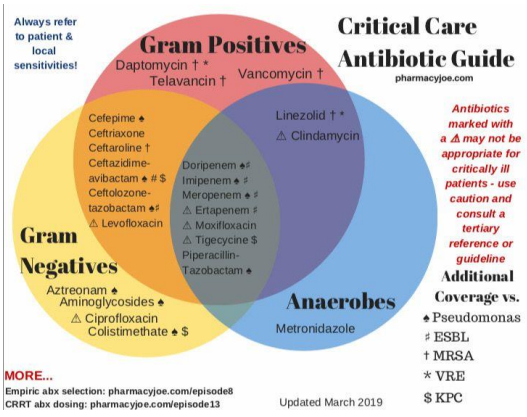
2024

National Antibiotic Guidelines

MINISTRY OF HEALTH AND WELLNESS
MAURITIUS



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Message from Minister

It is with great pleasure and a deep sense of responsibility that I introduce this guideline on antimicrobial stewardship and antibiotic use. The Ministry of Health and Wellness recognizes that effective antimicrobial stewardship is crucial to safeguarding public health, promoting patient safety, and ensuring the long-term effectiveness of antibiotics, which are invaluable tools in the treatment of infectious diseases.

As the Minister of Health and Wellness, I am committed to addressing the critical issue of antimicrobial resistance (AMR), and this guideline represents a significant step forward in our efforts.

This guideline has been meticulously crafted by a team of experts in the field of infectious diseases, pharmacy, surgery and healthcare policy. It reflects the latest scientific evidence, best practices, and international recommendations on antimicrobial stewardship. It serves as an important resource for healthcare professionals and policymakers, to understand the importance of responsible antibiotic use and the strategies needed to combat AMR.

I would like to commend the dedication and hard work of the experts who contributed to the development of this guideline. I urge healthcare professionals to embrace the principles outlined in this guideline, integrate them into their daily practice, and advocate for responsible antibiotic use. Together, we can work towards preserving the effectiveness of antibiotics for current and future generations.

In closing, I would like to express my gratitude to all those who have contributed to the creation of this guideline. Your efforts are instrumental in our collective mission to protect the health of our citizens and maintain the efficacy of antibiotics as a cornerstone of modern medicine.

Sincerely,

Dr K. K. Jagutpal
Minister of Health and Wellness
MAURITIUS

Approval Form

Version: 1.0 **Effective date:** 18 January 2024

NATIONAL ANTIBIOTIC GUIDELINES			
	NAME	**SIGNATURE**	**DATE**
AUTHORIZED BY	Senior Chief Executive *Mrs. D. Seewooruthun*	✓	17/01/24
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PREPARED BY	Antibiotic Technical Working Group *Dr D. C. Nuckchady*	✓	30/09/23

Date of next review: July 2025

Acknowledgement

We would like to extend our thanks and gratitude to our colleagues who helped write and review this guideline.

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This guideline was submitted to the laboratory and to all regional health directors who were requested to gather the comments and views from every concerned department of the public healthcare facilities. The neonatology chapter was also sent for review to all consultants-in-charge of pediatrics.

Chapter 1: Introduction

Purpose

Antibiotic guidelines are critical tools used in healthcare to guide clinicians in the appropriate use of antibiotics. They provide standardized recommendations for the selection, dosing, and duration of antibiotic therapy based on best available evidence. The guidelines help to promote appropriate antimicrobial stewardship by reducing the occurrence of antibiotic resistance, adverse drug reactions, and antibiotic-associated infections such as *Clostridioides difficile*.

Antibiotic overuse and misuse occur when antibiotics are used incorrectly e.g., when they are prescribed for a wrong indication, the dose is not completed, or they are dispensed for a longer duration than necessary or when they are prescribed for viral infections where they are not effective. This misuse of antibiotics can result in the emergence and spread of antimicrobial-resistant microbes and increased healthcare costs due to prolonged treatment and the need for more potent antibiotics. Overuse and misuse of antibiotics also increase the risk of adverse drug reactions, which can negatively impact patient outcomes.

Therefore, adherence to antibiotic guidelines is necessary to help reduce antibiotic abuse and misuse. It promotes the efficient use of healthcare resources, reduces patient morbidity and preserves the overall effectiveness of antibiotics.

Background

Multi-drug resistant organisms represent a serious danger to human life in Mauritius. According to the Global Antimicrobial Resistance and Use Surveillance System (GLASS) report for the year 2021, 27% of *K. pneumoniae* in blood cultures of patients admitted to general wards was non-susceptible to carbapenems while 50% of such organisms were non-susceptible to carbapenems when isolated from patients in the intensive care unit (ICU). This implies that colistin, which is a much inferior antibiotic with poorer efficacy, has to be used to treat such patients. Indeed, in 2022, an analysis of ICU patients infected with this organism revealed that the mortality rate was 91%.

Data gathered in 2018 showed that the antibiotic consumption rate in a public hospital was 427 Defined Daily Dose (DDD) per 1,000 patient-days (a figure that is comparable to other countries in the world), only 43% of these antibiotics were on WHO's Access list (the target being 60%), more than 50% of prescriptions of antibiotics were started on patients who did not need them, 39% of antibiotics were incorrectly dosed and 63% of antibiotics were dispensed for a longer duration than necessary.[23]

Furthermore, data collected in 2023 at a casualty in one of the regional hospitals showed that the rate of antibiotic use was 1,779 antibiotic DDD for every 1,000 patients seen, a value similar to that in the UK (1,874 DDD per 1,000 patients) and lower than that in Ethiopia (3,187 DDD per 1,000 patients).[25] More extended studies are awaited.

In addition, the antibiotic consumption rate in 2022 in the public sector was estimated to be 26 per 1,000 inhabitants per day, which puts Mauritius in the top 31% countries in the world that use the most antibiotics, based on limited data reported to GLASS.[26]

It is hoped that implementation of this guideline will help reduce the misuse and overuse of antibiotics in the country and thus alleviate the burden of antimicrobial resistance.

Methodology

1. October 2022: IPC Writing Committee decided that a technical working group should be formed to develop a national antibiotic guideline which will help to curb the rise in antimicrobial resistant organisms.
2. November 2022: The terms of reference for the antibiotic technical working group were created and submitted to MOHW.
3. December 2022: Approval was obtained from MOHW to write the national antibiotic guidelines and to set up the technical working group.

4. January 2023: Meeting of the technical working group was planned; several administrative difficulties were encountered to organize meetings.
5. February 2023: Technical Working Group met and a plan of action was set.
6. March 2023: Authors submitted their inputs.
7. April 2023: AMR Focal Point compiled the first draft which was reviewed and modified by the technical working group.
8. May 2023: Second draft was written, edited, corrected and formatted by the AMR Focal Point and submitted through MOHW to the Regional Health Directors for review by all relevant departments.
9. June 2023: Comments from stakeholders were reviewed and changes were made to the document. A third draft was submitted to WHO for its views.
10. July-August 2023: Comments from WHO and a few other units were received.
11. September 2023: Changes were made to the document based on the comments received, some staff provided late inputs to the neonatology section, a meeting with the Pharmacy Department was held to review the antibiotics included and the guideline was submitted to MOHW for approval.
12. December 2023: A Validation Committee met under the Chairmanship of the Director General Health Services and another request for comments from all Consultants-in-Charge (via Regional Health Directors) were made.

Remarks

1. This guideline is meant to help all antibiotic prescribers of the country.
2. The duration of treatment mentioned in this document is only an indication. Whenever relevant evidence is available, duration can be prolonged in complex scenarios where the patient is immunosuppressed, critically ill and / or not responsive to treatment. Similarly, the length of therapy can be shortened if the patient is only mildly sick.
3. All therapies should be modified in light of culture results. Interpret cultures cautiously since they can be spuriously negative if taken after the start of antibiotics, commensals may grow (without being indicative of any active infection) and / or cultures may be incorrectly taken.
4. Please review Annex B of the National IPC Guidelines to evaluate whether an infected patient requires isolation procedures – patients who are colonized or infected with multi-drug resistant organisms should be isolated under contact precautions.
5. While general guidance is provided, suggested therapies should be modified based on specific patient characteristics e.g., pregnancy status, renal function and allergies.

Scope of this guideline

1. This guideline only covers bacterial infections. Viral, fungal and parasitic infections (as well as prions) are outside its scope.
2. The document covers antibiotics used in the public sector of Mauritius. However, the private sector can also use this guideline – prescribers should ensure that antibiotics with a similar breadth of spectrum substitute the ones mentioned in this document.
3. Bacterial infections that are rarely diagnosed in Mauritius are not covered e.g., yaws, brucellosis, etc.
4. Ophthalmological conditions e.g., endophthalmitis, are not included.
5. Some common bacterial infections, e.g., tuberculosis, are not included because they are covered in other guidelines.

6. Due to a lack of studies carried out in Mauritius, the grading of evidence is outside the scope of this guideline.
7. Also not included are definitions of diseases, pathophysiology, risk factors, clinical presentations, diagnostic testing, pharmacokinetics, pharmacodynamics, antibiotic desensitization, vaccination protocol and allergy testing.

Disclaimer

The aim of clinical guidelines is to help clinicians to make informed decisions about their patients.

However, adherence to a guideline does not guarantee a successful outcome. Ultimately, healthcare professionals must make their own treatment decisions about care on a case-by-case basis, after consultation with their patients, using their clinical judgement, lab data, knowledge and expertise. A guideline is not intended to take the place of physician judgment in diagnosing and treatment of particular patients.

Chapter 2: Antimicrobial Stewardship Guidelines

Definitions

Antimicrobial stewardship is defined as 'an organizational or healthcare-system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness'. It is a coherent set of integrated actions which promote the responsible and appropriate use of antimicrobials to help improve patient outcomes across the continuum of care.

Antimicrobial resistance is defined as the 'loss of effectiveness of any anti-infective medicine, including antiviral, antifungal, antibacterial and antiparasitic medicines'.

Details on how to implement an antimicrobial stewardship program (ASP) can be found in the WHO toolkit and the core elements are in annexes A and B.[32]

Recommendations[13, 19-21, 28]

Leadership

1. Antimicrobial stewardship teams (AST) can help to reduce abuse and misuse of antimicrobials in hospitals through the monitoring of prescriptions.
2. Management of complex cases of infections should be handled through a multi-disciplinary team that may include a microbiologist, an infectious disease specialist, a relevant specialist and a surgeon.

Accountability

1. The ASP must ensure that the team has leadership, has accountability, has properly allocated responsibilities, has necessary resources for implementation, can track antibiotic use, will provide feedback and will educate or train healthcare workers and patients.

Gathering expertise

1. Prescribers should understand and adhere to national guidelines for prescription of antibiotics in order to reduce antibiotic resistance and to improve the outcome of patients.

Actions and activities

1. Interventions associated with an ASP include guaranteeing that the right patients are receiving: 1) the right type of antimicrobials; 2) the right formulation; 3) the right dose; 4) the right duration; 5) certifying these antimicrobials are given at the right time; and 6) ensuring that these patients have the correct indication for these antimicrobials.
2. Preauthorization (usually by a member of the AST team) and / or Prospective Audit and Feedback are key interventions that help reduce antibiotic abuse.
3. For inpatients who have suspected infections, microbiological samples should be taken before prescribing an antimicrobial and the prescription should be reviewed when the results are available.
4. For outpatients who have recurrent or persistent infections, consider taking microbiological samples when prescribing an antimicrobial and review the prescription when the results are available.
5. For patients who have non-severe infections, consider taking microbiological samples before making a decision about prescribing an antimicrobial, provided it is safe to withhold treatment until the results are available.
6. For patients with abscesses, deep-seated infections (like osteomyelitis or septic arthritis) or with uncommon infections (e.g., Pott’s disease), who are undergoing surgery, intra-operative cultures should be taken so that a firm diagnosis can be made.
7. Intravenous antibiotics should be used only in patients who cannot take orally or if an oral alternative is not available.

8. All antibiotic prescriptions should be reviewed at 48–72 hours for response to treatment to determine if the antimicrobial needs to be continued. Switch an intravenous antibiotic to an oral one as soon as feasible and safe for the patient – antibiotic timeouts are essential.
9. Always choose antibiotics with the narrowest spectrum to cover all the common pathogens that could be infecting the patient.
10. Antibiotic monotherapy is sufficient for most infections.
11. When certain antibiotics are out of stock, they should be replaced by those with a similar breadth of spectrum e.g., when ceftriaxone is not available, cefotaxime can often be used.
12. Antibiotics should be prescribed for the shortest effective course and at an appropriate dose and route of administration.
13. Antibiotics are superfluous for viral infections like most upper respiratory tract infections or for self-limited illnesses like acute gastroenteritis.
14. Antibiotics should be de-escalated according to culture results as soon as the results are available.
15. Ciprofloxacin does not cover *S. pneumoniae* and should not be used alone to treat respiratory infections – use respiratory fluoroquinolones instead.
16. The presence of fever does not automatically imply the patient is infected – many non-infectious diseases can present with pyrexia e.g., lymphoma, leukemia, renal cell carcinoma, systemic lupus erythematosus, drug fever and thromboembolic disease.
17. Similarly, leukocytosis does not equate infection – other causes of leukocytosis include smoking, seizures, diabetic ketoacidosis, vasculitis, hepatitis, steroid use, myocardial infarction, cancers like leukemia and asplenia.
18. On the other hand, the elderly and the immunosuppressed may not exhibit fever nor leukocytosis when infected; antibiotics may still be appropriate if signs and symptoms are suggestive of a bacterial infection.
19. Stop dates or antibiotic durations should always be mentioned in patient's charts or in casualty cards.
20. Serum drug levels of certain narrow therapeutic index antibiotics should be measured to ensure efficacy, prevent resistance through under-dosing and avoid side effects.
21. Skin tests for penicillin allergies should be performed as per international protocol – most patients are incorrectly labelled as being allergic to penicillins.
22. Septic patients should have their antibiotics started within 3 hours, if not within 1 hour, of their diagnosis.
23. The contamination rate of blood culture with skin commensals should be less 3% i.e., blood cultures should be taken in a sterile manner.
24. The presence of coagulase negative staphylococcus in blood cultures usually represent contamination and should only be treated in case of clinical deterioration and if growth is seen in more than 2 cultures.
25. Antibiotics with overlapping spectra should not be administered to the same patient.
26. Pre-operative antibiotics should be administered within 30-60 minutes before surgery (even if the patient is already on antibiotics).
27. When available, mupirocin should be used to decolonize patients contaminated with *S. aureus* prior to cardio-thoracic surgery, orthopedic surgery or any surgery involving prosthetic materials.
28. Loading doses of antibiotics should be used for severely ill patients or patients with infections of the central nervous system.

29. Prophylactic antibiotics should not be continued for more than 24 hours post-operatively.
30. Prophylactic antibiotics do not need to be given to patients just because they have drains, have central lines or because they are intubated.

Tracking and reporting

1. Antibiotic use and consumption should be evaluated regularly, and proper feedback should be forwarded to prescribers and to policy makers.
2. Pharmacists should help with the assessment of drug-drug interactions and with proper dosing of antibiotics.
3. Monitoring of side effects from antibiotics and of resistance rates should be undertaken regularly.
4. An updated antibiogram should be readily accessible to all healthcare providers.

Education

1. Specialists in relevant departments should provide training to healthcare personnel about antimicrobial stewardship and antimicrobial resistance.
2. Prescribers should take time to discuss with the patient and / or their family members or carers (as appropriate) regarding the patient's condition, and the management – full explanation should be given why / why not an antibiotic is being prescribed. If an antibiotic is being prescribed the patient / family members / carer should be explained about the exact mode and duration of taking antibiotic, including possible side effects.

Chapter 3: Antibiotics for Restricted Use

This list is based on WHO's 2021 AWaRe classification:[24]

- Access group: These antibiotics should be used preferentially as first line or second line.
- Watch group: Development of resistance to these antibiotics can be problematic – limit usage if possible.
- Reserve group: These are last resort antibiotics that should be used to treat multi-drug resistant organisms – usage is protected, and utilization should be strictly monitored.

ACCESS	WATCH	RESERVE
Benzathine penicillin G (IM)	Piperacillin / tazobactam	Colistin
Benzyl penicillin (IV)	Cefixime*	Linezolid
Phenoxymethylpenicillin	Cefotaxime	Tigecycline*
Amoxycillin / clavulanic acid	Ceftazidime	Ceftazidime-avibactam*
Amoxycillin	Ceftriaxone	Aztreonam*
Pivmecillinam	Teicoplanin	
Flucloxacillin	Meropenem	
Doxycycline	Clarithromycin	
Amikacin	Azithromycin	
Gentamycin	Erythromycin*	
Clindamycin	Ciprofloxacin	
Chloramphenicol	Levofloxacin	
Co-trimoxazole	Vancomycin	
Metronidazole	Rifampicin	
Nitrofurantoin*	Lincomycin	
Ampicillin-sulbactam*	Neomycin*	
Cefazolin*	Fosfomycin*	
Mupirocin*		

*Table 1: AWaRe classification of antibiotics that are in the formulary of the Ministry of Health and Wellness. * - these antibiotics are currently not in the formulary for the public sector but if approved by the Ministry of Health and Wellness, they may become available within 2 years after approval of this protocol. WHO's Essential Medicine List was reviewed in order to update this table.*

Restrictions

- Piperacillin / tazobactam, teicoplanin, vancomycin, colistin and meropenem can only be prescribed by specialists during working hours. After working hours, Medical Health Officers following verbal advice from specialists can prescribe these medications for a maximum of 24 hours (or for 48 hours to cover a public holiday or a Sunday) until the prescription is reassessed by a specialist. Healthcare providers should ensure that authorization doesn't delay therapy initiation. It is mandatory to send relevant cultures prior to starting these antibiotics.
    - In neonates, a specialist alone cannot prescribe meropenem – the signature of the consultant-in-charge is required.
- Meropenem can be prescribed for a maximum of 7 days only – authorization should be granted by a microbiologist or an infectious disease specialist to prescribe carbapenems for a longer duration after culture data from the lab is analyzed and after discussion with the treating doctor/s. The pharmacist is allowed to request for the result of

cultures at day 3 to day 5 of meropenem course and based on these results, he / she may provide pertinent advice to the prescribing doctors.

  - In neonates, prescription of meropenem for more than 3 days with negative cultures or positive cultures that do not indicate the need for meropenem, is not allowed unless the case is first discussed with an infectious disease specialist, a microbiologist or a neonatologist.

- Linezolid, tigecycline, ceftazidime-avibactam and aztreonam can only be prescribed under the guidance of a microbiologist, infectious disease specialist or consultant-in-charge, require that the results of cultures be available, and that no other antibiotics can be effectively utilized to treat the patient. During working hours, the prescription should be signed by both the consultant-in-charge and the specialist while outside of working hours, the prescription can be signed by the specialist only following verbal advice from the consultant-in-charge.

  - As additional guidance to prescribers, the patients should generally be in the intensive care unit, have a reasonable chance of surviving, show signs of sepsis (or severe immunosuppression), the positive cultures should be from a sterile site (e.g., blood or cerebrospinal fluid) and the organism should be susceptible to the antibiotic.

  - The maximum duration of treatment that can be prescribed by a consultant-in-charge is 7 days for these antibiotics – a more prolonged course requires authorization from a microbiologist or an infectious disease specialist.

  - For patients infected with multi-drug resistant organisms who do not qualify for these antibiotics or whenever these antibiotics are not available in stock, consult an expert to see whether high dose meropenem (2g IV q8h) with colistin IV may be utilized.

- Azithromycin, levofloxacin, cefixime and rifampicin can be prescribed by specialists only. However, in cases where sexually transmissible infections are to be treated by Medical Health Officers in the Casualty Department and where alternatives are not available, Medical Health Officers will be allowed to prescribe cefixime or azithromycin.

- Microbiologists and infectious disease specialists can prescribe any antibiotics.

Chapter 4: Dosage of Glycopeptides, Aminoglycosides and Polymyxins

Vancomycin dose for adults

- Starting dose if normal renal function:
  - 15 to 20 mg/kg/dose IV (rounded to the nearest 250 mg) every 8 to 12 hours
- For abnormal renal function:
  - eGFR 15-50ml/min/1.73m^2: 15 mg/kg IV every 24h
  - eGFR < 15ml/min/1.73m^2: 15 mg/kg IV every 48h
  - Intermittent hemodialysis: Loading dose may be needed (15 mg/kg x1); 10 mg/kg IV after dialysis on dialysis days
- Monitor serum drug level:
  - Send a trough level 30 minutes before the 4th dose and then adjust dose based on the results
  - Target trough level is 15 to 20 mg/L for mild to moderate infections
  - For severe infections with methicillin-resistant *Staphylococcus aureus*, an area under the curve / minimum inhibitory concentration of 400 to 600 mg•h/L should be targeted
  - Once the target is achieved, obtain levels every 3 days
  - Use online calculators to adjust the dose – when using the area under the curve / minimum inhibitory concentration method, at least 2 serum levels are required i.e., obtain a peak vancomycin level 60 minutes after the 4th dose (as well as a trough level)

Gentamicin dose for adults

- Starting dose if normal renal function:
  - 5 to 7 mg/kg IV once daily or 3 to 5 mg/kg/day IV in divided doses every 8 hours
  - A loading dose of 2.5mg/kg x1 IV may be given to patients on hemodialysis, who are obese or who are seriously ill from gram-negative sepsis
  - Use the adjusted body weight for obese patients
- For abnormal renal function:
  - eGFR 40-60ml/min/1.73m^2: 1.5 mg/kg IV every 12 hours
  - eGFR 20-39ml/min/1.73m^2: 1.5 mg/kg IV every 24 hours
  - eGFR < 20ml/min/1.73m^2: 1.5 mg/kg IV every 48h; adjust dose based on trough levels
  - Intermittent hemodialysis: 2 mg/kg/dose IV 3 times weekly after dialysis on dialysis days; serum level to be taken 2-4 hours after dialysis to allow for redistribution
- Monitor serum drug level:
  - Using the Hartford nomogram method, send a serum level 6–14 hours after the first dose
  - Adjust the dose frequency based on the nomogram or use an online calculator
  - For patients with stable renal function, send levels twice weekly

- The target trough is ≤ 1 mcg/mL and target peak level is 15 to 20 mcg/mL if single daily doses are given and 7 to 10 mcg/mL if multiple doses per day are administered

Amikacin dose for adults

- Serum amikacin level is important but currently not done by the Central Health Laboratory. The following is provided as guidance only.
- Starting dose if normal renal function:
  - 5 mg/kg IV every 8 hours or 7.5 mg/kg IV every 12 hours or 15 to 20 mg/kg IV once daily
  - A loading dose of 10mg/kg x1 IV may be given to patients on hemodialysis, who are obese or who are seriously ill from gram-negative sepsis
- For abnormal renal function:
  - eGFR 40-60ml/min/1.73m^2: 5 mg/kg IV every 12 hours
  - eGFR 20-39ml/min/1.73m^2: 5 mg/kg IV every 24 hours
  - eGFR < 20ml/min/1.73m^2: 5 mg/kg IV once; subsequent doses should be dictated by trough levels
  - Intermittent hemodialysis: 5 mg/kg/dose 3 times weekly after dialysis on dialysis days
- Monitor serum drug level:
  - Send a peak level 60 minutes after the 3rd dose and a trough level 30 minutes before 4th dose
  - Adjust the dose using an online calculator
  - Target trough is < 8 mg/L for multiple doses per day and < 2 mg/L for once-a-day dosing while the target peak is < 30 mg/L
  - For patients with stable renal function, send levels twice weekly

Colistin dose for adults

- Loading dose:
  - 9 million units IV x1 (use the same dose even if the renal function is impaired)
- Starting dose if normal renal function:
  - 3 million units IV Q8h or 4.5 million units IV Q12h
- For abnormal renal function:[15]
  - eGFR 40-60ml/min/1.73m^2: 3.5 million units IV Q12h
  - eGFR 20-39ml/min/1.73m^2: 3 million units IV Q12h
  - eGFR < 20ml/min/1.73m^2: 2 million units IV Q12h
  - Intermittent hemodialysis: 2 million units IV after dialysis on hemodialysis days and 1.5 million units IV on non-dialysis days
- Serum level should be monitored but the Central Health Laboratory does not currently carry out the test.

The doses in the following table assume a normal renal function. Regimens apply to non-pregnant women. See the references for details.[1-6, 17, 22, 27, 34]

Indications	Common etiologies	Primary treatment	If PCN allergy	Duration	Comments
GASTROINTESTINAL					
Gastroenteritis	Rotavirus, norovirus, adenovirus, salmonella non-typhi, *E. coli*	Antibiotics are not indicated	--	--	Treat with supportive care and fluids. Antibiotics are not needed even if stool cultures are positive. In dysentery or severe gastroenteritis, use ceftriaxone 1g IV Q24h for 5d or ciprofloxacin 500mg PO 12h for 3d. Dysentery and cholera are rare in Mauritius. Be careful of hemolytic-uremic syndrome if antibiotics are prescribed.
***Clostridioides difficile* colitis**	*Clostridioides difficile*	Metronidazole 400mg PO Q8H	Vancomycin 500mg Q6H PO*	10d	Avoid loperamide. Rare in Mauritius – send stool for lateral flow assay for toxins A & B & for GDH at CHL (NAAT for *tcdB* is not done currently).
***Helicobacter pylori* gastritis or peptic ulcer**	*Helicobacter pylori*	Amoxicillin 1g Q12H PO + clarithromycin 500mg Q12H PO + omeprazole 20mg Q12H PO	Clarithromycin 500mg Q12H PO + metronidazole 400mg Q8H PO + omeprazole 20mg Q12H PO	7d	Treatment failure with clarithromycin-based therapy appears common in Mauritius: to be confirmed with gastroscopy – use omeprazole 20mg PO Q12H + levofloxacin 500mg PO q24h + amoxicillin 750mg PO Q8H x14 days then. Bismuth for use as quadruple therapy is generally not available in Mauritius.
Liver abscess	*Klebsiella sp., Bacteroides sp., E. coli*, enterococci	Amoxicillin / clavulanate 1.2g IV Q8H	Ciprofloxacin 500mg PO 12h + metronidazole 400mg Q8H PO + gentamicin IV†	14d	Amebiasis rare in Mauritius – to add metronidazole if this is possible. Drainage is necessary if > 3cm in size. Prolong treatment to up to 6w if inadequate drainage or poor clinical response.
Acute cholecystitis	*Klebsiella sp., E. coli, Enterobacter sp.*	Ciprofloxacin 500mg PO BD	Gentamicin IV†	5d	Cholecystectomy is recommended within 24h in case of complications (perforation, gangrene or emphysema) or within 7d for good surgical candidates.
Gallbladder empyema or ascending cholangitis	*Klebsiella sp., E. coli, Enterobacter sp., Bacteroides sp.*, enterococci	Amoxicillin / clavulanate 1.2g IV Q8H	Ciprofloxacin 400mg IV 12h + metronidazole 500mg Q8H IV	7d	Drainage of the abscess or of the biliary tree is urgently required.
Appendicitis	*Klebsiella sp., E. coli, Enterobacter sp., Bacteroides sp.*, enterococci	Amoxicillin 1g Q8H IV + gentamicin† + metronidazole 500mg Q8H IV	Ciprofloxacin 400mg IV 12h + metronidazole 500mg Q8H IV	5d	Surgery may not be needed if inflammation is localized and if there is no abscess, but antibiotic duration is extended to 10d then.
Secondary peritonitis	*Klebsiella sp., E. coli, Enterobacter sp., Bacteroides sp.*, enterococci	Amoxicillin 1g Q8H IV + gentamicin† + metronidazole 500mg Q8H IV	Ciprofloxacin 400mg IV 12h + metronidazole 500mg Q8H IV	5d	Source control is imperative.
Spontaneous bacterial peritonitis	*Klebsiella sp., E. coli, Streptococcus sp.*	Ceftriaxone 2g IV 24h	Ciprofloxacin 400mg IV 12h	5d	Send ascitic fluid for culture and for WBC. Resistance to fluoroquinolones is likely if the patient has recently been on fluoroquinolones.
Diverticulitis	*Klebsiella sp., E. coli, Enterobacter sp., Bacteroides sp.*, enterococci	Amoxicillin 1g Q8H IV + gentamicin† + metronidazole 500mg Q8H IV	Ciprofloxacin 400mg IV 12h + metronidazole 500mg Q8H IV	5d	Uncomplicated (mild) diverticulitis may not require any antibiotics. Surgical management is necessary for moderate to severe disease, especially if perforated or when an abscess forms.
Necrotizing pancreatitis or pancreatic abscess	*Klebsiella sp., E. coli, Streptococcus sp.*, enterococci	Piperacillin-tazobactam 4.5g IV 8h	Meropenem 1g IV 8h	14d	Drainage and debridement are warranted. No antibiotics are needed for the vast majority of acute pancreatitis. Necrosis should be > 30% of pancreas and with signs of infection in order to start antibiotics.

KIDNEY, BLADDER AND PROSTATE					
Uncomplicated cystitis	*E. coli, S. saprophyticus,* enterococci, *Proteus sp.*	Pivmecillinam 400 mg PO Q8H	Nitrofurantoin 50mg PO 4x/day*	3d for women, 5d for men	Either medication can be used to treat asymptomatic bacteriuria during pregnancy. Asymptomatic bacteriuria should not be treated with antibiotics otherwise. A 3rd line of treatment is fosfomycin 3g PO single dose for an uncomplicated urinary tract infection due to *Escherichia coli* susceptible to fosfomycin.
Complicated urinary tract infection	*E. coli,* enterococci, *Proteus sp.*	Ceftriaxone 1g IV OD	Ciprofloxacin 500mg PO 12h + gentamicin†	7d	Rule out obstructive uropathy. Can add vancomycin IV if enterococcus likely.
CAUTI	*E. coli, Klebsiella sp,* enterococci, *Pseudomonas sp.*	Ceftriaxone 1g IV OD	Ciprofloxacin 500mg PO 12h + gentamicin†	7d	Remove indwelling catheter if not needed. Prefer intermittent catheterization if required. Change Foley at start of therapy if intermittent catheterization not possible. Can add vancomycin IV if enterococcus likely.
Prostatitis	*E. coli, Proteus sp.*	Ciprofloxacin 500mg PO BD	Trimethoprim / sulfamethoxazole 160 / 800mg PO Q12H	28d	3w of treatment may be utilized for acute prostatitis and up to 6w for chronic prostatitis.
Acute pyelonephritis	*E. coli, Proteus sp.*	Ceftriaxone 1g IV OD	Ciprofloxacin 500mg PO 12h + gentamicin† IV	7d	Duration can be increased to 14d if slow clinical response.
Perinephric abscess	*E. coli,* enterococci, *S. aureus*	Ceftriaxone 1g IVq24h + vancomycin†	Ciprofloxacin 500mg PO 12h + vancomycin† IV	14d	Drainage is imperative if > 5cm in size. If MRSA is ruled out, vancomycin can be stopped. If MSSA is confirmed, downgrade therapy to flucloxacillin 1g IV Q6h.
CENTRAL NERVOUS SYSTEM					
Acute meningitis	*S. pneumoniae*	Ceftriaxone 2g IV 12h + vancomycin†	Trimethoprim / sulfamethoxazole 5mg/kg of trimethoprim component Q6h IV + vancomycin† IV	14d	*L. monocytogenes* is uncommon in Mauritius. *N. meningitidis* is almost always imported. Cryptococcal meningitis is quite common – send HIV test. Acyclovir can be added to cover HSV. If pregnant, > 60y old, < 1m old or severely immunocompromised, add amoxicillin 2g Q4h IV for listeria. Add dexamethasone 10mg Q6h IV for 4 days within 12h of start of antibiotic except if post-operative, listeria or cryptococcal meningitis.
Brain abscess	*Streptococcus sp., Klebsiella sp., Bacteroides sp.*	Ceftriaxone 2g Q12H IV + metronidazole 500mg Q8H IV	Ciprofloxacin 400mg IV 8h + vancomycin† + metronidazole 500mg Q8H IV	6w	Add vancomycin if risk factors for *S. aureus* infection. Beta-lactam is preferred in the regimen to improve outcomes (including in most cases of mild to moderate allergies). Add dexamethasone 10mg Q6h IV if there is mass effect. Surgical drainage necessary if > 3cm in size. Treat for a minimum of 4w until abscess is < 1cm in size on MRI. Oral antibiotics can be considered after 4w of IV treatment.
Spinal epidural abscess	*S. aureus, E. coli*	Ceftriaxone 2g Q12H IV + vancomycin†	Ciprofloxacin 400mg IV 8h + vancomycin†	6w	The majority of patients will require surgical decompression to avoid a poor neurological outcome. May need to rule out spinal tuberculosis if patient has risk factors.
RESPIRATORY					
Acute bronchitis	Influenza, RSV, SARS-CoV-2	Antibiotics are not indicated	--	--	Do not use antibiotics even if a bacterial cause is suspected. Treat with over-the-counter medications. However, in patients with chronic obstructive pulmonary disease, bronchiectasis or other long-standing pulmonary lesions, 5 days of antibiotics may be considered.
Community-acquired pneumonia	*S. pneumoniae, H. influenzae, M. catarrhalis*	Mild: amoxicillin 1g PO Q8H Moderate to severe: amoxicillin / clavulanate 1.2g IV Q8H +	Mild: Doxycycline 100mg PO BD Moderate to severe: Levofloxacin 750mg IV OD*	5d	Add gentamicin if *Pseudomonas sp.* is suspected. If severe, send legionella urine antigen and prolong treatment to 7-10 days. Immunocompromised patients can require up to 10 days of treatment.

		clarithromycin 500mg PO Q12H			
Aspiration pneumonia	*Bacteroides sp., Streptococcus sp., Klebsiella sp.*	Amoxicillin / clavulanate 1.2g IV Q8H	Levofloxacin 750mg IV OD* (± metronidazole 500mg Q8H IV)	5d	Most cases are pneumonitis instead of pneumonia – prescribe antibiotics only if the CXR is abnormal or if severely ill (intubated or in shock); antibiotics can be stopped at 48h if the patient improves and there are no indications of a pneumonia on CXR. Anaerobes do not need to be covered unless the patient has specific risk factors like alcoholism, empyema or dental caries.
Ventilator-associated pneumonia (or hospital-acquired pneumonia)	*A. baumannii, Klebsiella sp., Pseudomonas sp.*	Meropenem 1g IV 8h	Colistin†	7d	The majority of cases are resistant to carbapenems – see chapter 6 for alternative regimens once cultures are obtained.
Legionnaire's disease	*Legionella sp.*	Levofloxacin 750mg PO OD*	Clarithromycin 500mg PO BD	7d	Fluoroquinolones may be superior to macrolides.
Lung abscess	*Bacteroides sp., Streptococcus sp., Prevotella sp., Fusobacterium sp.*	Amoxicillin / clavulanate 1.2g IV Q8H	Levofloxacin 750mg PO OD* + metronidazole 400mg Q8H PO	4w	Bronchoscopic sampling or sputum culture is useful. If patient fails targeted therapy after 10d, follow with percutaneous drainage, trans-bronchoscopic catheter drainage, bronchial stent placement in case of obstruction or with surgical resection.
Infected parapneumonic effusions and empyema	*Streptococcus sp., S. aureus, Bacteroides sp.*	Amoxicillin / clavulanate 1.2g IV Q8H	Levofloxacin 750mg PO OD* + metronidazole 400mg Q8H PO	4w	Send pleural fluid for culture – if positive for a pathogenic organism or pH < 7.2 or glucose < 2.2 mmol/L or purulent or loculated or if large enough effusion to cause shortness of breath, then drainage should be strongly considered.
EAR, NOSE AND THROAT					
Acute otitis media	*S. pneumoniae, H. influenzae, M. catarrhalis*	Amoxicillin 1g PO Q8H	Clarithromycin 500mg PO BD	5d	If the patient has received antibiotics recently, use amoxicillin / clavulanate 875 / 125mg PO Q12H instead of amoxicillin.
Acute sinusitis	Rhinovirus, influenza, parainfluenza, *S. pneumoniae, H. influenzae*	Amoxicillin 1g PO Q8H	Doxycycline 100mg PO BD	7d	Only use antibiotics if complicated sinusitis, immunosuppressed patient, no resolution after 7-10 days of observation or if severe illness requiring hospitalization. Most cases need supportive therapy only. Steroids may be considered if orbital cellulitis is present, but its role is controversial.
Pharyngitis and tonsillitis	Adenovirus, rhinovirus, coronavirus, group A streptococcus, Ebstein-Barr Virus	Antibiotics are not indicated	--	--	Phenoxymethylpenicillin 500mg Q6h PO or amoxicillin 500mg PO Q8H for 5d can be given if group A streptococcus is cultured on pharyngeal swab or if indicated by the Centor criteria. For those allergic to penicillin, clarithromycin 500mg PO Q12H for 5d can be used instead. Rash may occur in infectious mononucleosis if penicillins are administered.
Peritonsillar abscess	*Fusobacterium sp.*, group A streptococcus, *S. aureus*	Amoxicillin / clavulanate 1.2g IV Q8H	Clindamycin 600mg IV Q8H	14d	Consider adding vancomycin IV if there is no response within 48 hours. Tonsillectomy and / or surgical drainage are usually indicated, especially if there is trismus, voice change or uvular deviation. Use of steroids may be considered but is controversial.
Epiglottitis	*S. pneumoniae, H. influenzae, M. catarrhalis, S. aureus*	Ceftriaxone 2g IV Q24h	Clindamycin 900mg IV Q8h	7d	Add vancomycin IV if patient is septic or not responding to treatment. To assess for tracheostomy if airway is obstructed. 10-14d of treatment may be needed in complicated cases. Assess for abscess formation which may require drainage.
DENTAL					
Dental abscess and gingivitis	*Prevotella sp., Fusobacterium sp., Streptococcus sp.*	Amoxicillin / clavulanate 875 / 125mg PO Q12H	Levofloxacin 750mg PO OD* +	5d	Drainage and removal of necrotic tissue is the most important step. Only treat with antibiotics if there is fever, lymphadenopathy, pus or patient is immunosuppressed since most patients don't require antibiotics.

			metronidazole 400mg Q8H PO		
GENITAL TRACT					
Epididymo-orchitis	Low risk for STI: *E. coli, Pseudomonas sp.* High risk for STI: *N. gonorrhoeae and C. trachomatis*	Low risk for STI: Ciprofloxacin 500 mg Q12H PO x10d High risk for STI: Doxycycline 100 mg Q12H PO x7d + single dose ceftriaxone 500 mg IM	Low risk for STI: Trimethoprim / sulfamethoxazole 160 / 800mg PO Q12H x 10d High risk for STI: a single 240 mg dose of gentamicin IM + a single 2g oral dose of azithromycin*	See 3rd and 4th columns	Risk factors for STI include recent condomless sex, prior history of STI, specific sexual practices and age less than 35 years.
Uncomplicated gonococcal infections and mucopurulent cervicitis	*N. gonorrhoeae*	Single dose ceftriaxone 500 mg IM + doxycycline 100mg PO Q12H for 7d	A single 240 mg dose of gentamicin IM + a single 2g oral dose of azithromycin	See 3rd and 4th columns	Uncomplicated gonococcal infections are urogenital, anogenital, pharyngeal, and ocular without bacteremia nor infection of a secondary organ. Gentamicin is less effective in general, especially against pharyngeal infections.
Syphilis	*T. pallidum*	Primary, secondary and early latent: a single dose of penicillin G benzathine 2.4 mega units IM Late latent and tertiary syphilis: penicillin G benzathine 2.4 mega units IM once a week for 3 weeks Neurosyphilis, ocular syphilis and otic syphilis: 3 mega units benzyl-penicillin Q4h IV for 14d	Primary, secondary and early latent: doxycycline 100mg PO Q12H x14d Late latent and tertiary syphilis: doxycycline 100mg PO Q12H x28d Neurosyphilis, ocular syphilis and otic syphilis: doxycycline 200mg PO Q12H x28d	See 3rd and 4th columns	Primary: chancre. Secondary: rash. Early latent: asymptomatic and within 1 year of infection. Late latent: asymptomatic and after a year of infection. Tertiary: gummas or aortitis. Doxycycline is generally inferior to penicillin – consider desensitization if allergic to beta-lactam. Jarisch-Herxheimer reaction may occur. Doxycycline is relatively contraindicated in pregnancy. If allergic to penicillin and pregnant, use erythromycin 500mg PO 4x/d. Duration is 14d if primary, secondary or early latent. Duration is 30d if late latent.
Chlamydia STI	*C. trachomatis*	Doxycycline 100mg PO BD	Single-dose azithromycin 1g PO	7d	Associated with pelvic inflammatory disease, infertility, chronic pelvic pain and ectopic pregnancy. NAAT on first-catch urine, vaginal swab, rectal swab or pharyngeal swab can be sent to CHL. To rule out gonococcal infection.
Vulvovaginitis	Bacterial vaginosis (*Gardnerella sp.* and others), *Candida sp., Trichomonas sp.*	If pruritic, purulent or malodorous: Metronidazole 400mg PO Q12H x7d If curd-like discharge: fluconazole 150mg PO single dose	If pruritic or purulent: Clindamycin orally 300 mg Q12H X 7 days If curd-like discharge: Miconazole 2% topical QHS	See 3rd and 4th column	Should do a physical examination and where possible, POC microscopy of discharge to confirm diagnosis but microscopy is usually NA at POC in Mauritius. Fluconazole is relatively contraindicated in pregnancy. For recurrent vaginal candidiasis in non-pregnant women, use fluconazole 150mg PO on days 1, 4, 7, then weekly for 6m.

Pelvic inflammatory disease, tubo-ovarian abscess and non-obstetric endometritis	*N. gonorrhoeae, C. trachomatis, E. coli, Klebsiella sp., Bacteroides sp., S. aureus*	Ceftriaxone 1g IVq24h + doxycycline 100mg PO Q12H + metronidazole 400mg PO BD	Clindamycin 600mg PO Q6h + gentamicin IV†	14d	For mild to moderate disease where outpatient therapy is preferred, IV ceftriaxone can be replaced by ceftriaxone 500mg IM for one dose. Doxycycline 100mg PO Q12H + metronidazole 500mg PO Q12H can be used in outpatient. Tubo-ovarian abscesses > 7cm in size require surgical drainage. Sepsis can indicate a ruptured abscess which requires prompt surgical intervention.
Bartholin abscess	*E. coli, S. aureus, Streptococcus sp.*	Antibiotics are not indicated	--	--	I&D if < 3cm and marsupialization if ≥ 3cm. If septic, recurrent or associated with cellulitis, treat with amoxicillin / clavulanate 875 / 125mg PO Q12H + doxycycline 100mg PO Q12H for 5d.
Chorioamnionitis and septic abortion	*E. coli, Klebsiella sp., Bacteroides sp., Streptococcus sp.*	Piperacillin-tazobactam 4.5g IV Q8h	Clindamycin 600 mg IV 8 hourly + gentamicin IV†+ metronidazole 500 mg IV 8 hourly	Till 24 hours after delivery	Prompt delivery is recommended if safe for fetus. Ensure trough levels of gentamicin are measured since high doses can lead to congenital deafness in the fetus.
Postpartum endometritis	*E. coli, Klebsiella sp., Bacteroides sp., Streptococcus sp., Mycoplasma hominis*	Amoxicillin / clavulanate 1.2g IV Q8H	Clindamycin 600mg PO Q6h + gentamicin IV†	14d	If fever persists after 48h of treatment, consider the possibility of clindamycin-resistant group B Streptococcus or ampicillin resistant enterococcus and add vancomycin. Suction curettage to remove necrotic material may be necessary. Piperacillin-tazobactam 4.5g IV Q8H can be an alternative.
Puerperal sepsis	Group A streptococcus, *Clostridium sp.*	Piperacillin-tazobactam 4.5g IV Q6h + clindamycin* 900mg IV Q8h	Vancomycin† IV + clindamycin* 900mg IV Q8h + metronidazole 500mg IV Q8h	14d	Usually presents as toxic shock syndrome. Source can be from endometrium or another site. Debride necrotic tissue if present.
SKIN					
Impetigo	Group A streptococcus, *S. aureus*	Fusidic acid 2% topical BD	Mupirocin* 2% topical Q8H	7d	If associated with ecthyma, use IV penicillin. If MSSA is cultured or multiple lesions are present, flucloxacillin 500mg PO Q6h can be given (or clarithromycin 500mg PO Q12H can be used if allergic to penicillin).
Folliculitis	*S. aureus, Pseudomonas sp., Candida sp.*	Antibiotics are not indicated	--	--	If not improving after 7d, consider fusidic acid 2% topical Q8H for 5d, ciprofloxacin 500mg PO Q12H for 5d or fluconazole 100mg POq24h for 7d depending on the etiology.
Infected animal bite	*Pasteurella sp., Capnocytophaga sp., B. henselae, Bacteroides sp., S. aureus*	Amoxicillin / clavulanate 875 / 125mg PO Q12H	Ciprofloxacin 500mg PO Q12H + metronidazole 400mg PO Q8H	7d	Debride necrotic tissue and drain all abscesses. Convert to IV therapy if septic. Give Td or Tdap if last administered ≥ 5y ago. Rabies is not endemic in Mauritius and its vaccine is not required.
Infected human bite	*Eikenella sp., Fusobacterium sp., Streptococcus sp., Prevotella sp.*	Amoxicillin / clavulanate 875 / 125mg PO Q12H	Ciprofloxacin 500mg PO Q12H + metronidazole 400mg PO Q8H	7d	Debride necrotic tissue and drain all abscesses. Convert to IV therapy if septic. Give Td or Tdap if last administered ≥ 5y ago. If exposed to blood, to test for HIV, HBV and HCV.
Limb cellulitis or erysipelas or ecthyma	*Streptococcus sp., S. aureus*	If no abscess: benzyl-penicillin 2 mega units IV Q6h If purulent: ceftriaxone 1g IV OD	Vancomycin† IV	5d	Elevate affected limb. Look for *Tinea pedis* and treat with azoles. For outpatient therapy, use phenoxymethylpenicillin, clarithromycin, flucloxacillin, trimethoprim / sulfamethoxazole or doxycycline. Erysipelas and ecthyma are usually from *S. pyogenes.* Use the modified Dundee classification to decide which patients can be treated with oral medication.
Skin abscess	*S. aureus*	If ≥ 5cm size or septic patient: trimethoprim /	If ≥ 5cm size or septic patient:	5d	No antibiotics are needed if abscess is < 5cm in size. I&D is necessary. Tailor therapy if MRSA in culture.

		sulfamethoxazole 160 / 800mg PO BD	clindamycin 600mg PO Q8h		
Infected diabetic foot ulcer	*S. aureus, Klebsiella sp., Bacteroides sp.*	Amoxicillin / clavulanate 875 / 125mg PO Q12H	Trimethoprim / sulfamethoxazole 160 / 800mg 2 tabs PO Q12H + clindamycin 450mg PO Q8h	14d	Ensure osteomyelitis is ruled out. Superficial wound cultures are often contaminated – *Pseudomonas sp.* does not always require coverage. Assess for neuropathy and ischemia of the legs.
Chronic wounds including decubitus ulcers	*S. aureus*, coagulase negative staphylococcus, *Pseudomonas sp.*, *Acinetobacter sp.*, enterococcus	Antibiotics are not indicated	--	--	Most patients do not require antibiotics unless purulent discharge is noted with surrounding cellulitis, sepsis or fever. Take a deep culture of wounds for a targeted therapy – they are usually colonized with MDRO in Mauritius. Debridement, negative pressure therapy, hyperbaric oxygen therapy and skin grafts are the preferred treatments. Antimicrobial dressings can be considered in some settings. Do not send cultures if the wound appears uninfected.
Burn wound sepsis	*S. aureus, Pseudomonas sp., Acinetobacter sp.*	Piperacillin-tazobactam 4.5g IV Q6h + vancomycin† IV	Vancomycin† IV + gentamicin† IV + ciprofloxacin 400mg Q12H IV	14d	Debridement, cleansing and dressing changes are the mainstay of treatment. Many of the isolated organisms are multi-drug resistant in Mauritius – tailor antibiotics based on culture results. Treatment duration can be prolonged depending on clinical status, but failure of sepsis resolution usually implies that surgical intervention is needed. Give Td or Tdap if last administered ≥ 5y ago.
Necrotizing fasciitis including Meleney's synergistic gangrene, gas gangrene and Fournier's gangrene	Group A Streptococcus, *Clostridium perfringens, Clostridium septicum, Bacteroides sp., S. aureus*	Unknown or polymicrobial: piperacillin-tazobactam 4.5g IV Q6h + vancomycin† IV + clindamycin* 900mg IV Q8h Group A Streptococcus or *Clostridium sp.*: 4 mega units benzyl-penicillin Q4h IV + clindamycin* 900mg IV Q8h	Unknown or polymicrobial: ciprofloxacin 400mg IV Q12H + vancomycin† IV + metronidazole 500mg IV Q8h + clindamycin* 900mg IV Q8h Group A Streptococcus or *Clostridium sp.:* vancomycin† IV + clindamycin* 900mg IV Q8h	14d	Emergency surgical debridement to be carried out. Amputation may be needed. Antibiotic therapy is usually insufficient for cure. Beta-lactams are generally superior to non-beta-lactams. Intravenous immunoglobulins can be administered for group A Streptococcus infection at 1g/kg on day 1 and 0.5g/kg on days 2 and 3. Do not use clindamycin alone.
Surgical site infections	*S. aureus, Streptococcus sp., Klebsiella sp.*	Trimethoprim / sulfamethoxazole 160 / 800mg PO BD	Vancomycin† IV + ciprofloxacin 500mg PO BD	5d	Opening and draining the wound is the mainstay of treatment – antibiotics are not needed in most cases.
HEART					
Native valve infective endocarditis from MSSA‡	*S. aureus*	Flucloxacillin 2g IV Q4h	Vancomycin† IV + rifampin* 600mg PO Q12h	6w	Flucloxacillin is superior in efficacy to vancomycin.
Prosthetic valve infective endocarditis from MSSA‡	*S. aureus*	Flucloxacillin 2g IV Q4h + rifampin 300mg PO Q8H + gentamicin† IV	Vancomycin† IV + rifampin 300mg PO Q8H + gentamicin† IV	6w	Gentamicin is given only for 2w. Flucloxacillin is superior in efficacy to vancomycin.
Native valve infective	*S. aureus*	Vancomycin† IV	---	6w	Although 4w of treatment may be possible if there are no metastatic foci and the patient responds rapidly, 6w is generally preferred.

endocarditis from MRSA‡					
Prosthetic valve infective endocarditis from MRSA‡	*S. aureus*	Vancomycin† IV + rifampin 300mg PO Q8H + gentamicin† IV	---	6w	Gentamicin is given only for 2w. If resistant to gentamicin, use ciprofloxacin or amikacin instead depending on susceptibility. Surgical intervention may be necessary.
Native or prosthetic valve infective endocarditis from enterococci susceptible to penicillin‡	*Enterococcus sp.*	Gentamicin susceptible: Amoxicillin 2g IV Q4h + gentamicin† IV for 4w to 6w Gentamicin resistant: Amoxicillin 2g IV Q4h + ceftriaxone 2g IV Q12h for 6w	Gentamicin susceptible: Vancomycin† IV + gentamicin† IV for 6w Gentamicin resistant: Vancomycin† IV for 8w to 12w	See 3rd and 4th columns	If nephrotoxicity occurs with gentamicin, consider using it only for 2w. Use of beta-lactam is superior to vancomycin. Using vancomycin alone has a 50% relapse rate and surgical removal of valve may be necessary.
BONE AND JOINT					
Limb osteomyelitis (without hardware present)	*S. aureus, Enterococcus sp., Streptococcus sp., Klebsiella sp., E. coli*	Ceftriaxone 2g IVq24h + vancomycin† IV	Ciprofloxacin 750mg PO Q12H + vancomycin† IV	6w if infected bone is not removed	If infected bone is resected, continue antibiotics till 2d after surgery provided no cellulitis is present. If soft tissue is involved, continue antibiotics till 10d after surgery. Resection of bone is mainstay of treatment, especially in diabetic patients with poor vasculature. Superficial cultures are not useful – take bone biopsies or bone aspirate and tailor therapy based on results.
Vertebral osteomyelitis and infective discitis (pyogenic spondylitis)	*S. aureus, Streptococcus sp., E. coli,* enterococci	Ceftriaxone 2g IVq24h + vancomycin† IV	Ciprofloxacin 750mg PO Q12H + vancomycin† IV	6w	Biopsy is needed to establish microbiologic diagnosis. To rule out tuberculosis if patient has risk factors. Brucellosis is rare in Mauritius. Up to 12w of treatment may be needed in the presence of undrained abscesses and extensive bone damage. Switch to oral therapy depends on clinical response and bioavailability of antibiotic used. Rifampicin may be added if *S. aureus* is a proven cause.
Septic arthritis of native joint	*S. aureus, Streptococcus sp.;* depending on risk factors: *E. coli, Pseudomonas sp., Kingella sp.*	Ceftriaxone 2g IVq24h + vancomycin† IV	Ciprofloxacin 750mg PO Q12H + vancomycin† IV	4w	Send synovial fluid for culture. Joint drainage and irrigation are usually needed. Gram negatives including *Pseudomonas sp., Eikenella sp.* and gonococcus are more common if the hand joints are affected. If high risk for *Pseudomonas sp.*, add gentamicin IV.
SYSTEMIC SYNDROMES					
Leptospirosis	*Leptospira sp.*	Ceftriaxone 1g IV Q24h	Doxycycline 100mg PO Q12H or clarithromycin 500mg PO BD	7d	Oral therapy is preferred for mild disease while IV is given for moderate to severe illness. Jarisch-Herxheimer reaction may occur.
Neutropenic sepsis	*S. aureus, Enterococcus sp., Streptococcus sp., E. coli, Klebsiella sp., Pseudomonas sp.*	Low risk: Amoxicillin / clavulanate 875 / 125mg PO Q12H + ciprofloxacin 750mg PO BD High risk: Piperacillin-tazobactam 4.5g IV Q6h	Low risk: Clindamycin 300mg PO Q6h + ciprofloxacin 750mg PO BD High risk: Clindamycin 600mg PO Q8h + ciprofloxacin 750mg PO Q12H + vancomycin† IV	14d	Here, neutropenia is defined as a neutrophil count of $<0.5 \times 10^9$/L. Can stop antibiotics if the patient is afebrile for at least two days and the ANC is ≥500 cells/microL. Anti-fungal therapy may be needed. Consider line infections. High risk includes those with hypotension or hematological malignancy with previous fungal infection – see MASCC score. Add vancomycin if there are risk factors for MRSA. Use gentamicin instead of ciprofloxacin if patient was on fluoroquinolones recently. In case of septic shock, start with meropenem 1g IV 8h and de-escalate according to culture results.

Non-neutropenic sepsis in adults of unclear cause (including septic shock)	*S. aureus, Enterococcus sp., Streptococcus sp., E. coli, Klebsiella sp., Pseudomonas sp.*	If *Pseudomonas sp.* is likely: piperacillin-tazobactam 4.5g IV Q6h If MRSA is likely: ceftriaxone 2g IV Q24h + vancomycin† IV If none of above: ceftriaxone 2g IV Q24h	If *Pseudomonas sp.* is likely: ciprofloxacin 750mg IV Q12h + gentamicin† IV Otherwise: ciprofloxacin 500mg IV Q12h + vancomycin† IV	7d	Taking at least 2 blood cultures is mandatory. Source control and identification of the cause of sepsis is important. Do not necessarily start antibiotics if the patient is stable and has a fever of unknown origin. In case of septic shock, given the high rate of resistance, start with meropenem 1g IV 8h and de-escalate according to culture results.
CLABSI	*S. aureus, Klebsiella sp., Acinetobacter sp.*, coagulase negative staphylococcus	Ceftriaxone 2g IVq24h + vancomycin† IV	Ciprofloxacin 500mg IV Q12H + vancomycin† IV	14d	Catheter removal is preferred. Catheter must be removed if the patient is septic, hypotensive, has persistent bacteremia, has infective endocarditis or if the causative organism is *S. aureus*, *P. aeruginosa*, *Candida sp.* or an MDRO. Treatment duration varies depending on clinical condition and complications. For salvage therapy, use antibiotic lock therapy – instill 2ml solution every 24h (or up to 72h) of either vancomycin 5mg/ml or gentamicin 5mg/ml with heparin depending on the susceptibility of the organism, till systemic treatment is over.

*Table 2: PCN – penicillin; GDH – glutamate dehydrogenase ; CHL – Central Health Laboratory; NAAT – nucleic acid amplification test; WBC – white blood cells; CAUTI – catheter-associated urinary tract infection; HSV – herpes simplex virus; MRI – magnetic resonance imaging; RSV – respiratory syncytial virus; STI – sexually transmissible infection; POC – point-of-care; NA – not available; I&D – incision and drainage; MSSA - methicillin-susceptible Staphylococcus aureus; MRSA - methicillin-resistant Staphylococcus aureus; Td – tetanus / diphtheria vaccine; Tdap – tetanus / diphtheria / acellular pertussis vaccine; HIV - human immunodeficiency virus; HBV – hepatitis B virus; HCV – hepatitis C virus; MDRO – multi-drug resistant organisms; ANC – absolute neutrophilic count; CLABSI - central line-associated bloodstream infections. Centor criteria – to treat empirically as streptococcus throat if at least 4 out of the following 5 are present: fever > 38°C, tonsillar exudates, lymphadenopathy, no cough and age < 15 years old. MASCC risk index – high risk if score < 21 which occurs typically if at least 3 out of the following 7 are present: severe symptoms, systolic blood pressure < 90mmHg, active chronic obstructive pulmonary disease, hematological malignancy with prior fungal infection, dehydrated, admitted and ≥ 60 years old. Modified Dundee classification – use oral antibiotic to treat cellulitis if there are no signs of systemic illness and no risk factors for failure of treatment (e.g., no venous insufficiency & ≤ 9% of body surface area is affected). ‡ - for infective endocarditis, take 3 blood cultures before starting antibiotics; ensure antibiotics are correctly dispensed by nurses; empiric treatment for infective endocarditis or treatment of culture-negative infective endocarditis depends on which organisms are most likely to be causing the symptoms – a careful assessment of the patient's risk factors is necessary; early surgery (within 7d) is indicated if the patient has heart failure, valvular fistula, valvular abscess, heart block, fungal endocarditis and endocarditis from multi-drug resistant organisms; consider surgery in cases of bacteremia for > 5 days despite appropriate treatment, embolism and / or vegetation > 10mm in size . * - these antibiotics are currently not available but may be used available in the future. † - please check chapter 4 for dosage instructions. The dose of metronidazole available in the country varies from 400mg to 500mg per tablet – either can be used.*

- Cefazolin, instead of flucloxacillin, may be used to treat MSSA infections. Cefazolin is considered superior to ceftriaxone in such instances.
- In cases of severe sepsis or septic shock due to suspected ESBL organisms, meropenem IV can be started empirically without the need to wait for cultures.

Chapter 6: Initial Choice of Antibiotic Therapy for Sepsis From Multi-Drug Resistant Organisms

Patients whose cultures grow multi-drug resistant organisms do not require treatment if (a) there are no accompanying signs and symptoms of infection, (b) they are on palliative care, or (c) treating the underlying infection will not result in any significant improvement in quality of life (e.g., intubated patients with a large haemorrhagic cerebrovascular accident who are unlikely to survive). Excess use of antibiotics will make the organisms even more resistant.

In general, patients with a mild illness can be treated with a single antibiotic to which the organism is susceptible. Patients with moderate to severe disease may be treated with two antibiotics to which the organism is susceptible. If there are no such antibiotics, use high-dose beta-lactams or carbapenems infused over several hours (even if resistance exists) in combination with a polymyxin, as per clinical judgement.

Although controversial, patients with concomitant pneumonia can be treated with nebulized colistin (1-4.5 million units BD) or nebulized amikacin (500mg BD), depending on which antibiotic the organism is susceptible to, together with IV therapy, but beware of bronchoconstriction.

Patients infected with multi-drug resistant organisms must be isolated and substantial care must be taken not to spread the infection to other patients. Abuse of last line antibiotics will guarantee that no effective antibiotics will be left for the treatment of such patients. In case of doubt, request for help from a microbiologist or an infectious disease specialist.

Moderate to severe infections with organisms that harbor extended-spectrum beta-lactamases should be treated with carbapenems although for mild infections, piperacillin-tazobactam may be used if the organism is susceptible to it. Sulfa drugs, fluoroquinolones and aminoglycosides are alternatives depending on the susceptibility results – these classes of antibiotics should always be preferred over last line of antibiotics if the organism is not resistant to them.

The doses in the following table assume a normal renal function. Regimens apply to adult males and non-pregnant adult women. Consult the references for details.[8, 16]

Indications	Common etiologies	Primary treatment	Alternative	Duration	Comments
Sepsis from CRAB	*Acinetobacter sp.*	Colistin† IV + ampicillin-sulbactam* 9g IV Q8h over 4h infusion	Ampicillin-sulbactam* 9g IV Q8h over 4h infusion + tigecycline* 100mg IV Q12h (200mg IV x1 loading dose)	7d	Loading dose of 200mg tigecycline to be given. Most CRAB are resistant to sulbactam in Mauritius per CHL, but high dose may still be effective. Avoid using tigecycline if the patient has a bacteremia or a urinary tract infection.
Sepsis from CRKP, CRECOLI and CRSM	*Klebsiella sp., E. coli, Serratia sp.*	Ceftazidime-avibactam* 2.5g IV Q8h infused over 3h ± aztreonam* 2g IV Q8h infused over 3h	Tigecycline* 100mg IV Q12h (200mg IV x1 loading dose)	7d	Most isolates harbor NDM or OXA-48 carbapenemases as per CHL's tests. About 50% of isolates are resistant to ceftazidime-avibactam in Mauritius but susceptibility can return when aztreonam is added. If susceptible to ciprofloxacin or to trimethoprim / sulfamethoxazole, use these. Do not use aztreonam monotherapy. Avoid using tigecycline if the patient has a bacteremia or a urinary tract infection. Ceftazidime-avibactam can be used alone if the organism is susceptible to it.
Sepsis from DTR CRPA	*Pseudomonas sp.*	Ceftazidime-avibactam* 2.5g IV Q8h infused over 3h	Colistin† IV + meropenem 2g IV Q8h infused over 3h	7d	Resistance is usually through pumps or reduced porins – beta-lactamase inhibitors may not work unless resistance is through AmpC. Monotherapy with beta-lactam is acceptable. If susceptible to ceftazidime or piperacillin-tazobactam, these can be used. Prolong treatment to 10 days if complicated infection.
Sepsis from VRE	*Enterococcus sp.*	Linezolid 600mg IV Q12h	Teicoplanin 12mg/kg IV Q24h	7d	Loading dose for teicoplanin is necessary: 12mg/kg IV Q12h for 3-5 doses. Teicoplanin is active against vanC and some vanB but not vanA. Rule out infective endocarditis and a urinary source. Additional antibiotics may be needed if endocarditis is diagnosed.
Sepsis from MRSA	*S. aureus*	Vancomycin† IV	Linezolid 600mg IV Q12h	14d	Rule out infective endocarditis and line infections. Look for metastatic infections. Find the source. Prolong treatment to at least 4w if unclear source or complicated infection. Additional antibiotics may be needed if endocarditis is diagnosed.

*Table 3: CRAB – carbapenem-resistant Acinetobacter baumannii. CRKP – carbapenem-resistant Klebsiella pneumoniae. CRECOLI – carbapenem-resistant Escherichia coli. CRSM – carbapenem-resistant Serratia marcescens. DTR CRPA – difficult-to-treat carbapenem-resistant Pseudomonas aeruginosa. VRE - vancomycin-resistant enterococci. MRSA – methicillin-resistant Staphylococcus aureus. NDM - New Delhi metallo-beta-lactamase. OXA – oxacillinase. CHL – Central Health Laboratory. * - these antibiotics are currently not available but the Ministry can help with procurement. † - please check chapter 4 for dosage instructions.*

Chapter 7: Clinical Approach to the Initial Choice of Antibiotic Therapy for Selected Conditions in Children

See chapter 12 for the doses to be used in children. Please consult references 3, 5 and 7 for details.

Indications	Common etiologies	Primary treatment	Alternative	Typical duration	Comments
Community-acquired pneumonia	RSV, influenza, human metapneumovirus, coronavirus, *S. pneumoniae, H. influenzae, M. catarrhalis, C. trachomatis, M. pneumoniae*	Amoxicillin PO / IV	Clarithromycin PO	7d	To look for viral infections. *C. trachomatis* and viruses are more common in infants. Use clarithromycin to treat suspected pertussis (which is rare in Mauritius).
Sinusitis	Rhinovirus, influenza, parainfluenza, *Haemophilus influenzae, Streptococcus pneumoniae*, and *Moraxella catarrhalis*	Amoxicillin PO	Levofloxacin PO	7-10d	Antibiotics are not indicated in most cases of sinusitis. Only use antibiotics if symptoms stay for more than 10 days, temperature > 39 deg C with purulent nasal discharge for > 3 days or symptoms that worsen after initially getting better (especially fever or sudden onset headache). Amoxicillin / clavulanate may be used if symptoms do not improve with amoxicillin. Some authorities suggest avoiding the use of fluoroquinolones in children – cefixime + clindamycin may be used then in case of penicillin allergy.
Acute bronchitis	Adenovirus, influenza, parainfluenza, RSV, rhinovirus	Antibiotics are not indicated	--	--	Supportive therapy alone is necessary. To consider antibiotics if the child has cystic fibrosis or is immunosuppressed.
Acute otitis media	*S. pneumoniae, H. influenzae, M. catarrhalis*	Amoxicillin PO	Clarithromycin PO	7d	Can prolong treatment to 10d if recurrent otitis or perforated tympanic membrane. Can use amoxicillin/clavulanate if child was on amoxicillin in the last 30d.
Tonsillitis and pharyngitis	EBV, influenza, adenovirus, coronavirus, parainfluenza, group A Streptococcus	Antibiotics are not indicated	--	--	Supportive care alone is preferred. Use amoxicillin PO or phenoxymethylpenicillin PO if a throat swab is positive for group A Streptococcus or if indicated by Centor criteria. If penicillin-allergic, use clarithromycin PO.
Cystitis	*E. coli, Klebsiella sp., Proteus sp., Enterobacter sp., Enterococcus sp.*	Amoxicillin / clavulanate IV or PO	Cefotaxime IV	3-5d	If initially febrile or immunosuppressed, prolong treatment to 10d; may also prolong treatment duration if < 3 months of age.
Pyelonephritis	*E. coli, Klebsiella sp., Proteus sp., Enterobacter sp., Enterococcus sp.*	Amoxicillin / clavulanate IV or PO	Cefotaxime IV	10d	Children < 2y of age may present with poor appetite or vomiting only
Gastroenteritis	Rotavirus, *E. coli, C. jejuni*	Antibiotics are not indicated	--	--	IV fluids are indicated. Antibiotics are not needed even if stool cultures are positive. Cholera is not endemic in Mauritius. If dysentery or severe symptoms, treat with clarithromycin PO or ceftriaxone IV. Be careful of hemolytic-uremic syndrome if antibiotics are used.

Table 4: RSV - respiratory syncytial virus. EBV – Ebstein Barr virus. Centor criteria – to treat empirically as streptococcus throat if at least 4 out of the following 5 are present: fever > 38°C, tonsillar exudates, lymphadenopathy, no cough and age < 15 years old.

Chapter 8: Use of Antibiotics for Prophylaxis

The doses in the following table assume a normal renal function. Regimens apply to non-pregnant women and to adults. Consult the references for details. Antibiotics should be administered within 30-60 minutes before skin incision; if slow IV infusion of vancomycin needs to be given, then it can start 2 hours before incision. If a patient is already on an antibiotic during his / her admission prior to surgery, if that antibiotic will cover skin commensals well, then its dose should be timed 30-60 minutes before skin incision; otherwise, another antibiotic as per the table below needs to be administered in this time lapse. In most cases of surgical prophylaxis (except where implants are inserted), a single dose of antibiotic pre-op is sufficient.[3, 9-12, 18]

INDICATIONS	POTENTIAL PATHOGENS	PRIMARY PROPHYLAXIS	IF PCN ALLERGY	TYPICAL DURATION	COMMENTS
Cardiac surgery, thoracic surgery, hernia repair, neurosurgery, orthopedic surgery & vascular surgery	*S. epidermidis, S. aureus*	Cefazolin 2g x1 (if > 120 kg, give 3g x1), to be repeated every 4h during surgery	Vancomycin† IV x1	< 24h	Prefer vancomycin if colonized with MRSA. In the vast majority of cases, do not continue prophylaxis until all drains and in-dwelling catheters are removed. When CSF shunts are inserted, prophylaxis may be continued for 48h. When EVD are present, the neurosurgeon may decide to continue prophylaxis till removal of the device.
Upper gastrointestinal surgeries (esophageal, duodenal, pancreatic, biliary, etc.), gynecological and obstetric surgeries	*E. coli, Klebsiella sp., S. epidermidis, S. aureus, Streptococcus sp.*	Ceftriaxone 2g IV x1 (3g if > 100kg)	Vancomycin† IV x1 + ciprofloxacin 400mg IV x1	< 24h	Antimicrobial prophylaxis is not necessary in low-risk patients e.g., those undergoing elective laparoscopic cholecystectomies. Clindamycin 900mg IV + gentamicin 1.5mg/kg IV (single doses) is an alternative for patients who are allergic to penicillin.
Middle and lower gastrointestinal surgeries (appendectomy, colorectal, small intestine, etc.)	*Escherichia coli, Klebsiella sp., Bacteroides sp., Enterococcus sp.*	Ceftriaxone 2g IV x1 (3g if > 100kg) + metronidazole 500mg IV x1	Metronidazole 500mg IV x1 + ciprofloxacin 400mg IV x1	< 24h	For colorectal surgery: add neomycin* 1g PO + metronidazole 1g PO + erythromycin 1g PO for 3 doses during the afternoon and evening of the day before surgery (1pm, 2pm, 11pm) after mechanical bowel prep (MBP). Use 4L of polyethylene glycol as MBP.
Head and neck surgeries (including sinus surgeries)	*Streptococcus sp., S. aureus, Bacteroides sp., E. coli*	Clean: Cefazolin 2g x1 (if > 120 kg, give 3g x1), to be repeated every 4h during surgery Clean-contaminated or contaminated: Add metronidazole 500mg IV x1 to cefazolin	Clindamycin* 900mg IV x1	< 24h	Prophylaxis is not useful for tonsillectomies but may be given if a tonsillar abscess is present. Prophylaxis does not need to be given before functional endoscopic sinus surgery (FESS). Sinus surgeries are usually clean-contaminated.
Genitourinary surgeries	*E. coli, Klebsiella sp., Enterococcus sp., S. aureus*	Cefazolin 2g x1 (if > 120 kg, give 3g x1), to be repeated every 4h during surgery	Clindamycin* 900mg IV x1 + gentamicin 1.5mg/kg IV x1	< 24h	If urine culture is available pre-op, base the prophylaxis used on the organism identified. No antimicrobial prophylaxis is recommended for clean urologic procedures in patients without risk factors for postoperative infections.
Implants	*S. epidermidis, S. aureus, Corynebacteria, Cutibacterium sp., Enterobacteriaceae*	Cefazolin 2g IV Q8h (if > 120 kg, give 3g x1) + gentamicin 1.5mg/kg IV per dose Q8h	Vancomycin† IV Q12h + ciprofloxacin 400mg IV Q12h	24-48h	Data is limited on the use and duration of prophylaxis for implant surgeries. Gram negative coverage should be added due to the large number of gram-negative infections in Mauritius. Clindamycin with gentamicin or ciprofloxacin may also be used.
Dental procedures	*Streptococcus sp.*	Antibiotics are not indicated	--	--	Use amoxicillin 2g PO x1 or clarithromycin 500mg PO x1 30min before procedure if the patient has a history of infective endocarditis or a

					prosthetic material in the heart (including repair of a congenital defect) and is undergoing a procedure breaching the mucosa, abscess drainage, tooth extraction or routine dental cleaning.
3rd or 4th degree perineal tear during childbirth	*S. aureus, E. coli, Klebsiella sp.*	Ceftriaxone 2g IV x1 (3g if > 100kg)	Clindamycin* 900mg IV x1	Single dose, given prior to repair	Do not give antibiotics for 1st or 2nd degree tear.
Cervical cerclage	Group B Streptococcus	Amoxicillin 2g IV x1	Clindamycin* 900mg IV x1	Single dose	Utility of antibiotic prophylaxis is currently unclear.
Intra-partum group B Streptococcus prophylaxis	Group B Streptococcus	Amoxicillin 2g IV 4-12h before delivery every 4h	Vancomycin IV 2g loading dose 4-12h before delivery, then 1g IV Q12h	Till time of delivery	To send GBS screen near end of pregnancy. To give prophylaxis if GBS screen is positive or if patient had an infant with GBS infection before or GBS bacteriuria during this pregnancy or unknown antepartum culture status with a risk factor for invasive GBS disease. Antibiotics should not be started at time of positivity of culture but should be given before delivery. Scheduled C-section without labor or rupture of membranes do not require GBS prophylaxis even if GBS culture is positive. Not recommended routinely for normal vaginal delivery.
PPROM prophylaxis	Group B Streptococcus, *E. coli*	Clarithromycin 500mg PO Q12H + amoxicillin 500mg PO Q8H	Clarithromycin 500mg PO Q12H + clindamycin 300mg PO Q8h	7d	To give antibiotics if < 34 weeks gestation. For the first 48h, IV formulation can be given. Avoid amoxicillin / clavulanate since it is associated with a higher risk of necrotizing enterocolitis. If GBS culture is positive, select antibiotics based on susceptibility results given possible inducible resistance to clindamycin. If high risk for infection with *E. coli*, use ceftriaxone 2g IV Q24h instead of amoxicillin.
Post-splenectomy prophylaxis	*S. pneumoniae, H. influenzae*	Phenoxymethylpenicillin 250mg PO BD	Clarithromycin 500mg PO BD	Until age 5 and for at least one year following splenectomy	Ensure necessary vaccinations are administered. If there is a history of infection with an encapsulated organism, give prophylaxis for life. If patient has other reasons for being immunosuppressed, give prophylaxis till end of immunosuppression.
Rheumatic heart disease (secondary prophylaxis)	Group A Streptococcus	Benzathine penicillin IM 1.2 MU Q28 days or phenoxymethylpenicillin 250mg PO BD	Clarithromycin 500mg PO BD	Residual heart disease: for 10y or until 40y age Carditis without residual heart disease: for 10y or until 21y age No carditis: for 5y or until 21y age	Duration is based on severity of disease; pick whichever course is longer.
Post-chemotherapy neutropenic prophylaxis	*E. coli, Klebsiella sp., Pseudomonas sp.*	Ciprofloxacin 500mg PO BD	NA	Till ANC $\geq 0.5 \times 10^9$/L	Here, neutropenia is defined as a neutrophil count of $<0.5 \times 10^9$/L. Low risk individuals do not require prophylaxis. High risk patients are those with anticipated neutropenia for > 7d or those receiving induction chemotherapy for acute leukemia or those with ANC $< 0.1 \times 10^9$/L. Some patients may need prophylaxis against *Pneumocystis jivorecii* pneumonia and *Candida sp*.
Uninfected burns	*S. aureus, Pseudomonas sp., Acinetobacter sp.*	Silver sulfadiazine 1% topical OD	Wash wounds or disinfect wounds with 4% chlorhexidine gluconate OD	Until healed	Avoid sulfadiazine in pregnant females, while breastfeeding, in infants < 2m old or close to the eyes. Give Td or Tdap if last administered ≥ 5y ago and if wound is dirty. An alternative is diluted Dakin solution (0.05% hypochlorite) applied once a day – avoid in 3rd degree burns.
Uninfected animal bites	*Pasteurella sp., Capnocytophaga sp., B. henselae,*	Amoxicillin / clavulanate 875 / 125mg PO Q12H	Ciprofloxacin 500mg PO Q12H	3d	**Not necessary** to give antibiotic prophylaxis unless the wound requires surgical repair, is deep, affects the hands or is close to a joint. Give Td or

	Bacteroides sp., S. aureus		+ metronidazole 400mg PO Q8H		Tdap if last administered ≥ 5y ago. Rabies is not endemic in Mauritius and its vaccine does not need to be administered.
Uninfected human bites	*Eikenella sp., Fusobacterium sp., Streptococcus sp., Prevotella sp.*	Amoxicillin / clavulanate 875 / 125mg PO Q12H	Ciprofloxacin 500mg PO Q12H + metronidazole 400mg PO Q8H	3d	**Not necessary** to give antibiotic prophylaxis unless the wound requires surgical repair, is deep, affects the hands or is close to a joint. Give Td or Tdap if last administered ≥ 5y ago.
Uninfected skin lacerations	*S. aureus, Pseudomonas aeruginosa, Proteus mirabilis, E. coli*	Antibiotics are not indicated	--	--	Oral injuries: amoxicillin 500mg PO Q8H for 5d can be given. If exposed to dirty water or heavily contaminated wound (± foreign material), use ceftriaxone 2g IV Q24h + ciprofloxacin 500mg PO Q12H for 3d. Amoxicillin / clavulanate 875 / 125mg PO Q12H can be used for 3d in diabetic patients or if the laceration length is > 5cm.
Pre-operative decolonization for *S. aureus*	*S. aureus*	Mupirocin 2% intra-nasal q12-q8h + 2% chlorhexidine gluconate body wash OD	NA	5d	To be started 5d before surgery. To be used on patients who have been screened and are known to be positive for *S. aureus* prior to elective cardio-thoracic surgery, orthopedic surgery or any surgery involving prosthetic materials.
Prophylaxis for spontaneous bacterial peritonitis	*Klebsiella sp., E. coli*	Trimethoprim / sulfamethoxazole 160 / 800 mg PO OD	Ciprofloxacin 500mg PO OD	For 1 year or till no longer meet criteria for prophylaxis	To be used in patients with: • Cirrhosis and gastrointestinal bleed; OR • History of spontaneous bacterial peritonitis; OR • Cirrhosis and ascitic fluid protein < 1.5 g/dL and one of: o Creatinine ≥ 106 micromol/L o Blood urea nitrogen level ≥ 25 mg/dL o Serum sodium ≤ 130 mEq/L o Child-Pugh score ≥ 9 and a bilirubin ≥ 51 micromol/L.

*Table 5: PCN – penicillin. MRSA – methicillin-resistant Staphylococcus aureus. CSF – cerebrospinal fluid. EVD – extra-ventricular drain. GBS – group B Streptococcus. PPROM – preterm prelabor rupture of membranes. ANC - absolute neutrophil count. Td – tetanus / diphtheria. Tdap – tetanus / diphtheria / acellular pertussis. Ceftriaxone is typically used in Mauritius when cefazolin is not available, but ceftriaxone's coverage of gram positives is inferior. † - dose is weight-based; typically, for vancomycin, give 15-20mg/kg IV per dose i.e., 1g IV if 50-80kg and 1.5g IV if > 80kg. * - dose of clindamycin may be reduced to 600mg if weight < 70kg; repeat dose every 6h during surgery.*

Contrary to international recommendations, third generation cephalosporins are being overused for surgical prophylaxis due to limited access to first generation cephalosporins like cefazolin in the public healthcare system.

Whenever cefazolin is not available in public hospitals, ceftriaxone may be used for surgical prophylaxis even though it is generally considered inferior in its coverage of skin commensals. If ceftriaxone is also unavailable in public hospitals, cefotaxime may be substituted at a dose of 1g IV (50-100mg/kg IV for children) with a repeat dose every 4 hours during surgery if necessary. While a few studies propose the use of cefotaxime as prophylaxis for gynecological, urogenital and gastro-intestinal surgeries, data regarding its use for other surgeries is limited.

Prophylaxis is not indicated for dirty or contaminated surgeries – a full antibiotic course for treatment purposes is required. Prophylactic antibiotics are recommended for clean-contaminated procedures and for clean procedures where there is an implantation of a foreign body. Most patients who undergo endoscopy do not require prophylaxis unless they have specific co-morbidities – seek advice from the gastroenterologist.

For details, please consult references 7 and 29-31.

- The principles of antibiotic stewardship in neonates are similar to those for adults – see chapter 2 for details. In all situations, antibiotics should be tailored as per culture results.
    - Ensure all relevant cultures have been taken prior to starting antibiotics.
    - Remove catheters / central lines inserted for > 48 hours in septic babies or when fevers persist and send the tip for culture.
    - All antibiotic therapy should be reassessed 48h to 72h after cultures have been taken.
    - Meropenem can only be prescribed after consultation with the consultant-in-charge – maximum duration is for 48-72 hours initially. If cultures are positive for an organism that is susceptible mainly to meropenem, then the consultant-in-charge can give a course of 7 days maximum. If a more prolonged course is required, discussion is needed with a microbiologist, infectious disease specialist or neonatologist.
- Antibiotics can have serious short- and long-term consequences, including development of antimicrobial resistant organisms, untoward medication side effects, and increased risk for necrotizing enterocolitis, sepsis, and death; so, they should be used judiciously, and the narrowest spectrum of appropriate agent should be utilized for definitive therapy.
- Avoid azithromycin, clarithromycin, erythromycin, chloramphenicol, doxycycline, ceftriaxone, tigecycline, ciprofloxacin and levofloxacin in neonates.
- If there is an indwelling surgically placed central line, the team should consider obtaining a culture both peripherally and from the central line to improve the likelihood of identifying a true bacterial infection, as opposed to taking blood cultures only from the line.
- No prophylactic antibiotics are required just because umbilical arterial or venous catheters or other types of central lines are in-situ.
- Cerebrospinal fluid (CSF) studies should be obtained whenever possible in critically ill infants.
- If a blood culture is positive, CSF should be obtained, and repeat blood cultures should be performed every ~48 hours until sterility is achieved.
- Using an online tool (the Neonatal Early-Onset Calculator by Kaiser Permanent Research) can help to predict early-onset sepsis (i.e., at ≤ 72 hours of life) in infants born at > 34 weeks of gestation – low risk neonates do not require antibiotics.
- Amoxicillin and gentamicin are administered if red flags are present at birth even when sepsis is not yet diagnosed. However, if cultures are negative at 48-72 hours and especially if C-reactive protein and white blood cells are normal, stop all antibiotics unless there is clear, definitive evidence of a site-specific infection.
- Red flags include apnea, seizures, intubation, abnormal behavior, abnormal vital signs, metabolic acidosis, jaundice, abnormal muscle tone, feeding difficulties, encephalopathy, bleeding or abnormal glucose level.

- Antibiotic therapy for culture-negative sepsis should be stopped after 5 days and strong consideration should then be given to alternative diagnoses such as localized infections and viral / fungal / parasitic sources. Do not prolong therapy beyond 5 days if the only indicator of sepsis is an elevated CRP > 10 mg/L.
- If clinical deterioration is noted after 5 days of therapy as indicated by multiple biomarkers and worsening physical signs but cultures remain negative, switch to piperacillin-tazobactam IV + amikacin IV after repeat cultures are taken. Meropenem may be used for 48-72 hours only if the baby is in shock after which it can be continued only if cultures turn back positive.
- Empiric treatment of urosepsis, omphalitis and pneumonia is with amoxicillin IV and gentamicin IV till cultures are obtained – then tailor the antibiotics after 48-72 hours based on culture results. If the diagnosis is confirmed, continue treatment for 10 days. Otherwise, antibiotics can be withheld.
- Vancomycin + gentamycin can be used for the empiric treatment of skin, joint, bone or line infections till cultures are obtained.
- No empirical antibiotic treatment is needed for omphaloceles unless the sac is ruptured or there are signs and symptoms of sepsis.
- If repeated blood cultures are positive with the same microorganism, screen for the source by doing a lumbar puncture, abdominal ultrasound, cardiac ultrasound and a babygram. Examine the skin closely.
- See chapter 6 for the treatment of infections from multi-drug resistant organisms – doses should be adjusted based on the weight of the neonate. Tigecycline is relatively contraindicated in children – use with caution.
- Duration of treatment for necrotizing enterocolitis or spontaneous intestinal perforation can be from 3 days to 14 days depending on the stage.
- Meningitis from gram positive organisms can be treated for 14 days while if gram negative organisms are present, treatment duration is for 21 days.
- Congenital syphilis is treated with benzylpenicillin IV 50,000 units/kg every 12 hours (for neonates ≤7 days of age) or every 8 hours (for neonates >7 days of age) x10 days. An alternative is benzathine penicillin G 50,000 units/kg IM x1 but IM penicillin should not be used in proven or highly probable cases (use IV instead). Neonates born from Rapid Plasma Reagent (RPR) / Venereal Disease Research Laboratory (VDRL) positive mothers but who are unlikely to have active syphilis do not require treatment.
- For late onset neonatal sepsis, use piperacillin-tazobactam + amikacin instead of amoxicillin + gentamicin in Mauritius due to the high rate of resistant organisms in the neonatal ICUs of the country.

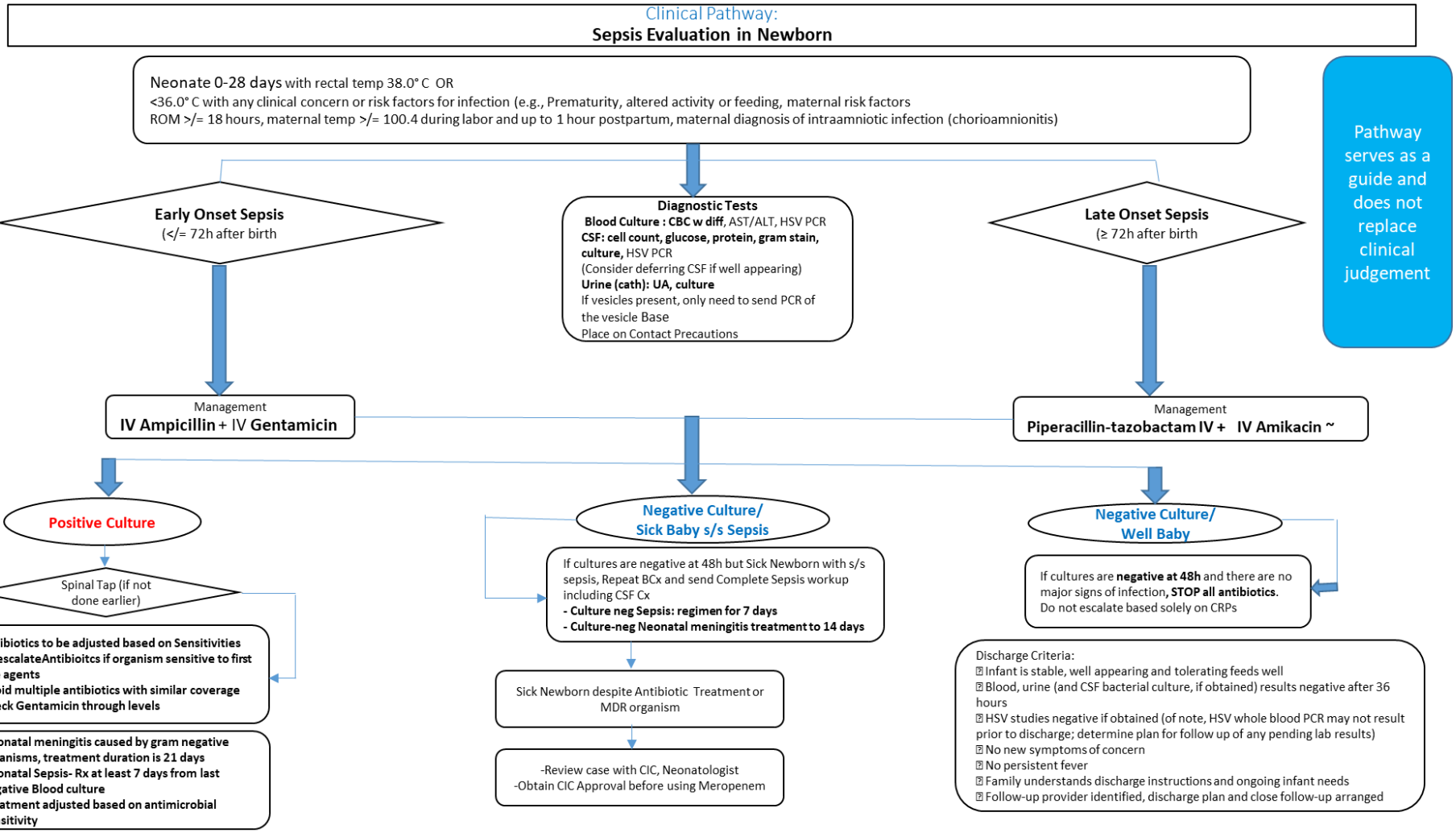

Figure 1: "Cultures are negative at 48h": this means 48h after the plating of specimen in the lab.

Gentamicin Dosing Chart			
PMA (wks)	**Postnatal (days)**	**Dose (mg/kg)**	**Interval (hours)**
≤29*	0 to 7 8 to 28 ≥29	5 4 4	48 36 24
30 to 34	0 to 7 ≥8	4.5 4	36 24
≥35	ALL	4	24

Piperacillin- Tazobactam Dosing			
PMA (weeks)	**Postnatal**	**Dose IV pip-tazo**	**Interval**
29 weeks or less	0 to 28 days	100 mg/kg/dose	12 hours
	greater than 28 days		8 hours
30 to 36 weeks	0 to 14 days	100 mg/kg/dose	12 hours
	greater than 14 days		8 hours
37 to 44 weeks	0 to 7 days	100 mg/kg/dose	12 hours
	greater than 7 days		8 hours
45 weeks or more	ALL	100 mg/kg/dose	8 hours
PMA = Postmenstrual age (PMA equivalent to gestational age plus postnatal age). PMA is the primary determinant of dosing interval, with postnatal age as the secondary qualifier.			
*Dose for piperacillin component			
Cohen-Wolkowiez, 2014			

Amikacin Dosing		
Postmenstrual Age	**Postnatal Age**	**Dosage**
29 weeks or less	0 to 7 days	14 mg/kg/dose every 48 hours
	8 to 28 days	12 mg/kg/dose every 36 hours
	29 days or older	12 mg/kg/dose every 24 hours
30 to 34 weeks	0 to 7 days	12 mg/kg/dose every 36 hours
	8 days or older	12 mg/kg/dose every 24 hours
35 weeks or more	All	12 mg/kg/dose every 24 hours
Hughes, 2017		

- ~ **Consider Vancomycin** for LOS with presence of Central line
- In case of CLABSI - DC central, Treat with PIV, when BCx neg, place clean central line
- If **LP not feasible** because of Clinical Stability consider 21 days of antibiotics
- Extended Antibiotics Courses: Discuss with ID in **severe infections, ex Abscess, Osteomyelitis, Endocarditis**
- **NEC**- Amp+ gent+ Flagyl (Follow NEC policy)
- **Neonatal Pneumonia**: 7 days of Amp and Gent
- **UTI**: Amp and gent (7 days), Ok to switch to oral agents after 72h parenteral Antibioitcs. Renal US. Given prophylactic Amox (15 mg/kg Q24h PO) in Moderate/Severe Hydronephrosis
- In Atypical Infections, EXIT clinical pathway, Discuss with neonatology/CIC
- **Avoid Daily change in Antimicrobials** as it will increase antimicrobial resistance
- **Consider Antifungals** if repeat cultures negative and infant symptomatic

Figure 2: PMA – post-menstrual age. LOS – late onset sepsis. CLABSI – central-line associated bloodstream infection. DC – discharge = stop or remove. PIV = peripheral intravenous line. BCx – blood culture. LP – lumbar puncture. ID – infectious diseases. NEC – necrotizing enterocolitis. UTI – urinary tract infection. US – ultrasound. CIC – consultant-in-charge.

Chapter 10: Risk Categories of Antibiotics in Pregnancy and Major Side Effects of Antibiotics

FDA pregnancy risk categories (PRC):

- A – no known risk to fetus
- B – insufficient evidence in humans; probably safe to use; use only if clearly needed
- C – possible adverse effect on fetus based on animal studies; use with caution and only if benefits outweigh the risks
- D – known adverse effect on fetus; may only be used if no other alternatives are available
- X – contraindicated during pregnancy

Pregnancy risk categories vary by country. In 2015, the FDA stopped using the above categories and started using the Pregnancy and Lactation Labeling Final Rule. Most medications should be avoided during the first trimester.

ANTIBIOTIC	PRC	MAIN SIDE EFFECTS
BENZATHINE PENICILLIN G	B	Diarrhoea, hypersensitivity, nausea, skin reactions, thrombocytopenia, vomiting, vulvo-vaginal fungal infection, hepatitis, Jarisch-Herxheimer reaction
BENZYL PENICILLIN B.P 1 MEGA IM/IV INJ	B	
PHENOXYMETHYL PENICILLIN TAB 250 MG (PEN V)	B	
AMOXYCILLIN + CLAVULANIC ACID INJ/ ORAL DROPS/ ORAL SUSPENSION/ TABLETS	B	
AMOXYCILLIN IM/IV INJ/ TABS	B	
PIVMECILLINAM HCL 200 MG TAB	B	
FLUCLOXACILLIN (AS SODIUM SALT) 500 MG/ VIAL IM/IV INJ/ TABS	B	
PIPERACILLIN (AS SODIUM SALT) INJ + TAZOBACTAM (AS SODIUM SALT) IV	B	
AMPICILLIN-SULBACTAM	B	
AZTREONAM	B	Neutropenia, hepatitis, phlebitis, rash, eosinophilia
CEFIXIME 200MG TABS	B	Abdominal pain, diarrhoea, dizziness, headache, leucopenia, nausea, neutropenia, pseudomembranous enterocolitis, skin reactions, vomiting, vulvovaginal candidiasis, acute kidney injury, arthralgia, drug fever, dyspepsia, face oedema, flatulence, genital pruritus, flatulence, hypereosinophilia, jaundice, serum sickness-like reaction, thrombocytosis
CEFOTAXIME (AS SODIUM SALT) INJ POWDER FOR RECONSTITUTION IM/IV 1 G/ VIAL	B	Abdominal pain, diarrhoea, dizziness, headache, leucopenia, nausea, neutropenia, pseudomembranous enterocolitis, skin reactions, vomiting, vulvovaginal candidiasis, eosinophilia
CEFTAZIDIME (AS PENTAHYDRATE) IM/IV 1 G /VIAL INJ	B	

CEFTRIAXONE (AS SODIUM SALT) IM/IV 1 G/ VIAL INJ	B	
CEFAZOLIN	B	
CEFTAZIDIME-AVIBACTAM	B	
TEICOPLANIN INJ 200MG VIAL	B	Skin reactions, pain and fever
MEROPENEM (AS TRIHYDRATE) IV INJ	B	Abdominal pain, diarrhoea, headache, inflammation, nausea, pain, skin reactions, thrombocytosis, vomiting
DOXYCYCLINE 100 MG TAB/CAP	D	Angioedema, diarrhoea, headache, Henoch-Schonlein purpura, hypersensitivity, nausea, pericarditis, photosensitivity reaction, skin reactions, systemic lupus erythematosus exacerbated, vomiting, dyspnea, hypotension, peripheral oedema, tachycardia
TIGECYCLINE	D	Diarrhea, nausea, vomiting, rash, anemia, headache
AMIKACIN SULPHATE INJ	D	Aphonia, decreased appetite, bronchospasm, chest discomfort, cough, diarrhoea, dizziness, fever, hemoptysis, headache, hearing impairment, nausea, oral candidiasis, oropharyngeal pain, renal impairment, skin reactions, altered taste, tinnitus, vomiting. Ototoxicity and nephrotoxicity are also noted
GENTAMYCIN (AS SULPHATE) IM/IV INJ	D	
STREPTOMYCIN (AS SULPHATE) 1 G IM INJ	D	
CLARITHROMYCIN (FOR IV INFUSION) INJ/ TAB	C	Decreased appetite, diarrhoea, dizziness, gastrointestinal discomfort, headache, hearing impairment, insomnia, nausea, pancreatitis, paresthesia, skin reactions, altered taste, vasodilation, vision disorders, vomiting, prolonged QT, atrio-ventricular block
AZITHROMYCIN 500 MG TAB	B (avoid in first trimester)	
ERYTHROMYCIN ORAL SUSPENSION/ TAB	B	
CLINDAMYCIN HCL 150 MG CAP	B (avoid in first trimester)	Skin reactions. Has been associated with antibiotic-associated colitis, which may be fatal
CHLORAMPHENICOL (AS SODIUM SUCCINATE) 1 G IV INJ	C	Agranulocytosis, bone marrow disorders, depression, diarrhoea, dry mouth, fungal superinfection, headache, nausea, nerve disorders, thrombocytopenic purpura, urticaria, vision disorders, vomiting
COLISTINE METHANE SULPHOMETHAT E (COLISTIMETHAT E SODIUM) 1 MEGA UNIT/ VIAL INJ	C	Kidney damage, diarrhoea, nausea, vomiting, paresthesia. Neurotoxicity and nephrotoxicity which is dose related
LINEZOLID 600 MG/VIAL FOR IV INFUSION INJ	C	Anaemia, constipation, diarrhoea, dizziness, gastrointestinal discomfort, headache, hypertension, increased risk of infection, insomnia, localized pain, skin reactions, nausea, vomiting, altered taste. Hematopoietic disorders have been reported. Serotonin syndrome
VANCOMYCIN HCL 500 MG IV INJ	C	Agranulocytosis, dizziness, drug fever, eosinophilia, hypersensitivity, nausea, tubulointerstitial nephritis, neutropenia, renal failure, severe cutaneous adverse reactions, thrombocytopenia, tinnitus, vasculitis, vertigo. Associated with a high incidence of nephrotoxicity
CO-TRIMOXAZOLE	D	Diarrhoea, electrolyte imbalance, fungal overgrowth, headache, nausea, skin reactions. Discontinue immediately if blood disorders or rash develops

RIFAMPICIN	C	Nausea, thrombocytopenia, vomiting, bone pain, gastrointestinal disorder, hyperbilirubinemia, psychotic disorder, psychosis, influenza-like symptoms, respiratory symptoms, collapse, shock, hemolytic anaemia, thrombocytopenic purpura and acute renal failure
CIPROFLOXACIN	C	Decreased appetite, arthralgia, asthenia, constipation, diarrhoea, dizziness, dyspnea, eye discomfort, eye disorders, fever, fungal infection, gastrointestinal discomfort, headache, myalgia, nausea, QT interval prolongation, skin reactions, sleep disorders, altered taste, tinnitus, vision disorders, vomiting. Arthropathy in children
LEVOFLOXACIN 750 MG TAB/CAP	C	
LINCOMYCIN 600 MG/AMP IM/IV INJ	C	Swollen tongue, nausea, vomiting, vaginal itching/discharge, skin rash/mild itching, dizziness, diarrhoea, hives, hypersensitivity reactions
METRONIDAZOLE	B	Dry mouth, myalgia, nausea, oral disorders, metallic taste, vomiting

Table 6: Side effects and pregnancy risk categories of some antibiotics.

Avoid azithromycin, clarithromycin, erythromycin, chloramphenicol, doxycycline, tigecycline, ciprofloxacin and levofloxacin in neonates. Avoid doxycycline, tigecycline, ciprofloxacin and levofloxacin in children. However, data about not using fluoroquinolones in children remains controversial.

ANTIBIOTICS	MEDICATIONS	INTERACTIONS
Penicillins	Methotrexate	Predicted to increase the risk of toxicity
	Warfarin	Abnormal INR – monitor closely
	Paracetamol	High anion gap metabolic acidosis with flucloxacillin
	Valproate	Pivmecillinam can increase concentration of valproate
Cephalosporins	Calcium salts	Ceftriaxone may increase risk of cardiorespiratory arrest
	Warfarin	Abnormal INR – monitor closely
Carbapenems	Valproate	Decrease concentration of valproate
Tetracyclines	Dairy products	Decrease concentration of tetracycline (take 1h before or 2h after)
	Ciclosporin	Increase concentration of ciclosporin
	Warfarin	Abnormal INR – monitor closely
	Lithium	Increase concentration of lithium
	Retinoids	Increase risk of benign intracranial hypertension.
Macrolides	Carbamazepine	Macrolides increase the concentration of the given medication
	Midazolam	
	Salmeterol	
	Diltiazem	
	Verapamil	
	Ciclosporin	
	Corticosteroids	
	Warfarin	
	Digoxin	
	Bromocriptine	
	Cabergoline	
	Erlotinib	
	Protease inhibitors	
	Trastuzumab	
	Opioids	
	Sildenafil	
	Statins	
	Tacrolimus	
	Docetaxel	

	Ticagrelor	
	Vinca alkaloids	
	Rifampicin	Rifampicin reduces the concentration of macrolides
Lincosamides	Neuromuscular blockade agents	Lincosamides can increase the concentration of neuromuscular blockade agents
Chloramphenicol	Phenytoin	Chloramphenicol increases the concentration of the given medication
	Sulfonylurea	
	Tacrolimus	
Linezolid	Beta 2 agonists	Hypertension
	Bupropion	
	Levodopa	
	Methylphenidate	
	Inotropes	
Sulfa	Warfarin	Sulfa drugs increase the concentration of the given medication
	Methotrexate	
	Sulfonylurea	
	Phenytoin	
	ACEI or ARB	Hyperkalemia
Fluoroquinolones	Amitriptyline	Prolonged QT & arrhythmia
	Amiodarone	
	Theophylline	Fluoroquinolones may increase the concentration of the given medication
	Warfarin	
	Sulfonylurea	
Metronidazole	Warfarin	Abnormal INR – monitor closely
Rifampicin	Warfarin	Abnormal INR – monitor closely
	Protease inhibitors	Rifampicin decreases the concentration of these drugs
	Non-nucleoside reverse transcriptase inhibitors	

Table 7: Drug-drug interactions of antibiotics with commonly used medications.

Chapter 12: Renal Dosing of Antibiotics

On days of hemodialysis, doses are given after dialysis since some antibiotics are dialyzable. See reference 14 and 33 for details. Disclaimer: doses in the table below may vary for extremes of weight, height, and age; values are for patients with usual body habitus. Consult the nephrologist for the doses of medications to be used during peritoneal dialysis.

Patients with more severe or multi-drug resistant infections may need higher doses – usual doses for adults are detailed in the table below.

The doses of the following antibiotics do not require adjustment in patients with renal failure but use with caution: benzathine penicillin (IM), phenoxymethylpenicillin (PO), pivmecillinam (PO), azithromycin (PO), ceftriaxone (IV), chloramphenicol (IV), clindamycin (IV / PO), doxycycline (PO), erythromycin (PO), linezolid (IV), metronidazole (IV / PO), neomycin (PO), rifampin (PO), tigecycline (IV). Flucloxacillin (IV) can be continued at 2g IV q6h in renal impairment including hemodialysis patients.

ANTIBIOTICS	**eGFR >50 mL/min/1.73m^2**	**eGFR 30-49 mL/min/1.73m^2**	**eGFR 10-29 mL/min/1.73m^2**	**eGFR <10 mL/min/1.73m^2**	**Hemodialysis**
AMOXICILLIN (PO)	500mg q8h or 1,000mg q12h		500mg q12h		
AMOXICILLIN (IV)	1,000mg q8h			500mg q8h	
AMOXICILLIN-CLAVULANATE (PO) *(Expressed as dose of amoxicillin)*	875mg q12h		500mg q12h		
AMOXICILLIN-CLAVULANATE (IV) *(Expressed as dose of amoxicillin)*	1,000mg q8h		1,000mg q12h		
AMPICILLIN-SULBACTAM (IV) *(Expressed as dose of both components)*	3g q6h		3g q12h	3g q24h	
AZTREONAM (IV)	2 g q8h		2g q12h	2g q24h	
BENZYLPENICILLIN / PENICILLIN G (IV)	3 million units q4h	2 million units q4h	2 million units q4h	1 million units q6h	2 million units q4h
CEFAZOLIN (IV)	2g q8h		1g 12h	1g q24h	2g q48h
CEFIXIME (PO)	400mg q24h	300 mg q24h	200mg q24h		
CEFOTAXIME (IV)	2g q8h	2g q12h		2g q24h	
CEFTAZIDIME (IV)	2g q8h				
CEFTAZIDIME-AVIBACTAM (IV)	2.5g (ceftazidime 2g - avibactam 0.5g) q8h	1.25g (ceftazidime 1g - avibactam 0.25g) q8h	0.94g (ceftazidime 0.75g - avibactam 0.19g) q12h	0.94 g (ceftazidime 0.75g - avibactam 0.19g) q24h	2.5g (ceftazidime 2g - avibactam 0.5g) q48h
CIPROFLOXACIN (IV)	400mg q12h		400 mg q24h		
CIPROFLOXACIN (PO)	500mg q12h		500mg q24h		
CLARITHROMYCIN (PO)	500mg q12h		500mg q24h		
LEVOFLOXACIN (PO)	750mg q24h	750mg q48h	500mg q48h		
LINCOMYCIN (IV)	600mg q8h		300mg q12h		

MEROPENEM (IV)	1g q8h	1g q12h	500mg q12h	500mg q24h	500mg q24h
NITROFURANTOIN (capsules – cystitis only)	100 mg q12h		Not recommended		
NITROFURANTOIN (suspension – cystitis only)	50-100 mg q6h		Not recommended		
PIPERACILLIN-TAZOBACTAM (IV) *(Expressed as dose of both components)*	4.5g q6h	4.5g q8h		2.25g q6h	2.25g q8h
TEICOPLANIN (IV) *(Adjust after 4th day of treatment)*	12 mg/kg q24h	6 mg/kg q24h		12 mg/kg q72h	
TRIMETHOPRIM-SULFAMETHOXAZOLE (PO) *(Expressed as dose of trimethoprim component)*	2 DS tab q12h		1 DS tab q12h		1 DS tab q48h
TRIMETHOPRIM-SULFAMETHOXAZOLE (IV) *(Expressed as dose of trimethoprim component)*	5 mg/kg q8h		2.5 mg/kg q12h		

Table 8: DS – double strength = 160mg / 800mg of trimethoprim / sulfamethoxazole.

ANTIBIOTIC	DOSE	MAXIMUM DOSE
Amikacin	15 to 30 mg/kg/dose every 24 hours or 15 to 22.5 mg/kg/day divided every 8 to 12 hours; serum concentration should be monitored	1,500 mg/day
Amoxicillin	40 to 45 mg/kg/day PO in divided doses every 8 hours; 30-60 mg/kg/dose IV Q8h	500 mg/dose PO; 2,000mg/dose IV
Amoxicillin / clavulanic acid	40 to 45 mg/kg/day PO of amoxicillin component in divided doses every 8 hours; 30-60 mg/kg/dose IV Q8h of amoxicillin component	500 mg/dose PO of amoxicillin component; 2,000mg/dose IV of amoxicillin component
Aztreonam	90 to 120 mg/kg/day in divided doses every 6 to 8 hours	8 g/day
Benzathine penicillin G	50,000 units/kg/dose IM once a week	2.4 million units/dose
Benzylpenicillin	100,000 to 300,000 units/kg/day IV in divided doses every 4 to 6 hours	24 million units/day
Cefotaxime	150 mg/kg/day IV in divided doses every 4 to 8 hours; can double the dose for CNS infections	2,000 mg/dose
Ceftriaxone	50 to 75 mg/kg/day IV in divided doses every 12 to 24 hours	2,000 mg/day
Clarithromycin	7.5 mg/kg/dose PO every 12 hours	500 mg/dose
Colistin	37,500-75,000 units/kg IV every 12 hours; a loading dose of 150,000 units/kg IV x1 may be given	5.4 million units/dose
Gentamicin	2 to 2.5 mg/kg/dose IV every 8 hours; serum concentration should be monitored	300 mg/day
Meropenem	20 mg/kg/dose IV every 8 hours	1,000 mg/dose
Metronidazole	15 to 50 mg/kg/day PO in divided doses 3 times daily; 22.5 to 40 mg/kg/day IV in divided doses 3 or 4 times daily	2,250 mg/day PO; 4,000 mg/day IV
Piperacillin-tazobactam	240 to 300 mg piperacillin/kg/day IV divided in 3 to 4 doses	16 g/day of piperacillin
Vancomycin	45 to 60 mg/kg/day IV divided every 6 to 8 hours; dose and frequency should be individualized based on serum concentrations	2,000 mg/day

Table 9: Doses of antibiotics can vary depending on the severity and type of infection. The doses in this table assume a normal renal function.

Chapter 14: Antibiogram for the Public Hospitals of Mauritius

For general in-patients

% of isolates that are susceptible to the given antibiotic	Penicillin	Ampicillin	Oxacillin	Ceftriaxone	Piperacillin-tazobactam	Meropenem	Gentamicin	Amikacin	Ciprofloxacin	Erythromycin	Tetracycline	Colistin	Vancomycin
Gram negatives													
Escherichia coli				44	76	95	63	81	40			100	
Klebsiella sp.				38	60	85	57	73	48			98	
Pseudomonas aeruginosa[#]					74	54	47	56	42			100	
Proteus sp.				58	100	97	55	69	76				
Acinetobacter sp.				2	19	26	23	43	17			100	
Gram positives													
Staphylococcus aureus	4		53							73	70		100
Enterococcus sp.		89								22	20		100

 # - 55% of Pseudomonas aeruginosa were susceptible to ceftazidime. Data are from organisms isolated in 2017. Sample size is limited (n = 106 to 155).

Reference: Dr. M. Issack. Samples were collected and analyzed at the Central Health Laboratory, Victoria Hospital, and at Dr. A. G. Jeetoo Hospital

For outpatients and Accident and Emergency patients

% of isolates that are susceptible to the given antibiotic	Penicillin	Ampicillin	Oxacillin	Co-amoxiclav	Ceftriaxone	Levofloxacin	Clarithromycin	Tetracycline	Co-trimoxazole	Vancomycin
Gram negatives										
Haemophilus influenzae		50		100	97	100	88			
Salmonella sp. (non-typhi)					99	98			98	
Campylobacter sp.						46	100			
Gram positives										
Enterococcus sp.[#]		100					9	18		100
Streptococcus pneumoniae	97 / 56[*]				95	97	62	79		
Group A Streptococcus[#]	100						94	27		
Group B Streptococcus[#]		100						19		100
Staphylococcus saprophyticus[#]			100				60	80		100

*# - These organisms were isolated in 2017; the other organisms were isolated in 2019. * - 97% for MIC ≤ 2 µg/mL; 56% for MIC ≤ 0.06 µg/mL. Susceptibilities for pneumococci were based mostly on samples collected from ear swabs in children. 55% of Enterobacteriaceae were susceptible to co-trimoxazole and 80% of Enterobacteriaceae were susceptible to pivmecillinam. Sample size is limited (n = 5 to 315).*

For ICU patients

% of isolates that are susceptible to the given antibiotic	Co-amoxiclav	Cefotaxime	Ceftazidime	Piperacillin-tazobactam	Meropenem	Gentamicin	Amikacin	Ciprofloxacin	Colistin	Co-trimoxazole
Escherichia coli	23	23		87	100	65	97	32	100	35
Klebsiella sp.	24	22		73	78	45	74	36	100	37
Pseudomonas aeruginosa			59	60	45	56	57	51	100	
Proteus sp.	60	20		100	97	23	50	63		20
Acinetobacter sp.	0.5	0.5		10	13	14	28	9	100	20
Enterobacter sp.		59		95	100	82	95	77	100	86
Serratia sp.		52		96	96	48	65	57		57
Stenotrophomonas maltophilia	10	6		65		39	42	94	52	90

Based on endotracheal cultures collected in 2017. Sample size is limited (n = 22 to 208).

Reference: Dr. M. Issack. Samples were collected and analyzed at the Central Health Laboratory, Victoria Hospital, and at Dr. A. G. Jeetoo Hospital

ANNEX A

Checklist of essential national* core elements for AMS programmes in LMICs – basic (light grey) and advanced (dark grey) core elements

	NATIONAL CORE ELEMENTS	Yes	No
1. NATIONAL PLAN AND STRATEGIES	**1. National action plan on AMR that states AMS is a priority** The government endorses a national action plan on AMR explicitly stating that AMS is a national priority.	☐	☐
	2. Dedicated funding for the national action plan on AMR The national action plan on AMR has been costed and includes national activities for implementing AMS activities in the short to medium term (1-3 years) and/or long term (5 years).	☐	☐
	3. Technical working group on AMS established with clear terms of reference The national multisectoral coordination group has established a TWG or subcommittee on AMS that includes at least one ministry of health focal point and is linked to the AMC and AMR surveillance and IPC technical working groups. For sample terms of reference, see Annex I.	☐	☐
	4. National AMS implementation plan or policy endorsement An achievable national implementation plan for AMS with defined goals, outcomes, timelines, structures (national and hospital core elements) and responsibilities has been developed. It is linked to the national IPC plan or policy if it exists and is integrated into the government's annual action plan as appropriate.	☐	☐
	5. Monitoring and evaluation mechanism in place for the national action plan on AMR A mechanism is in place to monitor and evaluate progress on implementing the national action plan on AMR with the explicit inclusion of AMS and IPC activities.	☐	☐
2. REGULATION AND GUIDELINES	**6. Integration of the AWaRe classification of antibiotics in the national EML and formulary** Develop or review and adapt the antibiotics contained in the national EML and the national formulary with reference to the WHO EML AWaRe groups of antibiotics and outline AMS strategies for each group.	☐	☐
	7. Up-to-date clinical guidelines that include AMS principles and integrate the AWaRe classification of antibiotics The government endorses and makes available up-to-date standard treatment guidelines for infection management, based on national susceptibility surveillance data (where possible) to assist with antibiotic selection for common clinical conditions. These guidelines should be based on and explicitly include stewardship principles. Incorporate the WHO EML AWaRe classification of antibiotics into the next update of the guidelines. Where guidelines exist, a first step is to review them and to identify missing guidelines with an initial focus on empirical treatment. Where guidelines do not exist, the government provides human and financial resources to support the development of such national standard treatment guidelines and their dissemination as a priority activity. Coherence between guidelines and EMLs should be ensured.	☐	☐
	8. Regulations on fixed-dose combinations of antibiotics The government puts in place regulations that ban fixed-dose antibiotic combinations not approved by national or international guidelines.	☐	☐
	9a. Regulations on prescription-only sale of antibiotics[i] The government puts in place legislation or regulations that require antibiotics to be dispensed only on prescription by a qualified health-care professional (where access to health care is not an issue).	☐	☐
	9b. Regulation and enforcement of prescription-only dispensing of antibiotics[i] Legislation or regulation is actively implemented and enforced that requires antibiotics to be dispensed only on prescription by a qualified health-care professional (where access to health care is not an issue).	☐	☐
	10. Measures in place to ensure continued availability of quality-assured antibiotics[i] The government acts to ensure that available antibiotics are of suitable quality and that substandard or falsified drugs are not being sold.	☐	☐
	11. Measures in place to ensure affordability of essential antibiotics[i] The government acts to ensure that antibiotics are made available in suitable dosages (including paediatric formulations when appropriate) at a reasonable price to the public.	☐	☐

NATIONAL CORE ELEMENTS		Yes	No
3. AWARENESS, TRAINING AND EDUCATION	**12. Regular public antibiotic awareness campaigns** Antibiotic awareness campaigns such as World Antibiotic Awareness Week and other targeted campaigns are regularly organized to address specific national or local issues and communities.	☐	☐
	13. Education in schools on basic infection principles The government ensures that schools provide education on basic IPC principles, including hand hygiene.	☐	☐
	14. Training on AMS competencies for AMS team members The government and/or health-care facilities facilitate access to in-service training in antimicrobial prescribing and stewardship for AMS team members in facilities. Use existing core competencies and set standards or adapt curricula.	☐	☐
	15. Education and training for all health-care professionals on AMS The government and/or other relevant bodies (e.g. professional societies) facilitate access to and/or support pre- and in-service training on how to optimize antibiotic prescribing, dispensing and administration for all relevant health-care professional groups (e.g. doctors, pharmacists, nurses). Use existing core competencies and set standards or adapt curricula (e.g. adaptation of the WHO core competencies and the AMR education and training curriculum guide).	☐	☐
	16. Incentives to support implementation of AMS programmes in all health-care facilities, including staffing standards, training and accreditation The government sets staffing standards for the AMS programme, makes implementation of AMS programmes in all facilities (public and private) a requirement, ensures that the health-care facility core elements (detailed in Chapter 3) are in place (e.g. by requiring certification/accreditation) and sets criteria to secure specific government funding for AMS in all facilities.	☐	☐
4. SUPPORTING TECHNOLOGIES AND DATA	**17. National surveillance system on AMC in place**[i,ii] The government supports programmes to compile and analyse appropriate data on the quantity and types of antibiotics purchased or distributed in the country (distinguishing between the health-care facility and community sector, if possible), following the WHO methodology on surveillance of AMC.	☐	☐
	18. National surveillance system on AMR in place with laboratory capacity to guide optimal use of antibiotics in clinical practice and update clinical guidelines Laboratory capacity is in place at the health-care facility or off-site (reference laboratory) to identify pathogens and their antibiotic susceptibility, to guide optimal use of antibiotics in clinical practice and to update guidelines. The laboratory further supports identification of key pathogens or syndromes to target AMS interventions. The government supports programmes to collate, compile and compare data from different facilities to identify trends over time and possibly to identify facilities that are outliers and might warrant investigation and assistance.	☐	☐
	19. Diagnostic tests available and capacity building undertaken to optimize antibiotic use Governments are encouraged to procure and promote the use of relevant diagnostic tests to optimize antibiotic use. The government acts to ensure that relevant and essential investigations (e.g. biology, microbiology, imaging) are available for all health-care facilities (either on-site, or with available access off-site).	☐	☐

* "National" can be substituted by "state" or "region" depending on the context.

[i] Indicator in the Tripartite M&E framework for the Global Action Plan on AMR.[ii] Indicator tracked on an annual basis through the TrACSS.

ANNEX B

Checklist of essential health-care facility core elements for AMS programmes in LMICs – basic (light grey) and advanced (dark grey) core elements

	HEALTH-CARE FACILITY CORE ELEMENTS	Yes	No
1. LEADERSHIP COMMITMENT	**1. AMS identified as a priority for health-care facility management** The facility management has formally identified AMS as a priority objective for the facility and included it in its key performance indicators. Financial and human resources have been allocated for AMS activities.	☐	☐
	2. Health-care facility AMS action plan endorsed that prioritizes activities and measures progress and accountability A health-care facility AMS action plan is endorsed that prioritizes activities and measures progress and accountability for ensuring appropriate antibiotic use, based on existing national or international guidelines and/or an existing national strategy. The AMS action plan is updated regularly as required.	☐	☐
	3. Dedicated financial support for the health-care facility AMS action plan There is dedicated, sustainable and budgeted financial support for AMS activities in the action plan (e.g. support for salary, training and information technology (IT) support).	☐	☐
2. ACCOUNTABILITY AND RESPONSIBILITIES	**4. Multidisciplinary AMS leadership committee in place with clear terms of reference*** This AMS committee can be either stand-alone or embedded in another existing committee structure (e.g. drug and therapeutics committee, pharmacy committee, infection control committee, patient safety committee). If embedded in another committee, AMS must be a standing item on the committee's agenda. The AMS committee is explicitly in charge of setting and coordinating the AMS programme/strategy according to its terms of reference.	☐	☐
	5. Dedicated AMS leader/champion identified for the health-care facility A health-care professional has been identified as a leader/champion for AMS activities at the facility and is responsible for leading the AMS team in implementing the AMS programme.	☐	☐
	6. Multidisciplinary AMS team with terms of reference* An AMS team of multidisciplinary health-care professionals who will implement the day-to-day AMS activities in the health-care facility. In resource-limited settings or small facilities it is often difficult to have an AMS team, and an AMS champion can be identified instead. The composition of the AMS team is flexible and should be based on existing recommendations and adapted to the local context: • option 1: >2 health-care professionals constituting a multidisciplinary team (e.g. tertiary hospitals); • option 2: a prescriber and a nurse or pharmacist (e.g. secondary or small hospitals); or • option 3: an AMS champion, e.g. a physician, nurse or pharmacist leading the stewardship programme, with access to expert advice.	☐	☐
	7. Other health professionals identified and involved in AMS activities Other health-care professionals apart from the AMS team (e.g. from the ICU, internal medicine and surgery, health informatics, or pharmacy or nursing personnel) participate in AMS activities based on the priorities of the health-care facility AMS action plan.	☐	☐
	8. Clearly defined collaboration between the AMS and IPC programmes A document clearly specifies the process of collaboration between the AMS team/committee and the IPC programme and/or committee. In many low-resource settings the IPC and AMS committees may be merged into one.	☐	☐
	9a. Regular (descriptive) activity reports on the implementation of the AMS programme Regular activity reports are produced and disseminated to health-care facility personnel and regional/ national AMS TWGs. These reports include data on antibiotic use/consumption and describe the interventions implemented by the AMS team.	☐	☐
	9b. Regular activity reports (status and outcomes) on the implementation of the AMS programme Regular activity reports are produced and disseminated to health-care facility personnel and regional/ national AMS TWGs with timelines for measurable short- and long-term targets/goals, based on analysis of local antibiotic use and evaluation of the impact of stewardship interventions.	☐	☐

HEALTH-CARE FACILITY CORE ELEMENTS		Yes	No
3. AMS ACTIONS	**10. Up-to-date standard treatment guidelines** The health-care facility has available, up-to-date recommendations for infection management based on international/national evidence-based guidelines and local/national susceptibility patterns (where possible), to assist with antibiotic selection for common clinical conditions (indication, agent, dose, route, interval, duration). A process is in place for regular review and updating of the guidelines based on new evidence or other external input.	☐	☐
	11. Regular AMS team review/audit of specified antibiotic therapy or clinical conditions at the health-care facility Depending on available resources, this can be conducted by prioritizing wards or specific patient conditions.	☐	☐
	12. Advice/feedback from AMS team members is easily accessible/available to all prescribers This can be achieved through various methods, including facility ward rounds, bedside consultations and dedicated telephone lines.	☐	☐
	13. The AMS team conducts regular ward rounds and other AMS interventions in select health-care facility departments The AMS team conducts regular ward rounds (in one or more wards) and other AMS interventions in select facility departments (one or more) identified in the health-care facility AMS action plan.	☐	☐
	14a. Health-care facility formulary with a list of approved antibiotics The health-care facility has a formulary with a list of approved antibiotics that may be based on national recommendations or the WHO EML.	☐	☐
	14b. Health-care facility formulary with a list of restricted antibiotics The health-care facility has a formulary with a list of antibiotics approved for use in the facility and specifies a list of restricted antibiotics that require approval by the designated AMS team member (or infectious disease physician if available, physician or AMS champion) when used and/or are only permitted for specific conditions, e.g. the WATCH and RESERVE groups of antibiotics.	☐	☐
	15. Laboratory and imaging services accessible to support AMS interventions The health-care facility has access to (on-site or off-site) laboratory and imaging services, and to timely, quality-assured results to support diagnosis of the most common infections.	☐	☐
	16. Health-care facility access to IT services to support AMS activities The specific requirements need to be defined at local/regional/national level. This could include, for example, measurement of antibiotic use.	☐	☐
	17a. Standardized facility prescription chart and medical records The health-care facility ensures the availability and use of standardized prescription charts, medical records and transfer notes.	☐	☐
	17b. Health-care facility policy for documenting prescribed medicines The health-care facility has a written policy that requires prescribers to clearly document the indication and antibiotics prescribed (agent, dose, route, interval, duration and review dates) in the prescription chart, medical record and transfer notes to other health-care institutions.	☐	☐

HEALTH-CARE FACILITY CORE ELEMENTS		Yes	No
4. EDUCATION AND TRAINING	**18. Basic training in optimal antibiotic use for health-care professionals** The health-care facility offers basic induction training (e.g. sensitization on AMR and use of standard treatment guidelines) to staff on how to optimize antibiotic prescribing, dispensing and administration.	☐	☐
	19. Continued training in optimal antibiotic use for health-care professionals The health-care facility offers continued educational resources (e.g. regular training on infection management) to train staff on how to optimize antibiotic prescribing, dispensing and administration.	☐	☐
	20. Initial and regular training of the AMS team in infection management The health-care facility offers initial and regular training of the AMS team in infection management (diagnosis, prevention and treatment) and AMS. This training is usually not offered at the facility level, but is likely to be available at the regional, national or international level. The facility should, however, ensure that members of the AMS team are adequately trained, according to local/national requirements.	☐	☐
5. MONITORING AND SURVEILLANCE	**21. Monitoring appropriateness of antibiotic use at the unit and/or facility-wide level through audits or PPSsi** The AMS team undertakes audits or PPSs, at the unit and/or health-care facility level, to assess the appropriateness of infection management and antibiotic prescription (e.g. indication, agent, dose and duration of antibiotic therapy in specific infectious conditions such as pneumonia or surgical prophylaxis) according to policy/guidance.	☐	☐
	22. Monitoring quantity and types of antibiotic use (purchased/prescribed/dispensed) at the unit and/or facility-wide level In collaboration with the facility pharmacy, the AMS team monitors the quantity and types of antibiotic use (purchased/prescribed/dispensed) at the unit and/or health-care-facility level.	☐	☐
	23. Monitoring of antibiotic susceptibility and resistance rates for a range of key indicator bacteria The AMS team monitors antibiotic susceptibility and resistance rates for a range of key indicator bacteria at the health-care facility-wide level, in alignment with national and/or international surveillance systems (e.g. GLASS).	☐	☐
	24. Monitoring compliance of AMS interventions by the AMS committee The AMS committee monitors compliance with one or more of the specific interventions put in place by the AMS team (e.g. indication captured in the medical record for all patients on antibiotics).	☐	☐
6. REPORTING AND FEEDBACK	**25. Regular evaluation and sharing of health-care facility data on antibiotic use with prescribers** Health-care-facility reports on the quantity of antibiotics purchased/prescribed/dispensed are reviewed and analysed, and key findings are shared with prescribers along with specific action points.	☐	☐
	26. Regular evaluation and sharing of health-care facility resistance rates with prescribers The facility reports on antibiotic susceptibility rates are reviewed, and analyses and key findings are shared with prescribers along with specific action points.	☐	☐
	27. Evaluation of appropriateness of data on antibiotic use is shared with prescribers Findings from audits/reviews of the quality/appropriateness of antibiotic use are communicated directly to prescribers along with specific action points.	☐	☐
	28. Health-care facility antibiogram for key antibiotics informed by data on antibiotic use and resistance The health-care facility aggregate antibiogram is developed and regularly updated based on a review and analysis of facility antibiotic use and antibiotic-resistant bacteria. The antibiogram may help to inform updates of clinical guidelines.	☐	☐

* In resource-limited settings, the functions of the AMS committee and AMS team may fall under the same team.
[i] Indicator in the Tripartite M&E framework for the Global Action Plan on AMR.

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