million IU) in 5 - mL vial; 1.44 g benzylpenicillin (= 2.4 million IU) in 5 - mL vial.	50,000 units/kg	Single dose
Alternative antibiotic choice(s)			
Cefotaxime (IV)	Powder for injection: 250 or 500 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	10 days
Infant, Child & Adolescent			
Preferred antibiotic choice for delayed diagnosis of congenital syphilis			
Drug	Formulation	Dosage	Duration
Benzylpenicillin (IV) <sup>A</sup>	Powder for injection: 600 mg (= 1 million IU); 3 g (= 5 million IU) (sodium or potassium salt) in vial.	50,000 units/kg/dose 6 hourly, maximum dose 5 million IU/kg/dose 6 hourly	10 days
Alternative antibiotic choice(s)			
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly, maximum dose 2 g 12 hourly	10 days
For acquired, primary, or secondary syphilis infection (not congenital syphilis)			
Benzathine benzylpenicillin (IM) <sup>A</sup>	Powder for injection: 900 mg benzylpenicillin (= 1.2 million IU) in 5 - mL vial; 1.44 g benzylpenicillin (= 2.4 million IU) in 5 - mL vial.	50,000 units/kg/dose, maximum dose 2.4 million units	3 doses at 1 - week intervals

Alternative antibiotic choice(s) or for confirmed penicillin allergy			
Children/adolescents <12 years of age:  Amoxicillin (PO)  PLUS  Probenecid (PO)  Probenecid - Tablets: 500 mg (not included in WHO MLEM)	Amoxicillin - Powder for oral liquid: 125 mg (as trihydrate)/5 mL, 250 mg (as trihydrate)/5 mL; solid oral dosage form: 250 mg, 500 mg (as trihydrate)	1 g 8 hourly	Early syphilis: 14 days  Late/latent syphilis: 28 days
	250 mg 8 hourly		
Adolescents 12 years & older:  Doxycycline (PO)	Oral liquid: 25 mg/5 mL, 50 mg/5ml (anhydrous); solid oral dosage form: 50 mg, 100 mg (as hyclate)	100 mg 12 hourly	Early syphilis: 14 days  Late/latent syphilis: 28 days
Principles of Stewardship: <ul style="list-style-type: none"> <li>• For congenital syphilis, a complete 10 - day course is required. If treatment is interrupted by 1 day (or longer), restart the full 10 - day course of treatment.</li> <li>• Infants treated for congenital syphilis should be followed - up 3 - monthly after initial treatment to repeat non - treponemal serological testing until the test becomes non - reactive. If the decrease in serological titre is less than 4 - fold, the course of treatment should be repeated.</li> </ul>			
Other Notes: <ul style="list-style-type: none"> <li>A. If benzylpenicillin (IV) or benzathine benzylpenicillin (IM) is not available, seek expert opinion on alternative therapies (The efficacy of cefotaxime/ceftriaxone is uncertain.).</li> <li>• Acquired syphilis in a child (not sexually active) requires investigation for child abuse.</li> <li>• Investigate and treat both parents, if necessary and if not already diagnosed and treated.</li> </ul>			

### Skin, Soft Tissue, Bone & Joints

Skin & Soft Tissue Infections (Including Impetigo, Cellulitis, Abscesses)			
Clinical definition: Bacterial infections of skin and underlying soft tissue. Common bacterial pathogens include <i>S. aureus</i> and Group A Streptococcus species. Anaerobes may play a role in specific regions of the body including the perineum.			
Neonate, Infant, Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration

Cloxacillin (IV)	Cloxacillin - Powder for injection: 500 mg (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 28 days: 50 mg/kg/dose 8 hourly</li> <li>○ Older than 28 days: 25 - 50 mg/kg/dose 6 hourly, maximum dose 2 g 6 hourly</li> </ul>	5 – 7 days
If Cloxacillin (IV) is not available, use Cefazolin (IV).	Cefazolin - Powder for injection: 1 g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 days &amp; older: 50 mg/kg/dose 8 hourly, maximum dose 4 g 8 hourly</li> </ul>	
For infants, children, and adolescents, switch to oral therapy when tolerated (Neonates should complete IV therapy):			
Flucloxacillin (PO)	Capsules: 500 mg; 1 g (as sodium salt)	25 mg/kg/dose 6 hourly, maximum dose 500 mg 6 hourly	5 – 7 days <i>(Total treatment duration including IV therapy.)</i>
Alternative antibiotic choice for infants and children unable to swallow Flucloxacillin capsules:			
Cefalexin (PO)	Powder for reconstitution with water: 125 mg/5 mL; 250 mg/5 mL; Solid oral dosage form: 250 mg (as monohydrate)	25 mg/kg/dose 6 hourly, maximum dose 1 g 6 hourly	5 – 7 days
In case of confirmed drug allergy or medical contraindication:			
Clindamycin (IV/PO)	Oral liquid: 75 mg/5 mL (as palmitate). Capsule: 150 mg (as hydrochloride). Injection: 150 mg (as phosphate)/mL	6 mg/kg/dose 6 hourly, maximum dose 600 mg 8 hourly (IV) or 450 mg 6 hourly (PO)	5 – 7 days



Principles of Stewardship:

- If the abscess can be incised and drained, withhold antibiotics for standard, uncomplicated abscess in an otherwise well person.
- If IV antibiotic therapy is indicated, review patient progress daily to consider switch from IV to oral therapy.

Other Notes:

- For patients with suspected animal bite, assess for rabies risk and manage accordingly, and administer a tetanus booster dose if indicated.
- If necrotizing fasciitis is suspected (especially if in perineal area), use ceftriaxone plus metronidazole plus clindamycin or, alternatively, amoxicillin/clavulanic acid plus clindamycin (clindamycin included to suppress toxin production), and obtain urgent expert advice regarding surgical management.

**Tetanus**

Clinical definition: Infection caused by *C. tetani* characterized by acute onset of muscle stiffness and muscular contractions.

Neonate, Infant, Child & Adolescent

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
Metronidazole (IV)	Injection: 500 mg in 100 mL vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 7.5 mg/kg/dose 12 hourly</li> <li>○ 8 days of age &amp; older: 7.5 mg/kg/dose 8 hourly, maximum dose 400 mg 8 hourly</li> </ul>	10 days

Alternative antibiotic choice

Benzylpenicillin (IV)	Powder for injection: 600 mg (= 1 million IU); 3 g (= 5 million IU) (sodium or potassium salt) in vial.	25 000 IU/kg/dose 6 hourly, maximum dose 5 million IU/kg/dose 6 hourly	10 days
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Principles of Stewardship:

- None

Other Notes:

- Also administer Human Tetanus Immunoglobulin (IM): neonates 500 IU, children 2000 IU, adults 3000 - 6000 IU.
- Wound care and debridement/umbilical cord care is required.
- Administer a booster dose of tetanus vaccine (not required in immunized patients who have received a booster dose within the past 5 years).

### Acute Osteomyelitis & Septic Arthritis

Clinical definition:

Acute osteomyelitis: Bone infection that usually begins in the metaphysis of long bones as a result of haematogenous deposition of organisms following transient bacteraemia. Infection may spread via the epiphysis to the joint resulting in septic arthritis. Common causative organisms vary by age: neonates – *S. aureus*, Group B streptococcus, Gram negative organisms including *E. coli*; infants & children – *S. aureus*, *H. influenzae*, Group A streptococci, *S. pneumoniae*. Sick cell anaemia is associated with bone infections caused by *Salmonella* species & *S. pneumoniae*.

Septic arthritis: May occur as a result of haematogenous deposition on the synovium during transient bacteraemia or as part of generalised septicaemia and may involve more than one joint. Common causative organisms vary by age: neonates – *S. aureus*, Group B streptococcus, *E. coli*; infants / children – *S. aureus*, *H. influenzae*, Group A streptococci, and *S. pneumoniae*.

Neonate

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
Cefotaxime (IV)	Powder for injection: 250 or 500 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 – 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	4 – 6 weeks

Alternative antibiotic choice(s)

Combination therapy with: Cloxacillin (IV)  PLUS Gentamicin (IV)	Cloxacillin - Powder for injection: 500 mg (as sodium salt) in vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 28 days: 50 mg/kg/dose 8 hourly</li> <li>○ Older than 28 days: 50 mg/kg/dose 6 hourly</li> </ul>	4 – 6 weeks
	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial	<ul style="list-style-type: none"> <li>○ 4 mg/kg/dose once daily</li> </ul>	
If Cloxacillin (IV) is not available, substitute with: Cefazolin (IV)  Combination therapy with: Cefazolin (IV)  PLUS Gentamicin (IV)	Cefazolin - Powder for injection: 1 g (as sodium salt) in vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 8 hourly</li> </ul>	4 – 6 weeks
	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial	<ul style="list-style-type: none"> <li>○ 4 mg/kg/dose once daily</li> </ul>	
Infant, Child & Adolescent			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Combination therapy with: Ampicillin (IV)  PLUS Cloxacillin (IV)	Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial	50 mg/kg/dose 6 hourly, maximum dose 2 g 6 hourly	4 – 6 weeks
	Cloxacillin - Powder for injection: 500 mg (as sodium salt) in vial	50 mg/kg/dose 6 hourly, maximum dose 2 g 6 hourly	
If Cloxacillin (IV) is not available, treat with: Cefazolin (IV) (alone)	Powder for injection: 1 g (as sodium salt) in vial.	50 mg/kg/dose 8 hourly, maximum dose 4 g 8 hourly	4 – 6 weeks
Alternative antibiotic choice(s)			

Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly, maximum dose 2 g 12 hourly	4 – 6 weeks
For patients with sickle cell anemia (Empiric gram - negative cover recommended)			
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly, maximum dose 2 g 12 hourly	4 – 6 weeks
In case of confirmed drug allergy or medical contraindication			
If patient has no history of immediate hypersensitivity / anaphylaxis to penicillins, treat with:  Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly, maximum dose 2 g 12 hourly	4 – 6 weeks
If patient has a history of immediate hypersensitivity / anaphylaxis to penicillins, treat with:  Clindamycin (IV/PO) PLUS  Ciprofloxacin (IV/PO)	Clindamycin - Injection: 150 mg (as phosphate)/ mL.	6 mg/kg/dose 6 hourly, maximum dose 600 mg 8 hourly (IV) or 450 mg 6 hourly (PO)	4 – 6 weeks
	Ciprofloxacin - Solution for IV infusion: 2 mg/ mL (as hyclate); Oral liquid: 250 mg/5 mL (anhydrous) ; Tablet: 250 mg (as hydrochloride)	10 mg/kg/dose 8 - 12 hourly, maximum dose 400 mg 8 - 12 hourly (IV); 15 mg/kg/dose 12 hourly, maximum dose 500 mg 12 hourly (PO)	
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>• Do not give empirical antibiotics for chronic bone and joint infections. Instead, conduct bone and tissue biopsies, and treat with directed therapy.</li> <li>• Initiate IV antibiotic treatment immediately as the diagnosis is made and blood and pus specimens have been collected, if available.</li> <li>• Adjust antibiotic therapy based on culture and AST results, if available, or if clinical response to antibiotic treatment is unsatisfactory.</li> <li>• Continue with IV antibiotics until there is evidence of good clinical response and laboratory markers of infection improve, and then consider switching to oral antibiotic therapy if an appropriate oral option is available. If culture is not available consider empiric stepdown therapy to oral antimicrobials with amoxicillin/clavulanic acid, cephalexin, or flucloxacillin.</li> </ul>			

Other Notes:

- Seek consultation with an orthopaedic specialist and consider surgical drainage
- If infection is caused by *S. aureus* that is resistant to cloxacillin (MRSA), replace cloxacillin with vancomycin 15 mg/kg/dose 6 hourly IV.

**Bloodstream:**

**Sepsis in the Newborn**

Clinical definition: Invasion of the blood by bacteria or other microorganisms before or after birth which may spread to involve other organs / systems e.g. meninges (meningitis), lungs (pneumonia), bone (osteomyelitis) and kidneys (pyelonephritis). Symptoms may be variable and non - specific. Common bacterial pathogens include Group B streptococcus, *S. aureus*, *Enterococcus* species, Gram - negative organisms including *Enterobacteriaceae* (such as *E. coli*, *K. pneumoniae*, *Enterobacter* and *Serratia* species) and *Acinetobacter* species and *Pseudomonas* species. The latter two are more commonly hospital associated, and will vary depending on local hospital settings. *L. monocytogenes*, although a recognised neonatal pathogen, is less common.

Early - onset (Less than 48 hours of age)

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration
Combination therapy with: Ampicillin (IV) PLUS Gentamicin (IV) <sup>A</sup>	Ampicillin - Powder for injection: 500 mg; 1 g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	5 – 7 days or as determined by clinical assessment and laboratory / microbiological results
	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.	<ul style="list-style-type: none"> <li>○ 4 mg/kg/dose once daily</li> </ul>	

For patients not responding to therapy

Combination therapy with: Cefotaxime (IV) <sup>B</sup> PLUS Ampicillin (IV)	Cefotaxime - Powder for injection: 250 or 500 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	5 – 7 days or as determined by clinical assessment and laboratory / microbiological results
	Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	
Late - onset (48 hours of age & older )			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration
Combination therapy with: Cefotaxime (IV) <sup>B</sup> PLUS Ampicillin (IV)	Cefotaxime - Powder for injection: 250 or 500 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	5 – 7 days or as determined by clinical assessment and laboratory / microbiological results
	Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	
For patients not responding to therapy or guided by laboratory/microbiological results or in health care facilities with high rates of hospital - acquired multidrug resistant gram - negative pathogens			

If meningitis suspected or confirmed:	Meropenem - Powder for injection: 500 mg (as trihydrate); 1 g (as trihydrate) in vial	40 mg/kg/dose 8 hourly	If meningitis is confirmed: 14 –21 days
Meropenem (IV) If meningitis excluded or considered unlikely: Piperacillin/tazobactam (IV) PLUS Amikacin (IV) <sup>A</sup>	Piperacillin/tazobactam - Powder for injection: 2 g (as sodium salt) + 250 mg (as sodium salt); 4 g (as sodium salt) + 500 mg (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 mg/kg/dose 12 hourly</li> <li>○ 8 days of age &amp; older: 100 mg/kg/dose 8 hourly</li> </ul>	7 – 10 days
	Amikacin - Powder for injection: 100 mg; 500 mg; 1 g (as sulfate) in vial.	15 mg/kg/dose once daily	

**Principles of Stewardship:**

- Empirical antibiotic selection should be guided by local patterns of antibiotic susceptibility, where data is available. In the absence of local data, follow the above - described guidelines.
- If an organism is cultured and antibiotic susceptibility testing is available, switching to a narrower spectrum antibiotic should be considered in discussion with a specialist and/or clinical microbiologist.
- Therapy duration should be determined by clinical and laboratory results and clinical response.

**Other Notes:**

- A. When treating with gentamicin or amikacin, conduct renal function testing and therapeutic drug monitoring, where available.
  - B. If cefotaxime is not available, use ceftriaxone 50 mg/kg/dose 12 hourly in neonates (in combination with benzylpenicillin or ampicillin) except in neonates with jaundice and neonates receiving calcium - containing IV fluids.
- Consider the addition of vancomycin in patients not responding to treatment or if resistant staphylococcal infection is suspected.

Possible Serious Bacterial Infection in infants younger than 3 months of age (Community - Acquired)

Clinical definition: An acutely unwell neonate or young infant for whom an urgent diagnostic assessment for possible serious bacterial infection including meningitis, pneumonia, urinary tract infection and bloodstream infection is required, and urgent empirical broad-spectrum antibiotic treatment is appropriate. In infants older than 3 months of age, children and adolescents, the choice of empiric antibiotic therapy should be guided by the clinical presentation and directed at the most likely organ system(s) involved and guided by the relevant section in this guideline. If the clinical presentation is non-specific, use the empiric antibiotic recommendations for the infant (28 – 90 days of age) below.

Neonate

Preferred antibiotic choice

Drug	Formulation	Dosage	Duration <sup>A</sup>
Combination therapy with: Cefotaxime (IV) <sup>B</sup> PLUS Ampicillin (IV)	Cefotaxime - Powder for injection: 250 or 500 mg per vial (as sodium salt)	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 20 days: 50 mg/kg/dose 8 hourly</li> <li>○ 21 days &amp; older: 50 mg/kg/dose 6 hourly</li> </ul>	7 – 10 days
	Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 100 mg/kg/dose 6 hourly</li> </ul>	

If meningitis excluded or considered unlikely



Combination therapy with: Ampicillin (IV) PLUS Cloxacillin (IV) PLUS Gentamicin (IV)	Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 100 mg/kg/dose 8 hourly</li> <li>○ 8 days of age &amp; older: 100 mg/kg/dose 6 hourly</li> </ul>	7 – 10 days
	Cloxacillin - Powder for injection: 500 mg (as sodium salt) in vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 - 28 days: 50 mg/kg/dose 8 hourly</li> <li>○ Older than 28 days: 50 mg/kg/dose 6 hourly</li> </ul>	
	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.	<ul style="list-style-type: none"> <li>○ 4 mg/kg/dose once daily</li> </ul>	
If Cloxacillin (IV) is not available, substitute with: Cefazolin (IV) Treat in combination with Ampicillin (IV) and Gentamicin (IV), as above.	Cefazolin - Powder for injection: 1 g (as sodium salt) in vial.	<ul style="list-style-type: none"> <li>○ First week of life (7 days or less): 50 mg/kg/dose 12 hourly</li> <li>○ 8 days of age &amp; older: 50 mg/kg/dose 8 hourly</li> </ul>	
Infant			
Preferred antibiotic choice			
Drug	Formulation	Dosage	Duration <sup>A</sup>
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	50 mg/kg/dose 12 hourly	7 – 10 days
If meningitis excluded or considered unlikely			

Combination therapy with:  Ampicillin (IV) PLUS Cloxacillin (IV) PLUS Gentamicin (IV) <sup>c</sup>	Ampicillin - Powder for injection: 500 mg, 1 g (as sodium salt) in vial	50 mg/kg/dose 6 hourly	7 – 10 days
	Cloxacillin - Powder for injection: 500 mg (as sodium salt) in vial.	50 mg/kg/dose 6 hourly	
	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.	5 - 7.5 mg/kg once daily	

**Principles of Stewardship:**

- A. The duration of antibiotic therapy depends on whether a focus of bacterial infection is confirmed (e.g. meningitis, lower respiratory tract infection, UTI, osteomyelitis / septic arthritis, bloodstream infection) and clinical response to treatment. Refer to the relevant sections on specific infections in this guideline. If no focus of infection is apparent clinically or confirmed on laboratory / microbiological testing, continue IV antibiotics until there is a good clinical response and laboratory markers of infection improve (usually less than one week)
- Reconsider choice of antibiotic, aiming for monotherapy where possible, when the results of cultures and antibiotic susceptibility testing become available or if the child does not improve.

**Other Notes:**

- B. If cefotaxime is not available, use ceftriaxone 50 mg/kg/dose 12 hourly in neonates (in combination with benzylpenicillin or ampicillin) except in neonates with jaundice and neonates receiving calcium - containing IV fluids.
- C. When treating with gentamicin, conduct renal function testing and therapeutic drug monitoring, where available.
- Early administration of broad - spectrum antibiotics is critical in patients presenting with sepsis.

## Part 6. Recommended Antibiotic Treatments for Common Bacterial Infections & Syndromes in Adult Patients

### Central Nervous System

Acute Bacterial Meningitis (Community - Acquired)			
Clinical definition: Inflammation of meninges and subarachnoid space. Common symptoms include headache, fever, stiff neck, reduced consciousness. Major causes of bacterial meningitis include <i>N. meningitidis</i> , <i>S. pneumoniae</i> , <i>L. monocytogenes</i> .			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	2 g 12 hourly	If culture negative: 10 days. In case of proven <i>S. pneumoniae</i> infection: 14 days
Cefotaxime (IV)	Powder for injection: 250 mg per vial (as sodium salt)	2 g 6 hourly	
Alternative antibiotic choice(s)			
Ampicillin (IV)	Powder for injection: 500 mg; 1 g (as sodium salt) in vial	3 g 6 hourly	10 days, or if confirmed <i>L. monocytogenes</i> : 3 weeks
Benzylpenicillin (IV)	Powder for injection: 600 mg; 3 g (sodium or potassium salt) in vial	4 MU 4 hourly	10 days
Chloramphenicol (IV) <sup>A</sup>	Powder for injection: 1 g (sodium succinate) in vial	1 g 6 hourly	10 days
In case of non - severe penicillin allergy			
Ceftriaxone	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	2 g 12 hourly	If culture negative: 10 days. In case of proven <i>S. pneumoniae</i> infection: 14 days
Cefotaxime (IV)	Powder for injection: 250 mg per vial (as sodium salt)	2 g 6 hourly	
In case of severe Penicillin allergy			
Moxifloxacin (IV, PO)	Tablet: 400 mg or 100 mg (dispersible); Injectable solution: 400mg/250 mL <sup>15</sup>	400 mg once daily	If culture negative: 10 days. In case of proven <i>S. pneumoniae</i> infection: 14 days

Principles of Stewardship:

- A. Chloramphenicol is not preferred and should only be used if other listed antibiotics are not available.
- Acute meningitis may be caused by a range of pathogens, some of which are not bacteria. Microbiologic diagnosis, including bacterial culture from CSF and blood, should be obtained as soon as possible to confirm etiology.
  - In presentations of subacute or chronic nature, consider diagnostic tests for TB meningitis, particularly in HIV - endemic areas.

Other Notes:

- Add ampicillin in situations of confirmed Listeria outbreaks and for patients at high risk for Listeria including:
  - Patients over 50 years of age
  - Immunosuppressed patients – cancer, transplantation etc.
  - Patients with alcoholism, cirrhosis, etc.
  - Pregnant women

## Head, Eye, Ear, Nose & Throat

### Acute Otitis Media

Clinical definition: Acute infection and inflammation of the middle ear. Common symptoms include ear pain and difficulty hearing. Common bacterial etiologies include *S. pneumoniae*, *H. influenzae*, *M. catarrhalis*, *S. aureus*, *Group A Streptococcus* sp.

Preferred antibiotic choice(s)

Drug	Formulation	Dosage	Duration
Amoxicillin (PO)	Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate)	500 mg 8 hourly	5 days

Alternative antibiotic choice(s)<sup>A</sup>

Amoxicillin + clavulanic acid (PO)	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt)	500 mg of amoxicillin component 12 hourly	5 days
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In case of confirmed drug allergy or medical contraindication

Azithromycin (PO)	Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	3 days
Principles of Stewardship:			
A. If patient has received antibiotics in the past month, use amoxicillin - clavulanic acid in preference to amoxicillin.			
Other Notes:			
<ul style="list-style-type: none"> <li>• None</li> </ul>			

### Dental Abscess including Gingivitis

Clinical definition: Tooth infections from cavities, gingivitis, and periodontitis. Common symptoms include severe pain, tooth sensitivity, and inflammation of the face and gums. Most infections are polymicrobial and include anaerobic bacteria.

#### Preferred antibiotic choice(s)

Drug	Formulation	Dosage	Duration
Amoxicillin - clavulanic acid (PO)	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt)	500 mg component of amoxicillin 8 hourly	3 days if adequate source control, or 5 days if not
Phenoxymethyl - penicillin (penicillin V) (PO)	Powder for oral liquid: 250 mg (as potassium salt)/5 mL; Tablet: 250 mg (as potassium salt)	500 mg 6 hourly	3 days if adequate source control, or 5 days if not

#### In case of confirmed drug allergy or medical contraindication

Combination therapy with:	Azithromycin - Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg 6 hourly	5 days
Azithromycin (PO)  PLUS  Metronidazole (PO)	Metronidazole - Oral liquid: 200 mg (as benzoate)/ 5 mL; Tablet: 200 mg to 500 mg	400 mg 8 hourly	

Principles of Stewardship:

- Dental abscess requires surgical drainage, not just antibiotics.
- If the abscess is drained and the patient is improving, consider stopping antibiotics after 3 days of treatment.
- Although gingivitis is a risk factor for dental abscess, only acute necrotizing gingivitis should be treated with antibiotics.
- For gingivitis without necrosis or abscess, do not treat with antibiotics.

Other Notes:

- For acute necrotizing gingivitis:
  - Treat with clindamycin [Dosage: Capsule: 150 mg (as hydrochloride); Injection: 150 mg (as phosphate)/ mL; Oral liquid: 75 mg/5 mL (as palmitate)] for 3 days.
  - For cases of acute necrotizing gingivitis associated with malnutrition, treat with vitamins.

**Bacterial Pharyngotonsillitis, including Streptococcal & Diphtheria**

Clinical definition: Infection causing acute inflammation of the pharyngeal wall and tonsils caused by various classes of *S. pyogenes* or *C. diphtheriae* (diphtheria). Common symptoms include sore throat; low - grade fever; and inflammation of the tonsils, uvula, lymph nodes, submandibular region, and neck.

Preferred antibiotic choice(s)

Drug	Formulation	Dosage	Duration <sup>16</sup>
Phenoxymethyl - penicillin (penicillin V) (PO)	Powder for oral liquid: 250 mg (as potassium salt)/5 mL; Tablet: 250 mg (as potassium salt)	500 mg 6 hourly	5 days
Amoxicillin (PO)	Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate)	500 mg 8 hourly	5 days
In case of confirmed severe penicillin allergy or medical contraindication			
Azithromycin (PO)	Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	3 days

<sup>16</sup> Casey, J. R., Pichichero, M.E. (2005). Metaanalysis of Short Course Antibiotic Treatment for Group A Streptococcal Tonsillopharyngitis. *The Pediatric Infectious Disease Journal*; 24(10): 909-917.

Principles of Stewardship:

- 85% or more of pharyngotonsillitis cases are viral. Most cases of pharyngotonsillitis in adults should be managed with watchful waiting & symptomatic relief. Antibiotics should not be considered unless there is a confirmed diagnosis of group A *Streptococcus*.

Other Notes:

- If clinical findings or epidemiologic context suggest diphtheria, treat with diphtheria antitoxin in addition to penicillin or macrolide.

## Cardiac

### Infective Endocarditis - Native valve endocarditis

Native valve endocarditis

Clinical definition: Symptoms may be variable and non - specific. Common etiologies include *S. aureus*<sup>A</sup> and streptococcal and enterococcal species.

Preferred antibiotic choice(s)

Drug	Formulation	Dosage	Duration
Combination therapy with:	Powder for injection: 600 mg; 3 g (sodium or potassium salt) in vial	5 MU 6 hourly	28 days
Benzylpenicillin (penicillin G, IV) PLUS Gentamicin (IV)	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/mL in 2 - mL vial	3 mg/kg daily	14 days

Alternative antibiotic choice(s)

Combination therapy with:	Ampicillin - Powder for injection: 500 mg; 1 g (as sodium salt) in vial	2 g 4 hourly	28 days
Ampicillin (IV) PLUS Gentamicin (IV)	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/mL in 2mL vial	3 mg/kg daily	14 days

In case of confirmed drug allergy or medical contraindication

Vancomycin (IV)	Powder for injection: 250 mg (as hydrochloride) in vial	20 mg/kg 12 hourly	6 weeks
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Prosthetic valve or pacemaker infection

Clinical definition: Infection associated with insertion or presence of prosthetic valve, pacemaker, or implanted defibrillator. Common etiologies include <i>S. aureus</i> , <i>S. epidermidis</i> , and other staphylococcal species.			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
Combination therapy with: Vancomycin (IV) PLUS Gentamicin (IV) PLUS Rifampicin (PO)	Vancomycin - Powder for injection: 250 mg (as hydrochloride) in vial	Loading dose: 25 – 30 mg/kg followed by maintenance dose: 10 – 15 mg/kg	6 weeks
	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial	3 mg/kg daily	2 weeks
	Rifampicin - Oral liquid: 20 mg/mL; Solid oral dosage form: 150 mg; 300 mg	7.5 mg/kg 12 hourly	6 weeks
Principles of Stewardship: <ul style="list-style-type: none"> <li>For suspected infective endocarditis cases, 3 blood cultures should be obtained in rapid succession from 3 anatomic sites within 6 hours before administration of antibiotic therapy.</li> <li>Approximately 10% of endocarditis cases are culture negative. The most common reason for which is receipt of antibiotics prior to the blood cultures. True, culture - negative endocarditis suggests infection by a fastidious organism, and includes <i>Bartonella</i> sp., <i>Coxiella burnetii</i> (Q Fever), and <i>Brucella</i> sp, each of which associate with specific risk factors. Discuss investigation and treatment options with your local pathology laboratory.</li> </ul>			
Other Notes: <ul style="list-style-type: none"> <li>If there are risk factors for <i>S. aureus</i> (e.g. patient is an IV drug user, if vegetation is very large, or patient has rapidly accelerating symptoms), add cloxacillin.</li> </ul>			

## Respiratory

### Acute Bronchitis

Clinical definition: Inflammation of the upper airways due to viral infection or irritants.

Acute bronchitis is a viral infection and should **NOT** be treated with antibiotics.

### Acute Exacerbation of Chronic Obstructive Pulmonary Diseases (COPD)

Clinical definition: Acute or subacute worsening of dyspnea (greater than or equal to 5 on a visual analogue scale that ranges from 0 to 10) sometimes but not necessarily accompanied by increased cough, sputum volume, and/or sputum purulence.



Preferred antibiotic choice(s) – Mild - moderate disease			
Drug	Formulation	Dosage	Duration
Amoxicillin (PO)	Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate)	500 mg 8 hourly	5 days
Doxycycline (PO)	Oral liquid: 25 mg/5 mL; 50 mg/5 mL (anhydrous); Solid oral dosage form: 50 mg; 100 mg (as hyclate)	200 mg STAT then 100 mg 12 hourly	5 days
Preferred antibiotic choice(s) – Severe disease			
Amoxicillin + clavulanic acid (PO)	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt)	500 mg of amoxicillin component 8 hourly	5 days
In case of confirmed drug allergy or medical contraindication in severe disease			
Azithromycin	Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	3 days
Principles of Stewardship: <ul style="list-style-type: none"> <li>Up to 50% of infection - related acute exacerbations are viral. Biomarkers such as C - reactive protein (CRP) and procalcitonin (PCT) may play a role in differentiating, when available.</li> </ul>			
Other Notes: <ul style="list-style-type: none"> <li>Exacerbations of COPD are commonly non - infectious and require optimization of non - antimicrobial therapeutic management.</li> </ul>			

### Mild to Moderate Community - Acquired Pneumonia (CAP) in Ambulatory Outpatients

Clinical definition: Pneumonia with onset in patients not admitted to the hospital. Mild to moderate disease severity is treated in the outpatient setting. (For severe CAP (CURB score >2), see below)

Preferred antibiotic choice(s)

Drug	Formulation	Dosage	Duration
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Amoxicillin (PO)	Amoxicillin - Powder for oral liquid: 125 mg (as trihydrate)/5 mL; 250 mg (as trihydrate)/5 mL; Solid oral dosage form: 250 mg; 500 mg (as trihydrate)	1 g 8 hourly	5 days
Alternative antibiotic choice(s)			
Doxycycline (PO)	Oral liquid: 25 mg/5 mL; 50 mg/5 mL (anhydrous); Solid oral dosage form: 50 mg; 100 mg (as hyclate)	100 mg 12 hourly	5 days
In patients with severe comorbidities (Alcoholism, chronic obstructive pulmonary disease, witnessed aspiration which is progressing after 24 – 48 hours, etc.)			
Amoxicillin + clavulanic acid (PO)	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt)	500 mg component of amoxicillin 8 hourly	5 days
In case of confirmed drug allergy or medical contraindication			
Azithromycin (PO) <sup>A</sup>	Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	3 days
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>• Macrolides should be avoided in countries with high macrolide resistance rates in <i>S. pneumoniae</i> and should rather be reserved for treatment of patients with penicillin allergy.</li> <li>• Fluoroquinolones should be avoided, particularly in TB - endemic countries.</li> </ul>			
Other Notes:			
<ul style="list-style-type: none"> <li>• A blood culture is preferred to sputum culture if the patient is admitted to hospital.</li> <li>• If azithromycin or another macrolide is not available, treat with a quinolone such as moxifloxacin or levofloxacin.</li> </ul>			
<b>Severe Community - Acquired Pneumonia for Hospitalized Patients</b>			
Clinical definition: Severe disease is defined as CURB - 65 score greater than two and requires hospitalization <sup>17</sup> .			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration

<sup>17</sup> Jones, B.E., Jones, J.J., Bewick, T., Lim, W.S., Aronsky, D., Brown, S.M., Boersma, W.G., et al. (2011). CURB-65 Pneumonia Severity Assessment Adapted for Electronic Decision Support. *CHEST*; 140(1):150-63.

Combination therapy with:	Ceftriaxone - Powder for injection: 250 mg; 1 g (as sodium salt) in vial	2 g daily	5 days
Ceftriaxone (IV/IM)	Cefotaxime - Powder for injection: 250 mg per vial (as sodium salt	2 g 8 hourly	5 days
OR			
Cefotaxime (IV/IM)	Clarithromycin - Solid oral dosage form: 500 mg;		
PLUS	Powder for oral liquid: 125 mg/5 mL; 250 mg/5 mL;	500 mg by mouth 12 hourly	5 days
Clarithromycin	Powder for injection: 500 mg in vial		
OR			
Azithromycin (PO)	Azithromycin - Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	5 days

In case of confirmed drug allergy or medical contraindication

Moxifloxacin (IV/PO)	Tablet: 400 mg; Tablet (dispersible): 100 mg; Injectable solution: 400mg/250 mL <sup>3</sup>	400 mg daily	5 days
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Principles of Stewardship:

- Obtain a blood culture prior to starting antibiotic therapy.
- If available, perform a legionella urinary antigen test – a positive result will allow stopping of the b - lactam and extension of azithromycin to a minimum of 7 days to treat *L. pneumophila*
- In high TB - endemic areas, assess patients presenting with fever and cough with or without constitutional symptoms (anorexia, weight loss, night sweats) for active TB disease.
- Doxycycline may be used in place of a macrolide if unavailable.

Other Notes:

- None

### Hospital - Acquired (Nosocomial) Pneumonia (HAP)

Clinical definition: Pneumonia with onset at least 48 hours following hospital admission excluding ventilator - acquired pneumonia. Early onset HAP is defined as onset within 5 days of admission. Common etiologies of early onset HAP include *S. pneumoniae*, *S. aureus*, *H. influenzae*, and enteric gram - negative bacilli. Late onset HAP is defined as onset after 5 days following admission; common etiologies include *E. coli*, *S. marcescens*, *K. pneumoniae*, *A. baumannii*, *P. aeruginosa*, and *Enterobacter* species.

Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
For facilities with low - level antibiotic resistance or where resistance is unknown and/or for patients not transferred from facilities with high resistance:			
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	2 g daily	8 days
Cefotaxime (IV)	Powder for injection: 250 mg per vial (as sodium salt)	2 g 8 hourly	8 days
Amoxicillin + clavulanic acid (IV)	Powder for injection: 500 mg (as sodium) + 100 mg (as potassium salt); 1000 mg (as sodium) + 200 mg (as potassium salt) in vial.	1 g of amoxicillin component 8 hourly	8 days
For facilities with high Gram - negative resistance and/or for patients with risk factors for resistance:			
Piperacillin - tazobactam (IV)	Powder for injection: 2 g (as sodium salt) + 250 mg (as sodium salt); 4 g (as sodium salt) + 500 mg (as sodium salt) in vial	4.5 g 8 hourly	7 – 14 day
Alternative antibiotic choice(s)			
Ertapenem	Powder for injection: 1g/vial <sup>3</sup>	1 g daily	7 – 14 days
In case of confirmed drug allergy or medical contraindication			
Moxifloxacin (PO)	Tablet: 400 mg; Tablet (dispersible): 100 mg	400 mg daily	7 – 14 days
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>• Empiric choice of antibiotics for HAP should be informed by the local resistance profiles in your hospital/unit.</li> <li>• It is recommended to obtain both blood and sputum cultures prior to starting antibiotics.</li> <li>• Switching from IV antibiotics to oral when patient can tolerate oral medication and as soon as signs and symptoms of infection are improving (e.g. clinical and laboratory white blood cell count improvement).</li> </ul>			

Other Notes:

- If risk factors for *Pseudomonas* infection exist, increase dosing frequency of piperacillin - tazobactam to 6 hourly, and use a second - generation carbapenem (e.g., meropenem or imipenem) in place of ertapenem.

## Gastrointestinal

### Acute Invasive Diarrheal Disease (Dysentery)

Clinical definition: Acute infection commonly caused by bacteria resulting in bloody diarrhea, often with associated fever and abdominal pain. Bacterial etiologies include *Shigella flexneri*, *Campylobacter jejuni*, enteroinvasive and enterohaemorrhagic *E. coli*, and non - typhoidal *Salmonella* species. Dysentery may also be caused by the protozoan pathogen, *Entamoeba histolytica*.

#### Preferred antibiotic choice(s)

Drug	Formulation	Dosage	Duration
Ciprofloxacin (PO)	Oral liquid: 250 mg/5 mL (anhydrous); Tablet: 250 mg (as hydrochloride)	500 mg 12 hourly	3 days

#### Alternative antibiotic choice(s)

Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	1 g 12 hourly	5 days
Azithromycin (PO)	Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	3 days

For severe cases or those progressing despite ciprofloxacin, add *Entamoeba* spp cover:

Metronidazole (PO)	Injection: 500 mg in 100 - mL vial; Oral liquid: 200 mg (as benzoate)/5 mL; Suppository: 500 mg; 1 g; Tablet: 200 mg to 500 mg	800 mg stat followed by 400 mg 8 hourly	7 days
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#### Principles of Stewardship:

- Non - bloody infectious diarrhea is generally caused by viruses and should not be treated empirically with antibiotics, but rather with supportive care and rehydration.
- Send stool sample for culture and sensitivity prior to starting antibiotics.

#### Other Notes:

- In patients with advanced HIV and CD4 count <100 cells/mm<sup>3</sup>, consider cytomegalovirus (CMV) colitis

<b>Complicated Intra - Abdominal Infections (cIAI)</b>			
Clinical definition: Intramural inflammation of the gastrointestinal tract extending into the peritoneal space			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration <sup>18</sup>
If mild to moderate:			4 days if source control has been achieved and clinical condition is improving. If not, duration will depend on clinical and radiological progress, jointly managed with surgeons.
Amoxicillin + clavulanic acid (IV/PO)	Powder for injection: 500 mg (as sodium) + 100 mg (as potassium salt); 1000 mg (as sodium) + 200 mg (as potassium salt) in vial; Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt)	875 mg of amoxicillin component 8 hourly	
If severe:			
Combination therapy with: Cefotaxime (IV)  PLUS Metronidazole (IV)	Cefotaxime - Powder for injection: 250 mg per vial (as sodium salt)  Metronidazole - Injection: 500 mg in 100 - mL vial	2 g 8 hourly  500 mg 6 hourly	
Combination therapy with: Ampicillin (IV)  PLUS Gentamicin (IV)  PLUS Metronidazole (IV)	Ampicillin - Powder for injection: 500 mg; 1 g (as sodium salt) in vial  Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.  Metronidazole - Injection: 500 mg in 100 - mL vial	200 mg/kg 4 hourly  1 mg/kg 8 hourly  500 mg 6 hourly	
If hospital - acquired in a facility where resistance has been documented, consider:			

<sup>18</sup> Sawyer, R. G., Claridge, J. A., Nathens, A. B., Rotstein, O. D., Duane, T. M., Evans, H.L., et al. (2015). Trial of Short-Course Antimicrobial Therapy for Intraabdominal Infection. *The New England Journal of Medicine*. 372: 1996-2005.

Piperacillin - tazobactam	Powder for injection: 2 g (as sodium salt) + 250 mg (as sodium salt); 4 g (as sodium salt) + 500 mg (as sodium salt) in vial	4.5 g 6 hourly	4 days if source control has been achieved and clinical condition is improving. If not, duration will depend on clinical and radiological progress, jointly managed with surgeons.
Alternative antibiotic choice			
Meropenem	Powder for injection: 500 mg (as trihydrate); 1 g (as trihydrate) in vial	1 g 8 hourly	4 days if source control has been achieved and clinical condition is improving. If not, duration will depend on clinical and radiological progress, jointly managed with surgeons.
In case of confirmed penicillin allergy or medical contraindication			
Combination therapy with: Clindamycin (IV) PLUS Gentamicin (IV) OR Ciprofloxacin (IV)	Clindamycin - Injection: 150 mg (as phosphate)/mL  Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.  Ciprofloxacin - Solution for IV infusion: 2 mg/ mL (as hyclate)	20 mg/kg/day divided every 6 to 8 hours  1 mg/kg 8 hourly  500 mg 12 hourly	4 days if source control has been achieved and clinical condition is improving. If not, duration will depend on clinical and radiological progress, jointly managed with surgeons.
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>• Obtain a blood culture prior to starting any new antibiotic therapy.</li> <li>• Breach of the gastrointestinal tract mucosa is a risk factor for candida infection, which should be considered if source control and antibiotic treatment are not inducing a response.</li> <li>• Investigate for TB in endemic areas.</li> </ul>			
Other Notes:			
<ul style="list-style-type: none"> <li>• cIAI is often a difficult infection to treat and requires close collaboration with surgical colleagues to manage, as source control is a key aspect of management.</li> </ul>			

<b>Typhoid (Enteric) Fever</b>			
Clinical definition: Systemic illness due to <i>S. enterica</i> serotype Typhi or Paratyphi, commonly acquired from ingestion of contaminated food or water. High fever and diarrhea or constipation are common presenting symptoms.			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
For uncomplicated cases from outside of South Asia or Pakistan (low levels quinolone resistance):			
Ciprofloxacin (PO)	Oral liquid: 250 mg/5 mL (anhydrous); Tablet: 250 mg (as hydrochloride)	500 mg 12 hourly	For mild cases: 7 days For severe cases: 10 days
For uncomplicated cases from South Asia or Pakistan (high levels quinolone resistance):			
Azithromycin (PO)	Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	3 days
For complicated cases, if patient is unable to take oral medication, or in case of confirmed drug allergy or medical contraindication:			
Ceftriaxone (IV, with de-escalation to ciprofloxacin or azithromycin depending on fluoroquinolone resistance)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	2 g daily	For mild cases: 7 days For severe cases: 10 days
Alternative antibiotic choice(s)			
Cefixime (PO)	Capsule or tablet: 200 mg; 400 mg (as trihydrate); Powder for oral liquid: 100 mg /5 mL	100 mg 12 hourly	For mild cases: 7 days For severe cases: 10 days
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>Obtain a blood culture prior to starting antibiotic therapy.</li> </ul>			
Other Notes:			
<ul style="list-style-type: none"> <li>Patients who acquire <i>S. Typhi</i> from Pakistan who have complicated, severe infection should be considered for empirical meropenem due to ongoing outbreak of XDR - <i>S. Typhi</i>.</li> <li>Median time to fever reduction is 5 days.</li> </ul>			



## Genitourinary

<b>Mild to Moderate Acute Uncomplicated Prostatitis</b>			
Clinical definition: Common symptoms include fever, chills, malaise, myalgia, pelvic pain, dysuria, and cloudy urine. In younger patients, common etiologies include <i>N. gonorrhoeae</i> and <i>C. trachomatis</i> . In older patients, common etiologies include <i>Enterobacteriaceae</i> species.			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
Ciprofloxacin (PO)	Oral liquid: 250 mg/5 mL (anhydrous); Tablet: 250 mg (as hydrochloride)	500 mg 12 hourly	10 – 14 days
Alternative antibiotic choice(s)			
Azithromycin	Capsule: 250 mg; 500 mg (anhydrous); Oral liquid: 200 mg/5 mL	500 mg daily	3 days
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>None</li> </ul>			
Other Notes:			
<ul style="list-style-type: none"> <li>In sexually active men, syndromic treatment for gonorrhoea and chlamydia should be added, as per national protocol.</li> </ul>			

<b>Uncomplicated Urinary Tract Infection (UTI)</b>			
Clinical definition: Infection of the bladder and lower urinary tract. Symptoms include urgency, dysuria, and frequency of micturition. UTIs are more common in women than men. Commonly caused by the enterobacteriales, <i>E. coli</i> and <i>K. pneumoniae</i>			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
Nitrofurantoin (PO)	Oral liquid: 25 mg/5 mL; Tablet: 100 mg.	50 mg 6 hourly	5 days
Amoxicillin + clavulanic acid (PO)	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt).	500 mg of amoxicillin component 12 hourly	5 days

Principles of Stewardship: <ul style="list-style-type: none"> <li>• Treatment with quinolones should be avoided.</li> <li>• Do not treat patients with asymptomatic bacteriuria except in pregnancy and consider in those persons undergoing genitourinary tract biopsy.</li> </ul>
Other Notes: <ul style="list-style-type: none"> <li>• None</li> </ul>

### Acute Pyelonephritis

Clinical definition: Bacterial infection of the kidney commonly presenting in women ages 18 – 40 years. Common symptoms include high fever, chills or rigors, costovertebral tenderness, and flank pain. Common etiologies include the enterobacteriales, *E. coli*, *K. pneumoniae*, and *P. mirabilis*. *P. aeruginosa* and *Enterococci* are less common causes.

Preferred antibiotic choice(s) for mild - moderate cases

Drug	Formulation	Dosage	Duration
Ciprofloxacin (PO)	Oral liquid: 250 mg/5 mL (anhydrous); Tablet: 250 mg (as hydrochloride)	500 mg 12 hourly	7 days

For severe cases consider:

Gentamicin (IV)	Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial	5 mg/kg daily	7 days
Amikacin (IV)	Injection: 250 mg (as sulfate)/ mL in 2 - mL vial	15 mg/kg daily	7 days
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	1 g daily	7 days
Cefotaxime (IV)	Cefotaxime - Powder for injection: 250 mg per vial (as sodium salt)	1 g 8 hourly	7 days

Principles of Stewardship:

- Obtain urine and blood cultures for bacterial identification and conduct antimicrobial susceptibility testing (AST) prior to starting antibiotic therapy.
- If treating *Pseudomonas* infection with ciprofloxacin, increase dose to 750 mg and treat 12 hourly.

Other Notes:

- Avoid treatment with aminoglycosides in patients with renal impairment.

## Skin, Soft Tissue, Bone & Joints

Skin & Soft Tissue Infections (SSTI)			
Clinical definition: Bacterial infections of skin and underlying soft tissue including cellulitis and abscess.			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
Cloxacillin (PO)	Capsule: 500 mg; 1 g (as sodium salt); Powder for oral liquid: 125 mg (as sodium salt)/5 mL	250 mg 6 hourly	5 days
Alternative antibiotic choices:			
Amoxicillin + clavulanic acid (PO) <i>Used for patients with animal bites<sup>A</sup>.</i>	Oral liquid: 125 mg amoxicillin + 31.25 mg clavulanic acid/5 mL AND 250 mg amoxicillin + 62.5 mg clavulanic acid/5 mL; Tablet: 500 mg (as trihydrate) + 125 mg (as potassium salt)	500 mg of amoxicillin component 8 hourly	5 days
Cefalexin (PO)	Powder for reconstitution with water: 125 mg/5 mL; 250 mg/5 mL (anhydrous); Solid oral dosage form: 250 mg (as monohydrate)	500 mg 6 hourly	5 days
In case of confirmed drug allergy or medical contraindication			
Clindamycin (PO)	Capsule: 150 mg (as hydrochloride); Oral liquid: 75 mg/5 mL (as palmitate)	300 mg 8 hourly	5 days
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>• Withhold antibiotics for standard, uncomplicated abscess in an otherwise well person if the abscess can be incised and drained.</li> <li>• If IV antibiotic therapy is clinically indicated, review patient progress at day 3 of treatment to consider switch from IV to oral therapy.</li> </ul>			
Other Notes:			
A. For patients with suspected animal bite, assess for rabies risk and consider administering a tetanus booster.			

Acute Osteomyelitis & Septic Arthritis			
Clinical definition: Acute osteomyelitis is a bone infection with symptoms lasting days or a few weeks, commonly caused by methicillin - susceptible or resistant <i>S. aureus</i> . Common etiologies of septic arthritis include <i>N. gonorrhoeae</i> , <i>S. aureus</i> , <i>Streptococcus</i> species, and Gram - negative bacilli.			
Preferred antibiotic choice(s)			
Drug	Formulation	Dosage	Duration
For the empiric treatment of acute osteomyelitis or septic arthritis:			
Cloxacillin (IV)	Powder for injection: 500 mg (as sodium salt) in vial.	2 g 6 hourly	4 – 6 weeks
Alternative antibiotic choice(s)			
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	1 g daily	4 – 6 weeks
Cefotaxime (IV)	Powder for injection: 250 mg per vial (as sodium salt)	2 g 8 hourly	
Amoxicillin + clavulanic acid (IV)	Powder for injection: 500 mg (as sodium) + 100 mg (as potassium salt); 1000 mg (as sodium) + 200 mg (as potassium salt) in vial	1 g Amoxicillin component 8 hourly	
For the treatment of monoarticular septic arthritis with STD risk			
Ceftriaxone (IV)	Powder for injection: 250 mg; 1 g (as sodium salt) in vial	1 g daily	2 weeks
In case of confirmed drug allergy or medical contraindication			
Clindamycin (IV)	Clindamycin - Injection: 150 mg (as phosphate)/mL; Oral liquid: 75 mg/5 mL (as palmitate)	600 mg 8 hourly	2 weeks
Principles of Stewardship:			
<ul style="list-style-type: none"> <li>Do not give empirical antibiotics for chronic bone and joint infections. Instead, conduct bone and tissue biopsies, and treat with directed therapy.</li> <li>For septic arthritis, conduct a joint culture before administering antibiotic therapy and refer to an orthopedic surgeon for assessment.</li> <li>If patient cannot take oral antibiotics, start with IV antibiotics and switch to oral therapy as soon as patient is able to take antibiotics orally.</li> </ul>			

Other Notes:

- Adequate drainage of purulent joint fluid is needed in addition to antibiotic therapy for septic arthritis.

**Bloodstream**

**Sepsis (Septicemia) & Septic Shock**

Clinical definition: Sepsis is life - threatening organ dysfunction caused by a dysregulated host response to infection. Septic shock is sepsis that requires vasopressor therapy to maintain blood pressure. **The choice of empiric antibiotic(s) will depend on the likely source of infection (see individual infections) and trends in AST patterns.** The guidance given here, relates to sepsis/septic shock where no infection source is immediately identifiable.

Preferred antibiotic choice(s) when no source is identified and/or is community - acquired with low risk of drug - resistant bacteria

Drug	Formulation	Dosage	Duration
Combination therapy with:	Ampicillin - Powder for injection: 500 mg; 1 g (as sodium salt) in vial	200 mg/kg 4 hourly	10 days
Ampicillin (IV) OR	Amoxicillin - clavulanic acid - Powder for injection: 500 mg (as sodium) + 100 mg (as potassium salt); 1000 mg (as sodium) + 200 mg (as potassium salt) in vial	1 g amoxicillin component 8 hourly	10 days
Amoxicillin - clavulanic acid (IV) PLUS Gentamicin (IV)	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/ mL in 2 - mL vial.	2 mg/kg 12 hourly	5 days

Alternative antibiotic choice(s)

Combination therapy with;	Ceftriaxone - Powder for injection: 250 mg; 1 g (as sodium salt) in vial	2 g daily	10 days
Ceftriaxone (IV) PLUS Gentamicin (IV)	Gentamicin - Injection: 10 mg; 40 mg (as sulfate)/mL in 2 - mL vial.	2 mg/kg 12 hourly	5 days

Preferred antibiotic choice(s) when no source is identified and is hospital - acquired with high risk of drug - resistant bacteria

Drug	Formulation <sup>1</sup>	Dosage	Duration
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Combination therapy with Piperacillin - tazobactam (IV)	Piperacillin - tazobactam - Powder for injection: 2 g (as sodium salt) + 250 mg (as sodium salt); 4 g (as sodium salt) + 500 mg (as sodium salt) in vial	4.5 g 6 hourly	10 days
PLUS Amikacin (IV)	Amikacin - Injection: 250 mg (as sulfate)/ mL in 2 - mL vial	15 mg/kg daily	5 days

**Principles of Stewardship:**

- If the primary source of sepsis is defined, amend treatment duration according to the suggested duration for individual infections.

**Other Notes:**

- Early administration of broad - spectrum antibiotics is critical in patients presenting with sepsis.
- Amikacin has better coverage for extended - spectrum betalactamase producing bacteria than gentamicin.



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