ANTIMICROBIAL STEWARDSHIP PROGRAM IN HOSPITALS

Manual of Procedures

2016
Manual of Procedures for Implementing Antimicrobial Stewardship Programs in Hospitals

2016
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MESSAGE OF THE SECRETARY OF HEALTH

We are faced today with global threat of endemic, emerging and re-emerging infections against which the current armamentarium of antibiotics are proving to be less and less effective. As the threat of antimicrobial resistance (AMR) grows, greater number of our people will fall into severe and prolonged illnesses, increasing mortality and health care costs. The dangerous consequences of AMR extend far beyond human health. AMR among humans cannot be extricated from animal health, leading to dire consequences in economic development and global security as a whole.

The advent of highly resistant pathogens calls our nation to get involved in all global efforts to fight AMR. The Philippine Action Plan to Combat AMR: One Health Approach launched in 2015 and the National Policy on Infection Prevention and Control in 2016, are two of the government’s responses to the anticipated perils of AMR. Highlighted in these policies is the Antimicrobial Stewardship (AMS) Program in health facilities ensuring rational prescribing, dispensing and use of antimicrobials to optimize the treatment for infectious diseases towards improving patient outcomes, preventing further impoverishment due to healthcare costs, and protecting the welfare of the public at large.

The challenge for us is to ensure concerted multidisciplinary approach to institutionalize the Program across all health facilities in the country through strong commitment, leadership and accountability. The Duterte Health Agenda call us to secure the health of the Filipino people and elicit multi-sector, multi-stakeholder support for health.

We have a responsibility to our generation, as well as those to come. Let us join all our efforts in the pursuit of a better health care system for our countrymen. All for health towards health for all.

PAULYN JEAN B. ROSELL-UBIAL, MD, MPH, CESO II
Secretary of Health
Infectious diseases kill millions of people around the world, 95% of them live in resource-constrained settings. In the 1940s, the discovery of antimicrobials revolutionized man’s ability to treat infectious diseases through these life-saving drugs. However, only a few decades later, health practitioners across the globe can no longer expect all these agents to be effective due to increasing antimicrobial resistance (AMR).

AMR is a significant public health threat that causes major health and economic consequences both in human and veterinary health. It claims lives, prolongs illnesses, increases healthcare costs and financial burden, adversely affects trade, and threatens the national and global security as well. In 2009, the Health Facility Development Bureau (HFDB) of the Department of Health (DOH) published the National Standards in Infection Control for Healthcare Facilities to strengthen infection control programs nationwide and prevent the occurrence of hospital-acquired infections (HAI) among patients. Its purpose is to serve as a guide and reference for the hospital management, service providers and support staff, and to capacitate them in providing quality service at various aspects of work and service delivery points in the hospital. In February 2016, the National Policy on Infection Prevention and Control (IPC) was released by the DOH to further provide guidance and strengthen the implementation of IPC programs across hospitals. It outlines the creation of a new National Council on Infection Prevention and Control Program in Healthcare Facilities that is mandated to oversee the implementation of the national policy, and the responsibilities of the relevant DOH offices, hospital executives and staff, local government units, and health care professionals specifically those working in the local hospital IPC Committees. The antimicrobial stewardship (AMS) is listed as one of the 14 priority areas.

In the Philippines, the Antimicrobial Resistance Surveillance Program (ARSP) found very alarming rates of resistance among various pathogens. For *Escherichia coli* and *Klebsiella spp.*, extended spectrum beta-lactamase (ESBL) enzyme has been found which renders these organisms resistant to many antibiotics. Up to 15% of *Klebsiella* species and 4 % of *E. coli* are resistant to carbapenems, a last resort group of antimicrobials. Multidrug-resistant *Pseudomonas aeruginosa* and *Acinetobacter* species make up 22% and 66% of these common hospital pathogens. *Streptococcus pneumoniae*, a causative agent of acute respiratory infections, showed increasing resistance to penicillin from 0% in 2010 to 5% (95% CI: 3.2-9) in 2013. Other alarming developments in AMR in the Philippines are the steady increase of methicillin-resistant *Staphylococcus aureus* (MRSA), which is an important cause of HAI and other community-acquired infections, and the high resistance rates of *Neisseria gonorrhoeae* to ciprofloxacin (74%), ofloxacin (70%), and tetracycline (55%). Many of the causative bacterial pathogens of infections in the ten (10) leading causes of morbidity in the country have also acquired multiple drug resistance. In the forefront is tuberculosis (TB) for
which multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) have already been recognized. The Philippines ranks 7th among the 27 countries identified that account for 90% of the world’s MDR-TB burden. Among the new TB cases in the Philippines, MDR-TB was found to be at 2%, and 21% of which were previously treated cases. Moreover, the dreaded AMR gene known as the NDM-1 (New Delhi metalo-beta-lactamase-1) was identified in E. coli pathogen isolated from the urine of a 33-year old female in March 2011.

In recognition of the rapidly emerging global public health threats of AMR, the World Health Organization (WHO) in 2011 has urged governments throughout the world to take an urgent concerted action to address the consequences of AMR. In response to this call, President Benigno Aquino III of the Philippines signed the Administrative Order no. 42 series of 2014 entitled “Creating an Inter-Agency Committee for the Formulation and Implementation of a National Plan to Combat Antimicrobial Resistance (AMR) in the Philippines” to bring together all key partners across many sectors towards identifying and implementing concrete efforts and plans to mitigate and control AMR. Major actionable areas in the National Plan include policy and planning; surveillance and laboratory capacity; access to quality antimicrobial agents; infection prevention and control; rational use of antimicrobial agents; and, research and development. It is vital therefore, that the Philippines prioritize addressing inappropriate and indiscriminate use of antimicrobial agents primarily through the institutionalization of an AMS Program in health facilities, which aims to strengthen the knowledge, attitude, and practices on rational prescribing, dispensing, and use of antimicrobials; and, to improve patient outcomes by decreasing infections caused by resistant organisms.
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Philippine Hospital Infection Control Society, Inc.
Philippine Hospital Infection Control Nurses Association
Philippine Pharmacists Association, Inc.
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AMS Pilot Hospitals

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Research Institute for Tropical Medicine
Rizal Medical Center
Southern Philippines Medical Center
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMR</td>
<td>Antimicrobial Resistance</td>
</tr>
<tr>
<td>AMS</td>
<td>Antimicrobial Stewardship</td>
</tr>
<tr>
<td>AMU</td>
<td>Antimicrobial Use</td>
</tr>
<tr>
<td>ARSP</td>
<td>Antimicrobial Resistance Surveillance Program</td>
</tr>
<tr>
<td>DOH</td>
<td>Department of Health</td>
</tr>
<tr>
<td>DDD</td>
<td>Defined Daily Doses</td>
</tr>
<tr>
<td>DOT</td>
<td>Days of Therapy</td>
</tr>
<tr>
<td>FTE</td>
<td>Full-time Equivalent</td>
</tr>
<tr>
<td>HAI</td>
<td>Hospital-acquired Infection</td>
</tr>
<tr>
<td>ID</td>
<td>Infectious Diseases</td>
</tr>
<tr>
<td>IDS</td>
<td>Infectious Diseases Specialist</td>
</tr>
<tr>
<td>IPC</td>
<td>Infection Prevention and Control</td>
</tr>
<tr>
<td>ICC</td>
<td>Infection Control Committee</td>
</tr>
<tr>
<td>MDR</td>
<td>Multi-drug resistant</td>
</tr>
<tr>
<td>MOP</td>
<td>Manual of Procedures</td>
</tr>
<tr>
<td>NAG</td>
<td>National Antibiotic Guidelines</td>
</tr>
<tr>
<td>NAGCom</td>
<td>National Antibiotic Guidelines Committee</td>
</tr>
<tr>
<td>PD</td>
<td>Pharmaceutical Division</td>
</tr>
<tr>
<td>PTC</td>
<td>Pharmacy and Therapeutics Committee</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
THE NATIONAL ANTIMICROBIAL STEWARDSHIP (AMS) PROGRAM

The National Antimicrobial Stewardship (AMS) Program is the concerted implementation of systematic, multi-disciplinary, multi-pronged interventions in both public and private hospitals in the Philippines to improve appropriate use of antimicrobials, which is essential for preventing the emergence and spread of antimicrobial resistance (AMR).

Specifically, the AMS Program aims to:
1. Promote rational and optimal antimicrobial therapy;
2. Improve patient outcomes and decrease healthcare costs by reducing unnecessary antimicrobial use, adverse drug events, and mortality and morbidity from infections (including secondary infections by resistant pathogens);
3. Foster awareness on the global and country situation on the threat of AMR and the compelling need to address it;
4. Effect positive behaviour and/or institutional changes through educational and persuasive interventions towards improving the use of antimicrobials by the prescribers, dispensers, other healthcare professionals, and patients;
5. Establish multi-disciplinary leadership and commitment, clinical governance and accountability in antimicrobial management to ensure that interventions are sustainable and well-supported with necessary technical and financial resources;
6. Create an environment where healthcare professionals are supported with monitoring tools and systems to implement antimicrobial management;
7. Conduct research aiming to analyse the progress and challenges on implementing hospital antimicrobial stewardship program; and,
8. Prevent or slow down the emergence of AMR.

Ultimately, the establishment and strengthening of the AMS program in hospitals is essential to achieve the national goal of reducing the morbidity and mortality due to AMR as indicated in the Philippine Action Plan to Combat Antimicrobial Resistance: One Health Approach. The action plan aims to achieve the following by 2020:

<table>
<thead>
<tr>
<th>Goals</th>
<th>Baseline Data</th>
<th>2020 Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce by 30% carbapenem-resistant Enterobacteriaceae (E. coli and Klebsiella sp.) infections</td>
<td>carbapenem-resistant E. coli = 2.1% (imipenem)</td>
<td>1.47%</td>
</tr>
<tr>
<td></td>
<td>carbapenem-resistant Klebsiella sp. = 8.8% (meropenem)</td>
<td>6.16%</td>
</tr>
<tr>
<td></td>
<td>= 7.6% (imipenem)</td>
<td>5.32%</td>
</tr>
<tr>
<td>Maintain the prevalence of ceftriaxone-resistant Neisseria gonorrhoeae to 0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Reduce by at least 30% overall methicillin resistance in Staphylococcus aureus compared to rates in 2014</td>
<td>60.3%</td>
<td>42.21%</td>
</tr>
<tr>
<td>Reduce by 30% multidrug-resistant Pseudomonas spp. infections compared to estimates in 2014</td>
<td>23%</td>
<td>16.10%</td>
</tr>
<tr>
<td>Reduce by 25% ciprofloxacin-resistant non-typhoidal Salmonella infections</td>
<td>21.6%</td>
<td>16.20%</td>
</tr>
</tbody>
</table>

(Source: RITM ARSP Annual Report 2014)
MANUAL OF PROCEDURES FOR THE IMPLEMENTATION OF THE DOH AMS PROGRAM

This Manual of Procedures (MOP) was developed to assist and align the efforts in implementing AMS programs in all (Level I, II, and III) hospitals across the country. It seeks to serve as a guide to individual hospitals in the design and establishment of local AMS programs while providing a framework for national-level action and commitment.

 Recommendations within this document are, as far as possible, based on review of published literature on strategies that have shown to be effective. Consultation with key members (Infectious Diseases physicians, clinical pharmacists, and Infection Control nurses) from eight (8) pilot hospitals as well as the National Antibiotic Guidelines Committee (NAGCom), other national Infectious Diseases societies and relevant DOH offices were undertaken to obtain a consensus opinion and ensure that this MOP is practical and feasible.

All attempts to consider the context of local culture and practices have been taken in the creation of this MOP. Nonetheless, we have chosen to only define core aspects of the national AMS program without being overly prescriptive. Hospitals are strongly encouraged to adapt this MOP to their individual setting in order to maximize its effectiveness, including reduce barriers to implementation and encourage shared ownership towards the goal of AMS.
CORE ELEMENTS OF THE NATIONAL AMS PROGRAM

The National AMS Program is based on six core elements that in concordance will form the foundation for its success (figure 1).

Figure 1. The six core elements of the DOH AMS Program

Core Element 1: Leadership
A dedicated multi-disciplinary AMS Committee and Team supported by the hospital administration shall be responsible to successfully implement, perform, and monitor the AMS Program in each hospital.

Core Element 2: Policies, Guidelines, Clinical Pathways
Antibiotic policies and standardized clinical guidelines and clinical pathways on the treatment and prophylaxis of infections provide evidence-based guidance to clinicians and other healthcare professionals on the management of infectious diseases and in the selection of the most appropriate antimicrobial agent.

Core Element 3: Surveillance of Antimicrobial Use (AMU) and Antimicrobial Resistance (AMR)
AMU and AMR are intricately related. Surveillance of AMU provides important insights into prescribing patterns that may explain for the evolution of AMR, and is useful in the development and evaluation of AMS interventions. AMR surveillance allows for the development of an antibiogram that informs empiric antimicrobial choice, characterises the impact of AMS activities on resistance, and identification of specific AMR problem areas that needs to be addressed notwithstanding the infection control measures.
Core Element 4: Action

The AMS Program employs a coordinated multi-pronged, multi-disciplinary approach to safeguard and optimize use of all antimicrobials used within the hospital. Active interaction between the AMS team and prescribers (and other healthcare professionals) is pivotal in encouraging compliance to AMS interventions and being able to effectively persuade and influence change in prescribing practices.

Core Element 5: Education

AMS practitioners need to gain competency through comprehensive education and clinical training to effectively and safely perform AMS interventions. Education of all healthcare professionals on the principles of judicious use of antimicrobials is also necessary to enable positive behavioural change.

Core Element 6: Performance Evaluation

Measuring process and clinical indicators to assess the overall quality management improvement and effectiveness of AMS interventions is fundamental in guiding the progressive implementation of the program towards achieving the goal to combat AMR.
### REQUIREMENTS AND TIMELINE OF IMPLEMENTATION OF AMS PROGRAM BY LEVEL OF HEALTHCARE FACILITY

Table 1. *AMS Program requirements and implementation timeline for each level of healthcare facility.*

<table>
<thead>
<tr>
<th>Core Elements</th>
<th>Level I</th>
<th>Level II</th>
<th>Level III</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Leadership</td>
<td>AMS Team + AMS/ICC Committee</td>
<td>AMS Team + AMS/ICC Committee</td>
<td>AMS Team + AMS/ICC Committee</td>
</tr>
<tr>
<td></td>
<td>2018</td>
<td>2018</td>
<td>2018</td>
</tr>
<tr>
<td>4. Action: Restriction and Pre-authorization</td>
<td>2019</td>
<td>2018</td>
<td>2018</td>
</tr>
<tr>
<td>4. Action: Point-Of-Care interventions</td>
<td>NA*</td>
<td>2019</td>
<td>2019</td>
</tr>
<tr>
<td>4. Action: Audit-and-feedback</td>
<td>NA*</td>
<td>2022</td>
<td>2022</td>
</tr>
<tr>
<td>5. Education</td>
<td>2018</td>
<td>2018</td>
<td>2018</td>
</tr>
<tr>
<td>6. Performance Evaluation</td>
<td>2022</td>
<td>2022</td>
<td>2022</td>
</tr>
<tr>
<td>AMS Training Implementation</td>
<td>2020</td>
<td>2018</td>
<td>2017</td>
</tr>
<tr>
<td>Full implementation of AMS Program in the hospital</td>
<td>Jan 2022</td>
<td>Jan 2022</td>
<td>Jan 2022</td>
</tr>
<tr>
<td>First performance evaluation report to be submitted to DOH</td>
<td>Jan 2021</td>
<td>Jan 2019</td>
<td>Jan 2018</td>
</tr>
</tbody>
</table>

* In the absence of an AMS committee, the AMS team may report to the ICC committee or any other formal hospital bodies with shared interest in antimicrobial use and resistance.

** Level I healthcare facilities are encouraged to implement these actions if capability permits.
1. All hospitals shall aim to establish an effective and efficient AMS program that involves a multidisciplinary, multi-intervention and coordinated strategy to optimize the use of antimicrobials. This shall be made explicit through a formal statement that the hospital supports initiatives to optimize the use of antibiotics through effective stewardship and monitoring.

2. The overall responsibility and accountability in implementing a hospital AMS program lies with the Chief of Hospital and members of the hospital administration who can ensure leadership and management support through, but not limited to, the following:
   - Dedicating sufficient funding and resources for AMS-related activities
   - Allowing the staff to contribute to the AMS goals of the hospital through participation in the hospital stewardship program
   - Supporting training and continuous education
   - Ensuring accountability from all levels and across relevant clinical departments through continuous monitoring of performance
   - Building an enabling environment to support AMS-related activities (e.g. IT system to monitor antibiotic use or antibiotic alert systems)

3. The Chief of Hospital shall create a governance structure that will make explicit the different roles and responsibilities, and job descriptions of all hospital staff in stewardship-related activities and other relevant hospital initiatives on infection prevention and control, with the end goal of safeguarding the welfare and safety of patients.

4. The AMS program is ideally led by an AMS Committee in partnership with the Therapeutics Committee, the Infection Control Committee and the Patient Safety Committee to enable a holistic and coordinated approach in implementing AMS strategies. However, the organization and set-up of these bodies may have variations across health facilities depending on available resources and expertise. In smaller (i.e. Level I to Level II) hospitals, the AMS program may be led by small AMS health teams headed by an IDS consultant, a visiting IDS consultant or an AMS-trained internist. In cases where the AMS Committee is not instituted, the alternative committee (e.g. IPCC or ICC) shall fulfill the role and responsibilities as required by the AMS Committee.
Figure 2. Ideal organizational structure of the AMS Program in a hospital

*While it is ideal to create a dedicated committee accountable for AMS directly reporting to the head of the hospital working in sync with the PTC and IPC committee, it is recognized that hospitals will have different organization structure, capability and health human resource. Hence, hospitals are granted with flexibility on the placing of the AMS program relative to the existing structure of the hospital management as long as the accountabilities are clear and the outputs are delivered.

A. Chief of Hospital or Medical Director

The Chief of Hospital or Medical Director is responsible for the overall antimicrobial prescribing practice and AMR in the hospital. He/she, along with members of the hospital administration, provides the leadership and empowers the AMS committee/team to enforce judicious use of antimicrobials through, but not limited, to the following:

1. Ensuring that a local framework for AMS program is in place;
2. Dedicating sufficient funding and resources for AMS-related activities for the operations of the AMS Team;
3. Establishing an enabling environment to support AMS-related activities (e.g. IT system to support electronic prescribing, monitor antimicrobial use, or antimicrobial alert systems);
4. Allowing staff to contribute to the AMS goals of the hospital through participation in the hospital AMS program;
5. Supporting AMS-related training and continuous education;
6. Ensuring accountability from all levels and across relevant clinical departments through continuous monitoring of performance.
B. Committee

The AMS committee shall ideally be composed of an IDS, a medical microbiologist, an AMS clinical pharmacist, representatives from the AMS Team, clinicians from key medical and surgical departments, and members of the hospital management. It may also include members of other related groups and committees (e.g. PTC).

Responsibilities of the AMS committee include but are not limited to the following:

1. Development and maintenance of antimicrobial policies, formulary, and clinical practice guidelines for antimicrobial treatment and prophylaxis;
2. Supervision of the over-all implementation, monitoring of the effectiveness and championing the efforts to improve the hospital’s AMS program and initiatives, with direct accountability to the DOH-PD;
3. Ensuring the availability of resources for the sustainability of the AMS program;
4. Collaboration with the PTC and IPC committees in promoting rational use of antimicrobials;
5. Provision of feedback to prescribers, and conduct educational activities for medical, nursing, and pharmacy staff on antimicrobial prescribing and AMS principles; and,

C. Pharmacy & Therapeutics and Infection Prevention & Control Committees

Collaborative effort with the PTC and IPC committees is important to provide a holistic approach in targeting AMR within the hospital. The PTC and IPC committees assist in AMS efforts by:

1. Maintaining the hospital antimicrobial policies and formulary and ensuring that they remain current and are adhered to;
2. Developing, maintaining and disseminating the hospital antibiogram;
3. Leading in the creation of evidence-based treatment and surgical prophylaxis guidelines that are incorporated into the antimicrobial policy; and,
4. Monitoring process and outcome measures of antimicrobial policies.

D. The AMS Team

A team responsible for the effecting and monitoring of AMS strategies to promote appropriate antimicrobial use shall be created under the AMS Committee (Table 2).

Responsibilities of the AMS team include but are not limited to:

1. Implementation of the AMS strategies and perform AMS interventions as needed;
2. Development and review of standard treatment guidelines and prescribing policies;
3. Regular collection, analysis and reporting on the progress of the AMS program to the hospital AMS committee, administrators and DOH;
4. Education of healthcare staff on appropriate antimicrobial prescribing and resistance;
5. Identification and designing of systems/processes to facilitate appropriate antimicrobial use; and,
6. Provision of expert advice on development of policies related to appropriate use of antimicrobials and control of AMR in the hospital.
Table 2. Human resource requirement for AMS Team with their roles and responsibilities.

<table>
<thead>
<tr>
<th>AMS Team</th>
<th>Roles &amp; Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMS Clinician</strong></td>
<td>• Provides expert advice on inclusion of antimicrobials into the hospital formulary&lt;br&gt;• Leads in implementing and monitoring of AMS activities&lt;br&gt;• Establishes and maintains approval systems for restricted antimicrobials&lt;br&gt;• Educates staff on appropriate antimicrobial use, AMS activities and AMR</td>
</tr>
<tr>
<td>0.5 FTE per hospital</td>
<td></td>
</tr>
<tr>
<td>• IDS (Level II-III hospital)</td>
<td></td>
</tr>
<tr>
<td>• AMS-trained physician (Level I hospital)</td>
<td></td>
</tr>
<tr>
<td><strong>AMS Clinical Pharmacist</strong></td>
<td>• Assists in coordinating and implementing AMS activities&lt;br&gt;• Assists in the development and dissemination of guidelines, monitoring of antimicrobial use and AMR, and in assessing the performance of AMS program&lt;br&gt;• Ensures/enforces compliance to all AMS policies, guidelines and procedures&lt;br&gt;• Performs point of care interventions to optimize the patient's antimicrobial therapy&lt;br&gt;• Educates pharmacy staff and students on AMS&lt;br&gt;• Coordinates with medical and nursing staff to ensure timely administration of appropriate antimicrobials&lt;br&gt;• Identifies cases that require review by ID specialists&lt;br&gt;• Provide drug information and advice on dosing, drug interactions and adverse drug reactions&lt;br&gt;• Evaluates antimicrobial prescribing behaviour and provide feedback to prescribers</td>
</tr>
<tr>
<td>1 FTE : 100 beds (Level III hospital)</td>
<td></td>
</tr>
<tr>
<td>1 FTE : 100 beds (Level II hospital)</td>
<td></td>
</tr>
<tr>
<td>1 FTE per hospital (Level I hospital)</td>
<td></td>
</tr>
<tr>
<td><strong>Executive</strong></td>
<td>• Provides administrative support to daily AMS activities&lt;br&gt;• Assists in monitoring of the performance of the AMS program&lt;br&gt;• Prepares AMS-related reports as requested by the AMS committee and DOH-PD</td>
</tr>
<tr>
<td>1 FTE per hospital</td>
<td></td>
</tr>
</tbody>
</table>

E. Microbiology Laboratory Department

The microbiology laboratory is a core pillar to AMS efforts in the hospital. The Head of the microbiology laboratory department shall:

1. Ensure the timely identification of pathogens and the quality performance of routine antimicrobial susceptibility testing;
2. Provide microbiological expertise in the development and review of standard treatment guidelines and formulary restrictions;
3. Participate in the evaluation of antimicrobial use and AMR surveillance; and,
4. Assist in the infection prevention and control efforts.
CORE ELEMENT 2
POLICIES, GUIDELINES AND CLINICAL PATHWAYS

- All hospitals shall have a hospital antibiotic policy to promote rational antimicrobial prescribing and dispensing practices.

- All hospitals shall adopt or adapt to their local context the National Antibiotic Guidelines to guide clinicians in the management of infectious diseases and in the selection of the most appropriate antimicrobial agent.

- Simple and clear clinical pathways shall be created to guide and standardize treatment for timely and appropriate management of infections, especially for common infections and syndromes.

- The AMS Committee, together with PTC and ICC, shall be responsible for the development, implementation and revisions of the hospital antimicrobial policy, standard guidelines and pathways, with the support and commitment from the hospital administration.

- A clear strategy for implementation shall be developed, such that all relevant healthcare professionals are aware and enabled to comply with the hospital’s antibiotic policy, guidelines and clinical pathways.

- The policy, guidelines and clinical pathways shall be reviewed regularly and updated as needed.
A. HOSPITAL ANTIMICROBIAL PRESCRIBING AND MANAGEMENT POLICY

1. The primary aim of the hospital antimicrobial policy is to minimize the morbidity and mortality due to antimicrobial-resistant infection; and preserve the effectiveness of antimicrobial agents in the treatment and prevention of infectious diseases.

2. All hospitals shall have a hospital antibiotic policy encouraging all hospital staff to practice rational antimicrobial prescribing and dispensing practices.

3. The AMS Committee, together with PTC and ICC, shall be responsible for the development, implementation and revisions of this policy with the support and commitment from the hospital administration.

4. The policy shall be simple, clear, clinically relevant, flexible, applicable to day-to-day practice, and readily accessible in user-friendly form. The development of the policy shall be based on:
   i. Current DOH standards on rational antibiotic use, which include the National Antibiotic Guidelines, national formulary restrictions, and the National Standards in Infection and Control for Healthcare Facilities;
   ii. Hospital antimicrobial resistance and usage patterns; and,
   iii. Evidence-based guidelines and literature on the management and prevention of infectious diseases.

5. The hospital antibiotic policy shall address at minimum the following:
   i. General principles for prudent antimicrobial use;
   ii. Requirements and procedures for purchase, management (including storage and disposal), prescription, administration, and counselling of antimicrobials;
   iii. List of restricted and monitored antimicrobials, and associated approval and monitoring procedures;
   iv. AMS activities that directly control the use of antimicrobials (e.g. antimicrobials subjected to audit, automatic stop order procedures);
   v. Clinical guidelines for antibiotic treatment of common infectious diseases, surgical prophylaxis and intravenous-to-oral antimicrobial switch;
   vi. Measures to monitor antimicrobial use; and,
   vii. Policy on liaising with pharmaceutical industry.

An example of a basic hospital antibiotic policy is in Appendix A.

6. The policy shall be reviewed and updated regularly.
B. GUIDELINES AND CLINICAL PATHWAYS

1. Evidence-based standard treatment and prophylaxis guidelines and clinical pathways provide guidance to clinicians in the management of infectious diseases and in the selection of the most appropriate antimicrobial, thus discouraging the misuse of antimicrobials and improving patient care.

2. The AMS Committee, together with PTC and ICC, shall be responsible for the development, implementation and revisions of the standard clinical guidelines and pathways with the support and commitment from the hospital administration.

3. All hospitals shall have standard treatment and prophylaxis guidelines, either by adopting or adapting from the National Antibiotic Guidelines.
   a. The National Antibiotic Guidelines for the appropriate use of antimicrobials was created by the DOH through a multidisciplinary team of ID experts (NAGCom) in partnership with local ID societies and has been contextualized to the Philippine setting. It outlines the recommended approach to the treatment of many infectious diseases across a range of body systems and aims to facilitate consistency of care and quality use of antimicrobials across hospitals.

   Hospitals are encouraged to submit feedback on the use of the National Antibiotic Guidelines to the DOH so that future revisions consider the local experience and impact in the actual delivery of care to patients, including the clinical outcomes.

   b. Hospitals with the necessary capabilities shall adapt the National Antibiotic Guidelines to their hospital's context, by taking into account the following:
      - local microbiological and antimicrobial susceptibility (antibiogram) patterns;
      - local antimicrobial consumption, costs and availability; and,
      - evidence from locally conducted clinical studies.

   Hospital-adapted recommendations that deviate from the National Antibiotic Guidelines shall be submitted with justification for deviations to the DOH-PD, for review and approval by the NAGCom.

4. Hospitals shall use the guidelines to create simple, clear, and localized clinical pathways to provide standardized guidance to clinicians for the timely and appropriate treatment of infections, especially for common infections and syndromes (refer to Appendix B and C for an example of a hospital-based clinical pathway on sepsis and pneumonia respectively).

5. These clinical guidelines and pathways shall be supported by a program of on-going educational activities for all relevant healthcare professionals on the need and usage of these guidelines so as to facilitate compliance.

6. The clinical guidelines and pathways shall be reviewed and updated regularly as needed.
CORE ELEMENT 3
SURVEILLANCE OF ANTIMICROBIAL USE (AMU) AND ANTIMICROBIAL RESISTANCE (AMR)

- The AMS Committee shall ensure the regular AMU monitoring to be reported annually to the DOH-PD, as well as to relevant hospital departments.

- All hospitals shall conduct AMR surveillance for pathogens defined by ARSP as reflected in their antibiogram which are to be submitted annually to the Antimicrobial Resistance Surveillance Program at the Research Institute for Tropical Medicine (RITM) (Appendix D).

- All hospitals shall develop institutional antibiograms at least once a year. The AMS Committee shall ensure that institutional antibiograms are accessible to all hospital healthcare staff and that the latter are able to interpret and apply this information to patient care.

- The microbiology laboratory of the hospital is required to participate and pass both the National External Quality Assessment Scheme (NEQAS) for microbiology and the Antimicrobial Resistance Surveillance Program Bacteriology Laboratory Accreditation. The ARSP accreditation shall be one of the bases for reimbursement of select antibiotics by the PhilHealth.

- The hospital management shall strengthen the capacity for laboratory surveillance that shall allow monitoring of antimicrobial susceptibility patterns and detection of resistant pathogens.
A. ANTIMICROBIAL USE SURVEILLANCE

1. Surveillance on the consumption of antimicrobials provide critical information on the antimicrobial prescribing/usage patterns within the hospital and/or specific patient groups, which is instrumental in elucidating potential misuse/overuse of antimicrobials, guiding the design of AMS interventions, and for evaluating the progress of AMS initiatives in reducing inappropriate antimicrobial use.

2. The AMS Committee shall ensure that the usage of at least the following antimicrobials are monitored and reported as defined daily doses per 1000 patient days (DDD/1000 patient days) and days of therapy (DOT) to measure the impact of the AMS program:
   i. All restricted antimicrobials;
   ii. All monitored antimicrobials;
   iii. All IV and PO formulations of antimicrobials subjected to IV-to-PO switch intervention.

3. The AMS Committee may consider monitoring the usage of additional antimicrobials based on the following:
   a. Antimicrobials to which there is emerging drug resistance as revealed by national or hospital AMR surveillance data.
   b. Antimicrobials specifically targeted by AMS interventions (e.g. audited antimicrobials) and antimicrobials which consumption may potentially increase as a result of these interventions (e.g. alternative antimicrobials that may be used in place of restricted ones).
   c. Broad spectrum antimicrobials, particularly those classified as “critically important antibiotics” by the WHO (Appendix E).
   d. Most commonly used antimicrobials in the hospital.
   e. Antimicrobials known to be, suspected of, or at risk of misuse in the hospital.

4. Analysis shall include correlation with laboratory data on resistant pathogens.

5. The methodology for surveillance of AMU shall be performed in accordance with the Philippines Antimicrobial Use Surveillance Methods Guide.

6. AMU data shall be reported to the DOH-PD, as well as to relevant hospital departments on a regular basis annually.
B. ANTIMICROBIAL RESISTANCE SURVEILLANCE

1. Surveillance of AMR and tracking trends in antimicrobial susceptibility is crucial to creating meaningful hospital and patient-group specific antibiograms, which:
   a. Provide critical data to determine institutional specific recommendations for empirical antimicrobial therapy for common infectious diseases, hospital antibiotics policies and targeted AMR containment strategies; and
   b. Provide a method to monitor the impact of infection control and AMS activities on the prescribing practices and resistance rates of bacterial pathogens in the hospital.

2. All hospitals shall conduct AMR surveillance and develop at least annual institutional antibiograms – a responsibility of the AMS committee and the microbiology laboratory. For hospitals without an on-site microbiology laboratory, microbiological culture and sensitivity results can be obtained from external laboratories for their own set of patients so they can develop their own antibiogram.

3. All hospitals shall submit annually their AMR surveillance report (institutional specific antibiogram) at a minimum for pathogens identified by the Antimicrobial Resistance Surveillance Program (ARSP) (Table 3) to the ARSL Research Institute for Tropical Medicine (RITM).

Table 3. Reportable pathogens under the National Antimicrobial Resistance Surveillance Program (ARSP)

<table>
<thead>
<tr>
<th>ARSP reportable pathogens</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Enterococcus faecium</em></td>
</tr>
<tr>
<td><em>Enterococcus faecalis</em></td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
</tr>
<tr>
<td>Methicillin-resistant <em>Staphylococcus aureus</em> (MRSA)</td>
</tr>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
</tr>
<tr>
<td><em>Acinetobacter baumanii</em></td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
</tr>
<tr>
<td><em>Haemophilus influenzae</em></td>
</tr>
<tr>
<td><em>Klebsiella pneumoniae</em></td>
</tr>
<tr>
<td><em>Neisseria gonorrhoeae</em></td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
</tr>
<tr>
<td><em>Salmonella enterica</em></td>
</tr>
<tr>
<td>Non-typhoidal <em>Salmonella</em></td>
</tr>
<tr>
<td><em>Shigella</em></td>
</tr>
</tbody>
</table>

4. The AMS Committee shall ensure that institutional antibiograms are accessible to hospital healthcare staff and that they are trained on the interpretation and application of the antibiogram for patient care.

5. The microbiology laboratory of the hospital shall be required to participate and pass both the National External Quality Assessment Scheme (NEQAS) for microbiology and the ARSP Bacteriology Laboratory Accreditation for PhilHealth reimbursement of select antimicrobials in the Philippine National Formulary (PNF). Quality AMR surveillance data in their hospital antibiogram using the WHONET program shall be submitted annually to the ARSL in RITM using the following email address: secretariat@arsp.com.ph.

6. The hospital management shall enable and take measures to strengthen capacity for laboratory surveillance that will allow the monitoring of antibiotic susceptibility patterns and detection of resistant pathogens.
CORE ELEMENT 4
ACTION

AMS PROGRAM STRATEGIES

The AMS Program employs a comprehensive combination of persuasive and restrictive interventional strategies to safeguard and ensure the optimal use of all antimicrobials used within the hospital, with the aim of optimizing clinical outcomes of the patients (Figure 3).

Persuasive interventional strategies aims to persuade healthcare professionals to prescribe antimicrobials appropriately by addressing underlying knowledge deficiencies, attitudes and/or behaviors through active interaction and discussion. Prospective audit of antimicrobial prescribing and direct intervention and feedback (Audit and feedback) and Point-of-care (POC) interventions are two such strategies utilized by the AMS Program.

Restrictive intervention strategies control the use of antimicrobials by instituting “barriers” to prescribing and administering of certain antimicrobials or after a duration of time. The AMS Program employs antimicrobial restriction and pre-authorization and seventh day automatic stop order.

SCOPE OF COVERAGE

All antimicrobials prescribed and used for admitted patients within the hospital are subjected to the interventions of the AMS Program, except for antimicrobials prescribed by IDS who are held responsible for the appropriate indication of the medicines.

Antimicrobial restriction and pre-authorization will additionally also be applicable to prescriptions written for outpatients.
Figure 3. Categories of antimicrobials and their corresponding interventional strategies.
Action 1. Antimicrobial Restriction and Pre-authorization

Antimicrobial restriction and pre-authorisation requires clinicians to obtain approval for use of selected antimicrobials before prescribing. These antimicrobials are typically last-line antimicrobials that demand preserving their use to conditions where they are truly indicated. This strategy is also helpful in minimising unnecessary patient exposure to toxicities and costs associated with inappropriate therapy.

Scope

This standard operating procedure shall cover the use of restricted antimicrobials administered orally and intravenously to all patients (inpatient and outpatient settings), with exceptions to the following situations:

- Use for treatment of MDR tuberculosis under the Programmatic Management of Drug-Resistant Tuberculosis (PMDT); and,
- The antimicrobial is prescribed on order of an IDS or AMS Clinician.

Procedural Detail

1. All attending physicians, on prescribing any restricted antimicrobials (Table 4) in the patient’s chart, must complete the Restricted Antimicrobial Order Form (Appendix F).

<table>
<thead>
<tr>
<th>RESTRICTED ANTIMICROBIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Antifungals (All except Fluconazole)</td>
</tr>
<tr>
<td>Aztreonam</td>
</tr>
<tr>
<td>Carbapenems (All)</td>
</tr>
<tr>
<td>4th Generation Cephalosporins (All)</td>
</tr>
<tr>
<td>Colistin</td>
</tr>
<tr>
<td>Linezolid</td>
</tr>
<tr>
<td>Vancomycin</td>
</tr>
</tbody>
</table>

2. The referring attending or resident physician shall immediately seek approval from the designated AMS Officer in the hospital (AMS clinician, ID specialist or ICC chair/physician member) via a phone consult, detailing relevant patient history and indication requiring the use of the restricted antimicrobial.

3. The outcome of the call, including approved duration of use, must be documented on the completed form in order for Pharmacy to dispense the approved doses. The AMS Officer shall verify the information entered and sign on the form to indicate his/her agreement at earliest time possible (no later than morning of next working day).
4. For life-threatening situations such as sepsis and bacterial meningitis, the first dose shall be given within 30 minutes to an hour without prior pre-authorization.

5. In the event when the approving AMS Officer cannot be contacted despite repeated attempts, the referring resident physician shall document as such on the form and the Pharmacy may dispense the first dose of the restricted antimicrobial to minimise delay in drug administration. Subsequent doses shall be dispensed only after the order has been authorized by the designated approver and in accordance to the approved duration of use.

6. This procedure shall be applicable at all times. The AMS committee and/or the PTC shall monitor the use of restricted antimicrobials (see Core Element 6) and adherence to this policy; reports of non-compliance shall be submitted to the AMS Chairperson for corrective action.

7. The AMS Committee and/or the PTC may consider additions to the list of restricted antimicrobials provided herein based on local need and individual hospital capabilities.
Action 2. Seventh Day Automatic Stop Order

Infections shall be treated with the shortest effective treatment duration. Unnecessarily prolonged antimicrobial exposure predisposes patients to adverse effects, emergence of drug-resistant organisms and increased costs. This policy shall govern the duration of antimicrobial use by requiring prescriptions to be regularly reviewed, specifically in the need to continue therapy beyond seven (7) days.

Scope

This standard operating procedure shall cover the use of all antimicrobials administered orally and intravenously to all patients admitted in the hospital (inpatient setting only), with exceptions to the following situations:

- Use in HIV/AIDS or cancer patients as antimicrobial prophylaxis according to guidelines; and,
- Use as anti-tuberculosis antibiotics.

Procedure Details

1. All antimicrobial prescriptions may be dispensed by the pharmacy for a treatment period of up to seven (7) days, after which an antimicrobial stop procedure will be enforced.

2. Seven (7) days of antimicrobial use is calculated as follows:
   a. Antimicrobials administered once daily: day of first dose (day 1) plus 6 days;
   b. Antimicrobials administered in divided doses or spaced more than 24 hours apart (e.g. Q48H): day of first dose (day 1) plus 7 days;
   c. For patients transferred to the hospital with antimicrobials started from an outside healthcare facility, the initial/original start date shall be used for calculation of treatment duration;
   d. Loading and missed doses are to be included in the treatment period;
   e. When there is a change in routes of administration or antimicrobial agent (escalation or de-escalation), the counting of days continues to apply.

3. Counting of antimicrobial days will reset if the order was discontinued or put on hold by the physician for more than 24 hours. This is calculated from time the last dose was given before the “discontinue” or “hold” order was written to the time the same antimicrobial was administered after the physician writes the order to resume it.

4. If there is a need to extend antimicrobial therapy for more than 7 consecutive days, the attending resident must complete the 7th day antimicrobial form (Appendix G), indicating reasons for continued use of the antimicrobial agent and intended treatment duration.

5. On completion of the form, the attending or resident physician shall seek approval from the designated AMS Officer in the hospital (AMS clinician, ID specialist or ICC chair/physician member) via a phone consult, detailing relevant patient history and indication requiring the need to continue antimicrobial therapy beyond seven (7) days.
6. The outcome of the call, including approved duration of use, must be documented on the completed form in order for Pharmacy to dispense the approved doses. The AMS Officer shall verify the information entered and sign on the form to indicate his/her agreement and approved treatment duration at earliest time possible (no later than morning of next working day).

7. The pharmacy may only dispense and nurses administer the antimicrobial after approval has been obtained and for the approved duration of therapy.

8. To avoid delays and interruption in administration, the nurse or pharmacist in charge of the patient shall alert the attending physician no later than on the 6th day of antimicrobial therapy.

9. There is no need to fill out the 7th-day antimicrobial form when:

   a. total treatment duration is intended to be ≤7 days; and,
   b. use of the antimicrobial beyond 7 days has been recommended by the AMS clinician, IDS or IPC Chairperson (recommendation must be made in writing as evidence for pharmacy to dispense and nurse to administer).

10. This procedure shall be applicable at all times. The primary responsibility to comply with this policy lies on the attending physician and nurse on duty.

11. The AMS committee and/or the IPC committee shall monitor the duration of antimicrobial use (see Core Element 6) and adherence to this policy; reports of non-compliance shall be submitted to the AMS Chairperson for corrective action.
**Action 3. Point-of-Care (POC) Interventions**

Point-of-care (POC) interventions occur routinely at the ward level with direct feedback to the prescriber/attending physician at the time of prescription or laboratory diagnosis. It improves patient management and outcomes, and is an excellent opportunity to educate clinical staff on appropriate prescribing.

Point-of-care interventions include:

1. Dose optimization;
2. Streamlining or de-escalation of antimicrobial therapy; and,
3. Intravenous to oral (IV-to-PO) antimicrobial therapy switch.

**A. DOSE OPTIMIZATION**

1. Optimization of antimicrobial dose is necessary to ensure efficacy of therapy, which prevents the selection of resistance, and to minimize risk of toxicity.

2. The dose of each prescribed antimicrobial shall be optimized based on:
   i. Individual patient characteristics, such as age, weight, renal and hepatic function, and dialysis modality;
   ii. Causative organism and its susceptibility to the antimicrobial;
   iii. Site of infection; and,
   iv. Pharmacokinetic and pharmacodynamic characteristics of the antimicrobial (e.g. concentration or time-dependent killing, side effects profile, drug-drug interactions, IV fluid compatibility).

3. For specific antimicrobials, special dosing strategies are available and shall be employed to improve treatment outcomes. The following are some examples:
   i. Prolonged or continuous dosing of Beta-lactams for critically ill patients;
   ii. Once-daily dosing of aminoglycosides to improve kill and reduce toxicity (except for infective endocarditis due to *Enterococcus sp.*); and,
   iii. Dosing of vancomycin according to weight and therapeutic drug monitoring of levels.

4. Optimal dosing shall be ensured throughout the course of all antimicrobial therapy by the prescriber and/or the attending physician.

5. Pharmacists shall perform routine checks on antimicrobial dosing and intervene with the prescriber/attending physician shall dosing adjustment be required. All interventions shall be documented in the patient’s medication/medical chart.
B. STREAMLINING OR DE-ESCALATION OF ANTIMICROBIAL THERAPY

1. Empiric antimicrobial regimens are often broad in spectrum to maximize the chance of providing activity against the infecting organism. However, timely de-escalation of therapy is necessary to limit exposure to broad spectrum antimicrobials, thereby preventing the selection of antimicrobial resistant pathogens, reduce cost of therapy and improved patient outcomes.

2. Streamlining or de-escalation of therapy entails:
   i. Adjusting empiric antimicrobial regimen to targeted therapy (culture-directed therapy) based on culture and antimicrobial sensitivity results;
   ii. Discontinuation of empiric antimicrobial therapy when investigations fail to demonstrate evidence of an infective process; and,
   iii. Discontinuation of redundant concurrent antimicrobials.

3. All empiric antimicrobials shall be reviewed in a timely manner for the possibility of de-escalation.

4. Procedure for de-escalation of therapy (Figure 4)
   a. To enable proper diagnosis of infection and subsequent tailoring of antimicrobial therapy, microbiological samples for culture and sensitivity tests shall be taken (where possible) prior to the initiation of antimicrobials. Specimens shall be collected from relevant sites (as clinically indicated) in a manner that maximizes microbiological yield and minimize risk of contamination. This is the responsibility of the prescriber and nurse on duty.
   b. Attending physician shall review the patient 48 to 72 hours after the start of therapy for the possibility of de-escalation.
   c. In the event that a positive culture is detected by the microbiological laboratory:
      i. The microbiologist or technologist shall directly notify the attending physician soonest possible (e.g. via text or phone call) when (a) growth is detected for all cultures from sterile sites and (b) multi-drug resistant pathogens are isolated from any culture site. If feasible, efforts shall be made to notify attending physicians of microbiological culture and sensitivity results from all sites.
      ii. The attending physician or resident shall follow up on the final culture and susceptibility results as soon as it is available.
      iii. If a clinical microbiologist is available, he/she may provide advice on the best choice of antimicrobial(s) for de-escalation, following discussion of the case with the attending physician.
iv. The microbiology service shall provide the AMS team with a daily list of patients identified to have positive culture(s).

v. The AMS Team shall review all patients identified to have positive culture(s) on the next working day to ensure that antimicrobials have been tailored according to culture results. Intervention to de-escalate therapy shall be made with the prescriber/attending physician if required. All interventions shall be documented in patient’s medication/medical chart.

d. In the event of negative culture, the prescriber/attending physician shall review the diagnosis of an infection and discontinue antimicrobials if there is no evidence of an infective process.

e. Other members of the patient’s healthcare team, particularly the nurse on duty and pharmacist, shall also routinely follow up on microbiological results and remind physicians to review the patient once they are available. They may intervene with the prescriber/attending physician if required. All interventions shall be documented in patient’s medication/medical chart.

![Figure 4. Procedure for streamlining or de-escalation of antimicrobial therapy](image)

**Figure 4. Procedure for streamlining or de-escalation of antimicrobial therapy**
C. INTRAVENOUS TO ORAL (IV-to-PO) ANTIMICROBIAL THERAPY SWITCH

1. Patients with serious infections requiring hospitalization are usually initiated on intravenous (IV) antimicrobial therapy to ensure maximum concentrations are attained at site of infection. For selected antimicrobials with excellent oral bioavailability, timely conversion to oral (PO) therapy once a patient meets the set criteria, results in advantages – reduced nursing time for IV drug preparation and IV line care, length of stay, healthcare costs, and potential complications from IV access – without adversely impacting clinical outcomes.

2. The AMS Committee and PTC shall be responsible for instituting the IV-to-PO Switch guidelines in the hospital and ensuring that all relevant healthcare staff are trained to perform IV-to-PO switch (e.g. lectures, posters on wards).

3. **General procedure for IV-to-PO Switch** (Figure 5)
   i. All patients receiving IV antimicrobials with excellent oral bioavailability (listed in Box 1) for indications that do not necessitate prolonged IV therapy (Box 3) shall be assessed for switch to PO therapy.
   ii. Patients shall be reviewed early within 48 hours, and switched to PO therapy as soon as they meet the switch criteria (Box 2).
   iii. Patients who do not meet switch criteria at initial assessment, shall be continually reviewed again at 24-hour interval.
   iv. Patients switched to PO antimicrobials shall be monitored for continued response to therapy.

4. The prescriber and/or the attending physician are responsible to ensure IV-to-PO switch is performed in a timely manner.

5. Other members of the patient’s healthcare team, particularly the nurse on duty and pharmacist shall also routinely review if patient meets the criteria for IV-to-PO switch and intervene with the prescriber/attending physician if required. All interventions shall be documented in patient’s medication/medical chart.

6. The AMS Team shall review all patients prescribed IV antimicrobials listed in Box 1 on the next working day to assess for eligibility for IV-to-PO switch. Intervention for PO switch shall be made with the prescriber/attending physician if required.

7. All interventions shall be documented in patient’s medication/medical chart. The standardized IV-to-PO switch intervention form (Appendix H) may be used to facilitate interventions and documentation.

8. Compliance to IV-to-PO Switch guidelines shall be reported to the hospital’s AMS Committee, PTC, clinical departments and DOH-PD by the AMS Team.

9. The IV-to-PO Switch guidelines shall be reviewed regularly and updated as needed.
**Figure 5. Procedure for Intravenous to Oral (IV-to-PO) Switch**

**Box 1: Antibiotic suitable for IV-to-PO Switch**
- Azithromycin
- Clindamycin
- Co-trimoxazole
- Fluconazole
- Fluoroquinolones: Ciprofloxacin, Levofloxacin, Moxifloxacin
- Linezolid
- Metronidazole

Review within 48h of initiation
There is no minimum required IV duration and patients should be switched to PO as soon as they meet the switch criteria.
Review by attending physician, pharmacists and nurse.

**Box 2: Switch Criteria**

1. **Clinical Stability**
   - Afebrile
   - Downward trend or normalisation of C-reactive protein (CRP) and White blood cell (WBC) count
   - Stable vital signs (No unexplained tachycardia, hypotension, tachypnea)

2. **Ability to tolerate oral intake**
   - Patient is not nil by mouth
   - Tolerating oral diet, medications and/or enteral feeds
   - Oral absorption is not compromised (e.g. No vomiting or diarrhoea, malabsorptive disorder)

**Box 3: Indications that mandates prolonged IV antimicrobial therapy**
- Deep-seated infections (e.g. abscess, empyema)
- *Staphylococcus aureus* bacteremia
- Meningitis or encephalitis
- Septic arthritis
- Osteomyelitis
- Endocarditis
- Necrotising soft tissue infections
- Infected implants or prosthesis
- Febrile neutropenia

Yes → Criteria met? → No

Convert to PO (unless indication mandates prolonged IV therapy)
Monitor patient

Continue IV
Review again after 24h
Action 4. Prospective Audit of Antimicrobial Prescribing & Direct Intervention and Feedback (Audit and Feedback)

Prospective audit with direct intervention and feedback to the prescriber involves the clinical evaluation of individual prescriptions of antimicrobials for appropriateness, followed by the immediate and direct communication with prescribers to optimize treatment for each patient.

Definition of Terms

<table>
<thead>
<tr>
<th>Monitored antimicrobial</th>
<th>Antimicrobial agent selected to be subject to AMS audit.</th>
</tr>
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<tbody>
<tr>
<td>Audited patient</td>
<td>Patient receiving a monitored antimicrobial and under scope of AMS audit.</td>
</tr>
<tr>
<td>Audit case</td>
<td>A single unique course of treatment using one monitored antimicrobial. Change in therapy involving a different monitored antimicrobial constitutes a new audit case.</td>
</tr>
<tr>
<td>Initial appropriateness</td>
<td>Monitored antimicrobial is of the right choice, administered at the right dose and route, given the patient’s specific clinical situation, at the point of prescription.</td>
</tr>
<tr>
<td>Final appropriateness</td>
<td>Monitored antimicrobial is of the right choice, administered at the right dose and route, and for the right duration given the patient’s specific clinical situation, at the end of therapy.</td>
</tr>
<tr>
<td>Overall appropriateness</td>
<td>Monitored antimicrobial is deemed appropriate at both initial and final time points.</td>
</tr>
</tbody>
</table>

Procedural Details (Figure 6)

1. Antimicrobials for audit:
   a. Monitored antimicrobials are all intravenous and oral formulations of
      i. 3rd generation Cephalosporins (all);
      ii. Fluoroquinolones (all);
      iii. Aminoglycosides (all);
      iv. Clindamycin
      v. Extended-spectrum Penicillins
      vi. Fluconazole
   b. The antimicrobial therapy for the audited patient shall be reviewed and optimized in its entirety, including any concurrent non-monitored antimicrobials that he/she is receiving.
   c. Hospitals may choose to audit more shall they identify the need to do so based on their unique hospital profile.
2. Audit is to be conducted hospital-wide. In consideration that hospitals may need time to implement/ scale-up the program, the following timeline may be used (table 5). Hospitals may choose to initiate audit in areas where critical antimicrobials are most inappropriately used, have high incidence of AMR and/or where AMS interventions would have the greatest impact.

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1 (2019)</th>
<th>Year 2 (2020)</th>
<th>Year 3 (2021)</th>
<th>Year 4 (2022)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% monitored patient population audited</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

3. A standardized procedure shall be in place to identify patients who have been prescribed monitored antibiotics, and to notify the AMS Team to begin audit, on a daily basis (e.g. collaborating with pharmacy to obtain a list of patients for which monitored antimicrobials were dispensed, or via use of IT systems).

4. Audit shall begin not later than 48 hours (or in the event of weekends and public holidays, the next working day) after prescription of monitored antimicrobial, and continue until the monitored antimicrobial has been discontinued.

5. Evaluation of appropriateness for monitored antimicrobial
   a. Each monitored antimicrobial shall be regularly evaluated for appropriateness of choice, dose, route of administration and duration of therapy throughout the period it is prescribed (Table 6).
   b. It is recommended to perform review at least at these time-points (Figure 6):
      i. Initial: At point of prescribing (day 1 or 2);
      ii. Ongoing: At point when findings from initial investigations including microbiological results are available (day 3 or 4); and,
      iii. Final: At point of expected discontinuation (completion of therapy).
   c. Assessment of appropriateness shall be conducted at initial and final time-points to identify reasons for inappropriate prescribing. An antimicrobial use is considered appropriate when it complies with established clinical guidelines and pathways, and tailored according to microbiological results within 24 hours of reporting.
   d. Due consideration shall be given to the individual patient’s clinical situation to ensure that antimicrobial therapy is appropriately tailored to the patient. Relevant patient-specific information (e.g. medical and medication records, microbiological, radiological and laboratory investigation results, severity of illness, goals of care) shall be reviewed. Bedside clinical review and examination of patient by AMS Clinician can be considered if indicated and acceptable to the primary team.
   e. The AMS Pharmacist(s) shall review and evaluate the prescriptions. When deemed inappropriate, or where there is limited evidence to guide the assessment of appropriateness, the audit case shall be discussed at the AMS Team meeting and a decision reached by consensus in consultation with AMS Clinician.
   f. AMS Team meetings shall be held daily to allow for timely case discussions and interventions.

6. Performing intervention
   a. Types of interventions include, but are not limited to, discontinuation of antimicrobial agent, escalation or de-escalation based on culture results, narrowing or broadening
of therapy based on guidelines and patient risk factors, optimization of dosing regimen and IV-to-PO conversion (Table 6).

b. Situations may arise when the monitored antimicrobial is appropriate but additional clinical information or advice is necessary to optimize patient care. The AMS Team may consider issuing the following recommendations:
   - Optimizing overall antimicrobial therapy by addition and/or discontinuation of concurrent non-monitored antimicrobials to ensure sufficient yet without unnecessary overlapping of antimicrobial coverage;
   - Formally referring to the IDS (if available) for complex or un-resolving infections
   - Implementing infection control measures;
   - Performing therapeutic drug monitoring; and,
   - Performing additional investigations to aid the diagnosis and management of infection or to rule-out infective causes.

c. All interventions (including those made verbally through phone or in-person) must be documented in writing and recorded in patient’s medical records.

d. It must be made clear in writing to the primary team that intervention/recommendation by the AMS team is not a substitute for a formal Infectious Diseases consultation.

e. All interventions must be followed up within 24 hours of issuance. If an intervention is not acted upon, all attempts shall be made to engage prescriber in discussion on the rationale for the intervention and to persuade acceptance of recommendation.

f. Interventions not accepted within 48 hours of issuance are considered rejected and reason(s) for rejection must be elucidated and documented.

Table 6. Types of inappropriate use and corresponding intervention types

<table>
<thead>
<tr>
<th>Reason for inappropriateness</th>
<th>Description</th>
<th>Intervention type</th>
</tr>
</thead>
<tbody>
<tr>
<td>No infection</td>
<td>Monitored antimicrobial started or continued despite lack of signs and symptoms or evidence of infection (e.g. antibiotic use in viral infection).</td>
<td>Discontinue antimicrobial agent</td>
</tr>
<tr>
<td>Wrong choice</td>
<td>Wrong selection of antimicrobial agent based on guidelines, clinical progress, and/or microbial culture and susceptibility results.</td>
<td>Escalate or de-escalate therapy</td>
</tr>
<tr>
<td>Wrong dose</td>
<td>Dosing regimen is inappropriate according to patient characteristics, end-organ function, therapeutic drug monitoring and pharmacodynamic/pharmacokinetic properties.</td>
<td>Optimize dosing regimen</td>
</tr>
<tr>
<td>Wrong route</td>
<td>Use of parenteral antimicrobial when an oral route of administration may be used.</td>
<td>IV-to-PO switch</td>
</tr>
<tr>
<td>Wrong duration</td>
<td>Continued use of monitored antimicrobial beyond the length deemed appropriate for effective treatment of that particular infection according to local guidelines.</td>
<td>Discontinue antimicrobial agent</td>
</tr>
</tbody>
</table>

7. Documentation

a. Documentation is of utmost importance for the purpose of external audits and in the event of medico-legal issues.

b. Documentation shall include, but is not limited to: name of AMS clinical pharmacist in-charge of the case, all pertinent information substantiating the evaluation of appropriateness and any intervention(s) performed, details of interventions performed and their outcomes (accepted or rejected), and communications (written and verbal) with primary team and other members of the healthcare team.
c. Important documents:
   i. A standardized audit form for each individual audit case, either in paper (Appendix I) or electronic form, shall be maintained and kept by the AMS Team for at least 2 years.
   ii. Document of intervention, either in a letter addressed to the attending physician or as an entry in the patient’s medication/medical chart, shall be kept with the patient’s records.

8. Key performance measures specific to Audit and Feedback (see Core Element 6) are to be reported to the AMS committee and hospital management (quarterly) and DOH-PD (yearly).

![Figure 6. Procedure for Audit and Feedback](image-url)
CORE ELEMENT 5
EDUCATION

- Education, one of the core elements of AMS, aims to teach all health professionals the necessary principles of judicious prescribing and use of antimicrobials.

- All hospitals shall aim to provide training and continuous education to healthcare staff, who are in contact with patients on antibiotics. These include not only the prescribers (i.e. attending physicians), nurses, clinical pharmacists, microbiologists, and midwives, but also medical students and paramedical staff under training to ensure that the transfer of basic and advanced scientific knowledge and skills on the proper use of antibiotics occurs at an early stage.

- The AMS Committee shall ensure that the above-mentioned hospital personnel attend the standard Training Course on AMS through an education program certified or recognized by the DOH.

- Hospitals, especially teaching and training institutions, shall also develop training modules with clear learning outcomes and competencies on AMS starting early in the undergraduate curriculum up to postgraduate training covering microbiology, prevention and control of infectious diseases, clinical pharmacology, hospital pharmacy and patient communication skills and the prudent use of antibiotics.

- All AMS Practitioners must be on a relevant professional registry such as the Register of Physicians/Specialists, Register of Pharmacists, Register of Nurses or their equivalent AND have completed an AMS training program specifically for AMS practitioners that is conducted or recognized by the DOH.

- AMS Practitioners shall continually update themselves on the newest developments in the area of microbiology, infectious disease management and prevention, pharmacotherapy, and AMS practice.

- Educational strategies must also be targeted to patients and their caregivers on basic principles of infection prevention and control, personal hygiene, handwashing, and core messages on AMR and AMS. All hospitals shall ensure that systems are in place for patient education and counselling on how to correctly take their prescribed antimicrobials and responsibly use antimicrobials.
A. EDUCATION FOR AMS PRACTITIONERS

1. All AMS Practitioners must be on a relevant professional registry such as the Register of Physicians/Specialists, Register of Pharmacists, Register of Nurses or their equivalent and have completed an AMS training program specifically for AMS practitioners that is conducted or recognized by the DOH.

2. AMS Provider: A trained pharmacist responsible for audit of antimicrobial prescriptions and for performing AMS interventions or support shall have knowledge in the following core areas:
   a. Knowledge and skills necessary for the establishment of an AMS program (e.g. aims of AMS, types of AMS strategies, ethics and controversies of AMS)
   b. Clinical knowledge and skills required for the practice of AMS:
      i. Pharmacology of anti-infective agents including:
         □ Spectrum of activity, and clinical indications of anti-infective agents;
         □ Principles of pharmacokinetics and pharmacodynamics (PK/PD) and its implications; and,
         □ Monitoring of common adverse effects and drug interactions.
      ii. Basic microbiology and infectious diseases:
         □ Diagnostic criteria, treatment options and existing clinical guidelines for common infections;
         □ Basic mechanisms of antimicrobial resistance, common antimicrobial resistance profiles with corresponding risk factors, and treatment options directed against these; and,
         □ Limitations of current diagnostic techniques for infectious diseases.
      iii. Interpretation of antibiograms and their utility.
      iv. Basic clinical skills:
         □ Communication with patients and healthcare providers; and,
         □ Basic clinical review and evaluation, including assessment of gastrointestinal absorption, severity of infection, clinical documentation and reporting.
   c. Measurements of the outcomes and impact of an AMS program include:
      i. Importance and process of measurement to monitor and drive the program;
      ii. Process and outcome indicators; and,
      iii. Surveillance of AMR and AMU.

3. AMS clinician: An AMS trained physician or IDS responsible for adjudicating appropriateness of antibiotic prescription, especially in complex cases shall have knowledge in the following core areas:
   a. All of the core knowledge as AMS Provider (see above).
   b. Comprehensive understanding of antimicrobial pharmacology.
   c. Comprehensive understanding of ID, including diagnostic tests and their interpretation and treatment guidelines.
   d. Advanced clinical skills, particularly in patient evaluation and ID clinical care.
4. It is the responsibility of the AMS practitioner to gain knowledge in these core areas and maintain competency to ensure the effectiveness of AMS program and the safety of their patients. This can be achieved through either formal and/or informal education (Table 7).

Table 7. Examples of informal education for AMS practitioners

<table>
<thead>
<tr>
<th>Informal education for AMS practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identify mentor with ID expertise for case discussions</td>
</tr>
<tr>
<td>• Attend ward rounds with ID specialist</td>
</tr>
<tr>
<td>• Observership with a clinical microbiologist</td>
</tr>
<tr>
<td>• Join ID professional organizations</td>
</tr>
<tr>
<td>• Attend ID professional meetings</td>
</tr>
<tr>
<td>• Participate in ID-related continual education programs</td>
</tr>
<tr>
<td>• Read ID-related journals and articles</td>
</tr>
<tr>
<td>• Participate in ID journal club</td>
</tr>
<tr>
<td>• Attend ID-related morbidity and mortality case reviews</td>
</tr>
</tbody>
</table>

5. AMS Practitioners shall continually update themselves on the newest developments in the area of microbiology, infectious disease management and prevention, pharmacotherapy and AMS practice. This is to ensure that their AMS practice and recommendations are current and appropriate.

B. EDUCATION FOR HEALTHCARE PROFESSIONALS AND HOSPITAL STAFF

1. Education, one of the core elements of AMS, aims to teach all health professionals the necessary principles of judicious prescribing and use of antimicrobials.

2. All hospitals shall aim to provide training and continuous education to healthcare staff, who are in contact with patients on antibiotics. These include not only the prescribers (i.e. attending physicians), nurses, clinical pharmacists, microbiologists, and midwives, but also medical students and paramedical staff under training to ensure that the transfer of basic and advanced scientific knowledge and skills on the proper use of antibiotics occurs at an early stage.

3. The AMS Committee shall ensure that the above-mentioned hospital personnel attend the standard Training Course on AMS through an education program certified or recognized by the DOH.

4. Hospitals, especially teaching and training institutions, shall also develop training modules with clear learning outcomes and competencies on AMS starting early in the undergraduate curriculum up to the postgraduate training covering microbiology, prevention and control of infectious diseases, clinical pharmacology, hospital pharmacy and patient communication skills and the prudent use of antibiotics.
5. The educational topics shall include:
   a. The threat, causes and adverse impact of AMR;
   b. The importance and benefits of AMS;
   c. The hospital’s AMS program and antibiotic policy;
   d. Roles and responsibilities that the various HCP have to ensure appropriate use of antimicrobials and combat AMR;
   e. Good practices for ID management (for practicing HCP), including:
      i. General principles of antimicrobial therapy;
      ii. Interpretation of antibiotic susceptibility reports and antibiograms;
      iii. Diagnostic and treatment guidelines and pathways for common infectious diseases;
      iv. Therapeutic drug monitoring.

6. The AMS Committee/Team shall use every opportunity for education through various educational methods (e.g. didactic presentations, printed/electronic materials, roadshows, concurrent- or post-audit feedback) that are best suited to its monitored audience.

7. Regular education is needed in view of changes in AMR with time and staff turnover.

C. EDUCATION OF PATIENTS AND CARE-GIVERS

1. Educational strategies must also be targeted to patients and their caregivers on basic principles of infection prevention and control, personal hygiene, handwashing, and core messages on AMR and AMS.

2. All hospitals shall ensure that systems are in place for patient education and counselling on how to correctly take their prescribed antimicrobials and responsibly use antimicrobials.

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2 Examples of patient education materials are available at:
2) World Health Organisation: http://www.who.int/gpsc/5may/patient-tips.pdf [Accessed 31 August 2016]
CORE ELEMENT 6
PERFORMANCE EVALUATION

- Measuring process and clinical indicators to assess the overall quality management improvement and effectiveness of AMS interventions in the hospital is a fundamental component of a successful AMS Program. This is crucial in guiding the progressive implementation of the program both at the health facility and national level, ultimately towards achieving the goals of the national agenda to combat AMR.

- The AMS Committee of all hospitals are to submit to the DOH Pharmaceutical Division an annual AMS program monitoring report for tracking of progress of the AMS Program.

A. REPORTING PROCESS

1. All hospitals, through its AMS Committee, shall submit an annual (1st January to 31st December) report on the progress of their AMS program to the DOH-PD using the Standardized Reporting Form by 31st January the following year.

2. The hospital administration, PTC and AMS Committee may, at their discretion, mandate frequent (but not more often than quarterly) evaluation and reporting of the progress of the AMS program to enable problem areas to be identified and addressed early.

3. The AMS executive is to be responsible for the coordination, compilation, and submission of hospital reports. All hospital staffs are to assist with the provision of data as required in order for timely and accurate reporting to be done.

4. The progress and performance of the hospital AMS program will be evaluated against the stipulated target performance indicators set by the DOH. It is the duty of each hospital to ensure all efforts are made to achieve and excel in these indicators.

B. PERFORMANCE INDICATORS

1. All AMS strategies and interventions implemented shall be monitored individually and as a whole to measure their effectiveness and to identify areas for further improvement.

2. Performance indicators comprise of quality, quantity, process, and outcome indicators. Indicators adopted shall be specific, measurable, objective, reliable, and representative of the goals and objectives of the intervention.

3. Indicators to be reported to the DOH are specified in Tables 8, 9, and 10. These indicators are to be submitted alongside, and not replace, the AMU report outlined in the AMU Final Methods Guide.

4. Hospitals may consider use of indicators to evaluate patient safety of AMS interventions (e.g. proportion of patients with accepted AMS recommendation and had infection-related readmission and/or infection-related mortality within 30 days of intervention) if data is readily available.
### Table 8. Program Indicators

<table>
<thead>
<tr>
<th>Qualitative Program Indicators (Infrastructure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your facility have a formal <strong>antimicrobial stewardship program</strong> accountable for ensuring appropriate antimicrobial use?</td>
</tr>
<tr>
<td>Does your facility have a <strong>formal organizational structure</strong> responsible for antimicrobial stewardship (e.g., a multidisciplinary committee focused on appropriate antimicrobial use, pharmacy committee, patient safety committee or other relevant structure)?</td>
</tr>
<tr>
<td>Is a <strong>trained</strong> antimicrobial stewardship <strong>team</strong> available at your facility (e.g., greater than one staff member supporting clinical decisions to ensure appropriate antimicrobial use)?</td>
</tr>
<tr>
<td>Is there a physician identified as a <strong>leader</strong> for antimicrobial stewardship activities at your facility?</td>
</tr>
<tr>
<td>Is there a <strong>pharmacist</strong> responsible for ensuring appropriate antimicrobial use at your facility?</td>
</tr>
<tr>
<td>Does your facility provide any <strong>salary support</strong> for dedicated time for antimicrobial stewardship activities (e.g., percentage of full-time equivalent (FTE) for ensuring appropriate antimicrobial use)?</td>
</tr>
<tr>
<td>Does your facility have the <strong>IT capability</strong> to support the needs of the antimicrobial stewardship activities?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualitative Program Indicators (Policy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your facility have <strong>facility-specific treatment recommendations</strong> based on local antimicrobial susceptibility to assist with antimicrobial selection for common clinical conditions?</td>
</tr>
<tr>
<td>Does the facility have an <strong>approved hospital formulary list</strong> or <strong>essential medicines list (EML)</strong>?</td>
</tr>
<tr>
<td>Does your facility have a written policy that requires prescribers to <strong>document an indication</strong> in the medical record or during order entry for all antimicrobial prescriptions?</td>
</tr>
<tr>
<td>Is it routine practice for specified antimicrobial agents to be approved by a physician or pharmacist in your facility (e.g., <strong>pre-authorization</strong>)?</td>
</tr>
<tr>
<td>Is there a formal procedure for a physician, pharmacist, or other staff member to review the appropriateness of an antimicrobial within or after 48 hours from the initial order (<strong>post-prescription review</strong>)?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualitative Program Indicators (Monitoring and Feedback)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has your facility produced a <strong>cumulative antimicrobial susceptibility report</strong> in the past year?</td>
</tr>
<tr>
<td>Does your facility <strong>monitor if the indication</strong> is captured in the medical record for all antimicrobial prescriptions?</td>
</tr>
<tr>
<td>Does your facility audit or <strong>review surgical antimicrobial prophylaxis</strong> choice and duration?</td>
</tr>
<tr>
<td>Are results of antimicrobial audits or reviews <strong>communicated directly</strong> with prescribers?</td>
</tr>
<tr>
<td>Does your facility <strong>monitor antimicrobial use</strong> by grams [Defined Daily Dose (DDD)] and/or counts [Days of Therapy (DOT)] of antimicrobial(s) by patients per days?</td>
</tr>
<tr>
<td>Has an <strong>annual report</strong> focused on antimicrobial stewardship (summary antimicrobial use and/or practices improvement initiatives) been produced for your facility in the past year?</td>
</tr>
</tbody>
</table>
### Quantitative Program Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Formula</th>
</tr>
</thead>
</table>
| Percentage of antimicrobials prescribed consistent with the hospital formulary list | \[
\frac{\text{No. of antimicrobials prescribed that are on the formulary list}}{\text{No. of antimicrobials prescribed}} \times 100
\] |
| Median and range of duration of prescribed antimicrobial treatment        |                                                                         |
| Percentage of patients who receive surgical antimicrobial prophylaxis for specific conditions in accordance with hospital guideline | \[
\frac{\text{No. of patients receiving surgical antimicrobial prophylaxis for specific conditions in accordance with hospital guidelines}}{\text{Total no. of caesarian procedures}} \times 100
\] |
| Percentage of doses of prescribed antimicrobials actually administered    | \[
\frac{\text{No. of doses of prescribed antimicrobials that was administered}}{\text{Total no. of doses prescribed for the course of therapy}} \times 100
\] |
| Average duration of hospital stay of patients who receive antimicrobials  | \[
\frac{\text{Total number of hospitalisation days for patients receiving antimicrobials}}{\text{Sum of patients receiving antimicrobials}} \times 100
\] |

### Table 9. Process and outcome indicators for Core Element 4

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Process indicators (per month)</th>
<th>Outcome indicators (per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point-of-care interventions</td>
<td>• No. of interventions (by intervention type) and % acceptance</td>
<td>• DDD/1000 patient-days of all restricted and monitored antimicrobials;</td>
</tr>
<tr>
<td></td>
<td>• DDD/1000 patient-days of all IV and PO formulations of antimicrobials subjected to IV-to-PO switch intervention</td>
<td></td>
</tr>
<tr>
<td>7th -day automatic stop order and Restriction and pre-authorisation</td>
<td>• No. of requests and % approval</td>
<td>• median and range of total antimicrobial days for each case admission</td>
</tr>
<tr>
<td></td>
<td>For audit-and-feedback:</td>
<td>For audit-and-feedback:</td>
</tr>
<tr>
<td>Audit-and-feedback (report by MAM*)</td>
<td>• % monitored patient population audited</td>
<td>• % empiric MAM prescriptions without cultures done within 48 hours of initiation</td>
</tr>
<tr>
<td></td>
<td>• No of MAM prescriptions reviewed</td>
<td>• % initial appropriateness</td>
</tr>
<tr>
<td></td>
<td>• No. of interventions and % acceptance</td>
<td>• % final appropriateness</td>
</tr>
<tr>
<td></td>
<td>For audit-and-feedback:</td>
<td>• % overall appropriateness</td>
</tr>
</tbody>
</table>

*MAM: monitored antimicrobial. It is defined as a unique course of an antimicrobial agent used for the treatment of a unique infective episode e.g. empiric ceftriaxone that is subsequently changed to culture-directed ciprofloxacin will involve two MAM prescriptions.
Table 10. Measurement technique for indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Measurement technique</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Process indicators</strong></td>
<td></td>
</tr>
<tr>
<td>No. of interventions</td>
<td>Sum of interventions made</td>
</tr>
<tr>
<td>% acceptance</td>
<td>(\frac{\text{No. of interventions accepted} \times 100}{\text{Sum of interventions made}})</td>
</tr>
<tr>
<td>No. of requests</td>
<td>Sum of requests for extension reviewed</td>
</tr>
<tr>
<td>% approval</td>
<td>(\frac{\text{No. of requests approved} \times 100}{\text{Sum of requests made}})</td>
</tr>
<tr>
<td>No. of cases reviewed</td>
<td>Sum of unique antimicrobial courses reviewed</td>
</tr>
<tr>
<td>% monitored population audited</td>
<td>(\frac{\text{No. of patients in audited hospital units} \times 100}{\text{Sum of patients admitted to the whole hospital during the same time period}})</td>
</tr>
</tbody>
</table>

Example:
Audit-and-Feedback was implemented only in Internal Medicine unit by the end of Year 2017. Total number of patients admitted into this unit in 2017 is 200 while total number of patients admitted into the hospital in 2017 is 1000.

% monitored population audited = \(\frac{\text{Number of patients admitted into IM in 2017} \times 100}{\text{Sum of patients admitted to the whole hospital in 2017}}\)

= \(\frac{200 \times 100}{1000}\)

= 20%

If the AMS Team expanded their scope for Audit-and-Feedback during the course of a year, the latest measure of % monitored population audited shall be reported and using the time period of their last expansion.

<table>
<thead>
<tr>
<th><strong>Outcome indicators</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DDD/1000 patient-days</td>
<td>Defined daily doses of each antimicrobial normalised by 1000 patient-days (refer to AMU Final Methods Guide)</td>
</tr>
<tr>
<td>Days of Therapy (DOT)</td>
<td>The aggregate sum of days for which any amount of a specific antimicrobial agent was administered to individual patients</td>
</tr>
<tr>
<td>Median and range of total antimicrobial days for each case admission</td>
<td>Median number and range of total duration of antimicrobial use for each patient admission with antimicrobial use (refer to AMU Final Methods Guide)</td>
</tr>
<tr>
<td>% empiric prescriptions without cultures done within 48hrs of initiation</td>
<td>(\frac{\text{No. of empiric TAM courses without prior cultures done}}{\text{sum of empiric TAM courses}})</td>
</tr>
<tr>
<td>% initial appropriateness</td>
<td>(\frac{\text{No. of TAM courses appropriate at initial timepoint} \times 100}{\text{Sum of TAM courses audited}})</td>
</tr>
<tr>
<td>% final appropriateness</td>
<td>(\frac{\text{No. of TAM courses appropriate at final timepoint} \times 100}{\text{Sum of TAM courses audited}})</td>
</tr>
<tr>
<td>% overall appropriateness</td>
<td>(\frac{\text{No. of overall appropriate TAM courses} \times 100}{\text{Sum of TAM courses audited}})</td>
</tr>
</tbody>
</table>
Table 11. Targets for process and outcome indicators for core element 4

<table>
<thead>
<tr>
<th>Outcome Indicators (per month)</th>
<th>Year 1 (2020)</th>
<th>Year 2 (2021)</th>
<th>Year 3 (2022)</th>
<th>Year 4 (2023)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% empiric prescriptions without cultures done within 48hrs of initiation</td>
<td>≤15%</td>
<td>≤10%</td>
<td>≤5%</td>
<td>≤5%</td>
</tr>
<tr>
<td>% initial appropriateness of monitored antimicrobial prescriptions</td>
<td>65%</td>
<td>70%</td>
<td>75%</td>
<td>80%</td>
</tr>
<tr>
<td>% final appropriateness of monitored antimicrobial prescriptions</td>
<td>65%</td>
<td>70%</td>
<td>75%</td>
<td>80%</td>
</tr>
<tr>
<td>% overall appropriateness of monitored antimicrobial prescriptions</td>
<td>65%</td>
<td>70%</td>
<td>75%</td>
<td>80%</td>
</tr>
<tr>
<td>% intervention acceptance</td>
<td>75%</td>
<td>80%</td>
<td>85%</td>
<td>90%</td>
</tr>
</tbody>
</table>
REFERENCES


Appendix A
Example of a Basic Hospital Antibiotic Policy

ANTIMICROBIAL POLICY

<table>
<thead>
<tr>
<th>Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td></td>
</tr>
<tr>
<td>Review date</td>
<td></td>
</tr>
<tr>
<td>Author(s)</td>
<td></td>
</tr>
<tr>
<td>Contact details for enquiries</td>
<td></td>
</tr>
<tr>
<td>Details of electronic availability of policy</td>
<td></td>
</tr>
<tr>
<td>Associated policies and guidelines</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
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<th>Scope and Purpose</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards for Prudent Antimicrobial Prescribing and Use</td>
<td></td>
</tr>
<tr>
<td>Prudent Prescribing Initiatives</td>
<td></td>
</tr>
</tbody>
</table>

SCOPE AND PURPOSE

1. The *Manual of Procedures for Implementing Antimicrobial Stewardship Programs In Hospitals, 2016*, by the Department of Health, Philippines, requires all hospitals to have a hospital antibiotic policy as a stand against antimicrobial resistance and commitment towards appropriate antimicrobial use through effective stewardship.

2. The hospital antimicrobial policy encourages rational antimicrobial prescribing and dispensing practice of all hospital staff with the primary aim of minimizing the morbidity and mortality due to antimicrobial-resistant infection; and preserving the effectiveness of antimicrobial agents in the treatment and prevention of infectious diseases.

3. This policy is mandatory and applies to all hospital staff. Failure to comply may result in disciplinary action.

1 Adapted from *Specialist Advisory Committee on Antimicrobial Resistance (SACAR) Antimicrobial Framework* and the Antimicrobial Policy from Royal Devon and Exeter hospital (UK).
STANDARDS FOR PRUDENT ANTIMICROBIAL PRESCRIBING AND USE

1. A history of allergy to relevant agents shall always be sought and documented.

2. Do not start antimicrobial therapy without clear clinical justification. Antimicrobials shall be used after a treatable infection has been recognized or there is a high degree of suspicion of infection. In general, colonization or contamination shall not be treated. Patients who receive antimicrobial therapy are at increased risk of colonisation and infection with Clostridium difficile, MRSA and other multi-resistant pathogens. Patients shall not be subjected to this increased risk without reasonable evidence of infection or established prophylactic benefit.

3. Antimicrobials shall be used for prophylaxis only when its benefit has been established and prescribed in accordance with guidelines. Majority of surgical procedures require only a single dose of perioperative prophylaxis. Long-term prophylaxis shall be given only if clear clinical indication exists (e.g. post-splenectomy).

4. Before starting antimicrobial therapy every effort shall be made to collect relevant specimens for microbiological investigations (see policy and procedures for microbiological samples).

5. Effective treatment must be started promptly and within one hour (soonest possible) in patients with life-threatening infection. Treatment delay is associated with increased morbidity and mortality.

6. Antimicrobial therapy shall be used solely as an adjunct in cases where surgery or wound management is the primary intervention. The presence of foreign bodies has a profound effect on the activity of antimicrobial agents and it is often necessary to remove the foreign material to cure an infection in its vicinity (e.g. prosthetic heart valve or joint implant). Similarly, drainage of infected abscesses or empyema and debridement of necrotic tissue is critical to successful outcomes.

7. The choice of antimicrobial shall be determined by the sensitivity of the identified causative pathogen if it is known.

8. Empiric therapy must be governed by the National Antibiotic Guidelines (NAG) (or the adapted hospital antibiotic guidelines) or other specialist guidelines where the NAG does not exist. Local guidelines are developed in accordance with local pathogen epidemiology & antimicrobial sensitivity patterns, and recommend antimicrobial agents selected for target site penetration and evidence-based clinical efficacy. If guidelines are not followed for clinical reasons, the reason shall be clearly documented.

9. Narrow-spectrum antimicrobial agents shall be prescribed in preference to broad-spectrum agents where appropriate. Broad-spectrum agents cause the most collateral damage to non-pathogenic normal flora, which form an integral component of the host defence against infection by competing with pathogens for nutrients and producing antibiotic secretions. Broad-spectrum agents also apply selection pressure to colonising bacteria increasing the risk of colonisation by antimicrobial-resistant strains, which could subsequently cause difficult to treat infection.
10. **Broad-spectrum empirical antimicrobial therapy** may be indicated in certain circumstances. Examples are listed below.
   a. Life-threatening infection or severe sepsis
   b. Significantly immunocompromised hosts
   c. Suspected or confirmed polymicrobial infection
   d. Recent exposure to antimicrobials or failure of first-line therapy with narrow spectrum antimicrobials
   e. Risk of infection with resistant pathogens due to recent contact with a healthcare environment or exposure to antimicrobials
   f. Laboratory-confirmed resistant pathogen
   g. History of colonisation or infection with resistant pathogen in a relevant time period

11. **Empirical antimicrobials must be reviewed at 48 hours.** A review of the patient’s clinical status and results from investigations (e.g. microbiological, laboratory and/or radiology) shall be performed; and an antibiotic plan developed to either stop antibiotics; switch to oral treatment; de-escalation to narrow spectrum if a causative organism is identified and antimicrobial sensitivity data are available; antibiotics continued and reviewed after a further 24 hours; or initiate outpatient-based parenteral antimicrobial therapy.

12. **Targeted therapy shall be used in preference to broad-spectrum antimicrobials unless there is a clear clinical reason** (for example, mixed infections or life-threatening sepsis). The prescription of broad-spectrum antimicrobials shall be reviewed as soon as possible and promptly de-escalated to narrow-spectrum agents when sensitivity results become available. If therapy was not de-escalated, the reason shall be clearly documented.

13. **Document all prescriptions for antimicrobial therapy in the medical notes and drug chart/prescription, including the indication for treatment, the drug, dose, route of administration, date for review and intended duration (start and stop date).** Review of antimicrobial therapy by medical colleagues following transfer of care is facilitated by clear documentation of the reason for initiating prescribing and the original intended course length. Consideration shall be given to creating a separate section on the drug chart for antimicrobials to include the indication.

14. **The timing, regimen, dose, route of administration and duration of antimicrobial therapy shall be regularly reviewed and optimized.** In general, antimicrobial courses must be reviewed daily.

15. **Antimicrobial therapy must be prescribed at an appropriate dose, as recommended in the NAG (or the adapted hospital-specific antibiotic guidelines) or other specialist guidelines where the NAG does not exist.** The dose must be appropriate for the patient’s weight, renal and hepatic function, site of infection, causative pathogen and pharmacokinetic and pharmacodynamic properties of the antimicrobial.

16. **Wherever possible, antimicrobials shall be given orally rather than intravenously.** As soon as possible the prescription shall be switched to an oral equivalent in accordance to the IV-to-PO switch guideline. The intravenous prescription shall be reviewed after 48 hours as a minimum.

17. **Antimicrobial treatment shall be stopped as soon as clinically indicated.** A stop date or review date shall be recorded by the prescriber on the drug-chart. In general, antimicrobial courses shall be reviewed within 5 days.
18. All antimicrobial prescriptions may be dispensed by the pharmacy for a treatment period of up to 7 days, after which an antimicrobial stop procedure will be enforced. If there is a need to extend antimicrobial therapy for more than 7 consecutive days, the Seventh Day Antimicrobial Form must be completed and approved by of the designated approver in the hospital. Pharmacists are required to confirm authorisation before dispensing beyond 7 days (see Seventh Day Automatic Stop Order Procedure and Seventh Day Antimicrobial Form).

19. Non-formulary antimicrobials must not be prescribed without authorization by the Pharmacy and Therapeutics Committee (PTC). All formulary antimicrobials have been reviewed by the PTC for cost-effectiveness, safety and the propensity to cause resistance. All new antimicrobials must be approved via the appropriate channels before being included in the formulary.

20. Restricted antimicrobials must not be prescribed without authorisation. The following antimicrobial agents have been designated as ‘restricted’ antimicrobials:
   i. IV Antifungals (all except Fluconazole)
   ii. Aztreonam
   iii. Carbapenem (all)
   iv. 4th Generation Cephalosporins (all)
   v. Colistin
   vi. Linezolid
   vii. Vancomycin

   These may only be prescribed upon completion of the Restricted Antimicrobial Order Form with the expressed authorisation of the designated approver in the hospital. Pharmacists are required to confirm authorisation before dispensing restricted antimicrobials (see Antimicrobial Restriction Procedure and Restricted Antimicrobial Order Form).

21. Monitored antimicrobials are subjected to prospective clinical audit, followed by immediate and direct feedback to the prescriber (if necessary) by the Antimicrobial Stewardship (AMS) Program. This multi-disciplinary team effort ensures the appropriateness of prescribing and optimizes treatment for the individual patient. The following antimicrobial agents have been designated as ‘monitored’ antimicrobials:
   i. 3rd generation Cephalosporins (all)
   ii. Fluoroquinolones (all)
   iii. Aminoglycosides (all)
   iv. Clindamycin
   v. Extended-Spectrum Penicillins
   vi. Fluconazole

22. Staff administering systemic antimicrobial agents must query any prescription that does not state a stop/review date (duration) and indication on the drug chart with the medical team. Any prescription continuing beyond the stop/review date must also be queried. Continue to administer the antimicrobial while awaiting review.

23. Clinical pharmacists in inpatient and outpatient settings must support prudent prescribing/use of antimicrobials by:
   • Reviewing antimicrobial prescriptions for appropriateness and guideline compliance – any concerns must be raised urgently with the clinicians caring for the patient.
   • Requesting a stop/review date (duration) and an indication is recorded on the drug chart.
as part of every antimicrobial prescription. If the stop/review date or duration and indication are not documented on the medicine chart or in the notes, contact the prescriber and request this information and then endorse the drug chart accordingly. Inform the prescriber that the standard is to include a stop/review date and indication every time an order for an antimicrobial agent is made. If the prescriber is unavailable, write in the notes requesting a stop/review date and indication be written on the drug chart and in the medical notes.

• Provide patient counseling on appropriate antimicrobial administration and use.
PRUDENT PRESCRIBING INITIATIVES

1. A **formulary of antimicrobials**. This is a list of antimicrobials which are approved for use within the hospital. The formulary will indicate the antimicrobials that will be subject to restrictions. The formulary will be maintained by the PTC in collaboration with the AMS Committee and Infection Control Committee.

2. **The National Antibiotic Guidelines (or the adapted hospital-specific antibiotic guidelines)**. These are available from the Department of Health (DOH) website and cover the prophylaxis and treatment of most common infections and important conditions for which antimicrobials are used.

3. **Hospital Clinical Pathways**. These provide standardized guidance to clinicians for the timely and appropriate treatment of infections, especially for common infections and syndromes.

4. A **compulsory programme of education** on the appropriate use of antimicrobials for healthcare staff, who are in contact with patients on antibiotics. The AMS Committee will be responsible for provision of this standard Training Course on AMS through an education program certified or recognized by the DOH.

1. **Surveillance and monitoring of antimicrobial use and resistance in accordance with the Manual of Procedures for Implementing Antimicrobial Stewardship Programs In Hospitals (2016), the Philippines Antimicrobial Use Surveillance Methods Guide, and the Antimicrobial Resistance Surveillance Program (ARSP).**

5. **Hospital Antiibiogram** to inform the development of hospital-specific antimicrobial guidelines and selection of appropriate empiric antimicrobial therapy.

6. **Medicine management policy** defines the appropriate procedures for the purchase, storage, prescribing, dispensing, counseling, administration and disposal of medicines, including antimicrobials.

7. **Policy on liaising with pharmaceutical industry** to prevent inappropriate interaction between pharmaceutical industry representatives and hospital staff that may negatively influence prescribing behavior and formulary selection.
Appendix B
Example of a Sepsis Clinical Pathway

(Source: The Medical City)
The Medical City
Modified Severe Sepsis Alert Protocol R10.2 – Page 2

Hemodynamic resuscitation MAP < 65

IV fluid challenge:
Plain LR 30 ml/kg fast drip
(Exclusion criteria: CHF-FC III-IV and CKD on HD)
Caution if with metabolic acidosis, give 0.9 NaCl

Reassess BP after 15 minutes

MAP < 65

Start:
Norepinephrine
0.03-2mcg/kg/min (initial 0.15mcg/kg/min), titrate to achieve MAP ≥60mmHg

If MAP < 65mmHg despite vasopressor and fluid support, start:
Vasopressin
0.01-0.6 units/min
or
Epinephrine
0.1-2.0 mcg/kg/min

Insert Arterial line

Plain LR 10 ml/kg fast drip and reassess every 30 min
Caution if with metabolic acidosis, give 0.9 NaCl

May substitute:
• 25% albumin IV infusion 50ml as fast drip
• 25% albumin + 200ml Plain LR to run for 1 hour

If scVO2 <70%

If with evidence of inadequate cardiac contractility on bedside echocardiography

Consider additional fluids
Consider Dobutamine infusion
Consider RBC transfusion for Hb < 10

Consider Dobutamine infusion
## Clinical Pathway for Adult Severe Sepsis and Septic Shock

### Inclusion Criteria
- Any 2 of the following SIRS Criteria plus at least 1 of the Organ Dysfunction Criteria

#### SIRS Criteria
- Temperature > 38 °C or < 36 °C
- HR > 90
- RR > 20 or PaCO₂ < 32 mmHg
- WBC > 12,000 or < 4000 or > 10% immature band forms

#### Organ Dysfunction Criteria
- Altered sensorium
- SBP < 90 or dropped > 40 from baseline
- Respiratory failure requiring assisted ventilation; hypoxemia, SäO₂ < 90% on RA
- Upper or Lower GI bleeding
- New onset jaundice
- Urine output < 0.5 ml/kg/hr for > 6 hr or azotemia (area 2x baseline or > 1.3)
- Platelet < 100 or INR > 1.5 not on antiocoagulation

### Physician's Notes

#### Subjective Complaints
- Please take vital signs
- Blood Pressure every hour for the next 24 hours
- Inform AP:
- Infectious Disease:
- Time referred:
- Critical care/intensivist:
- Time referred:

#### Laboratory Tests/Procedures
- Request for Sepsis Alert Package
  - CBC with Platelet
  - Plasma lactate
  - Na, K, Cl
  - Serum bicarbonate
  - Creatinine, BBS
  - Blood C6 x 2 different sites, Time drawn

#### Orders Within 30-60 Minutes
- CBC with Platelet
- Plasma lactate
- Na, K, Cl
- Serum bicarbonate
- Creatinine, BBS
- Blood C6 x 2 different sites, Time drawn
- CBF
- 1C, Mg
- Procalcitonin
- PT, APTT
- AST, ALT
- TB, DB, IB
- Albumin
- Cystatin C
- Urate NGAL

#### Medications/IV
- Start empiric antibiotics within 30-60 minutes:
  1. 
  2. 

#### Review of Meds
- Refer to Drug Database Form

---

*See Appendix*
## INPATIENT ORDER SHEET – (2nd sheet of WITHIN 30-60 MINUTES)

### PHYSICIAN’S NOTES

**TREATMENTS / MONITORING**

- Hemodynamic Resuscitation:
  - Initial IV bolus: 30 mL/kg Plavix in 30-60 minutes (Exclusion Criteria: CPRF-FC III-IV and CRD 5 on hemodialysis) CAUTION: If with metabolic alkalosis, give 0.9% NaCl.
  - Norepinephrine 16 mg in 250 mL D5W IV at _______ mcg/kg/min, titrate to achieve MAP = 65 mmHg (0.03-2 mcg/kg/min, Initial 0.15 mcg/kg/min)
  - If MAP < 65 mmHg despite vasopressor and fluid support, start:
    - Vasopressin 40 units in 100 mL D5W at _______ units/min (0.03-0.06 units/min)
    - Others: Epinephrine 5 mg in 250 mL D5W at _______ mcg/kg/min (0.1-2 mcg/kg/min)

**Respiratory Support**

- Give supplemental O2: _______ LPM
- Nasal Cannula
- Face Mask
- to achieve O2 saturation = 93%

- Intubate
  - Mechanical Ventilator Settings:
    - Assist/Control Mode
    - Tidal Volume (6-8 ml/kg ideal body weight)
    - Backup Rate
    - FIO2
    - Pressures Support
    - PEEP
  - Chest X-ray post intubation
  - ABG 1 hour post intubation

**Urine Output Monitoring**

- Insert Foley Catheter
- Record intake and output every hour

### GOALS OF TREATMENT

- Monitor for the following patient goals
  - MAP = 65 mmHg, Time at target:
  - Urine Output = 0.5 ml/kg/hr
  - SaO2 = 93%
  - CBC 125-175/137-157/3.5-4.5

### CONSULTS

- Time referred
  - REFER TO Dr. __________ for __________ management
  - Dr. __________ for __________ management

### ACTIVITY / SAFETY

- Activate fall prevention protocol
- Limited Activity without Bathroom Privileges

### PATIENT / FAMILY EDUCATION

- Explain initial need for Critical Care unit transfer
- Explain benefits and risks of the procedures/interventions
- Secure informed consent

### DISPOSITION

- Transfer to Critical Care Unit as soon as possible

### ACTIVATED BY

- Signature Over Printed Name / Date / Time

### ATTENDING PHYSICIAN / RESIDENT - IN CHARGE

- Signature Over Printed Name / Date / Time

### ACKNOWLEDGED BY

- Signature Over Printed Name / Date / Time

### NURSE - IN CHARGE

### VARIANCE CODES:

<table>
<thead>
<tr>
<th>A. Patient / Family</th>
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</thead>
<tbody>
<tr>
<td>1. Patient Medical Condition</td>
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<td>2. Patient / Family Decision</td>
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<td>3. Patient / Family Availability</td>
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<td>4. No Funds</td>
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<td>5. Other Reasons</td>
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### ACTION CODES:

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</thead>
<tbody>
<tr>
<td>1. Medical Order</td>
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<tr>
<td>2. Provider’s Decision</td>
</tr>
<tr>
<td>3. Provider’s Response time</td>
</tr>
<tr>
<td>4. Other Reasons</td>
</tr>
</tbody>
</table>

### C. TMC System

| 1. Results / Data availability |
| 2. Supplies / Equipment related |
| 3. Appointment / Availability |
| 4. Weekend / Holiday |
| 5. Other Reason |

### D. Outside TMC

| 1. Transportation / Availability |
| 2. Home Care availability |
| 3. Other Reasons |

### *See Appendix*
### S - Subjective Complaints

**TREATMENTS / MONITORING:**
- Hemodynamic Resuscitation / Monitoring
  - Insert Arterial Line
  - If MAP < 65 mmHg, give Plain LR 10 mL/kg fast drip and reassess every 30 minutes
  - CAUTION: If with metabolic alkalosis, give 0.90% NaCl
  - May substitute: 25% albumin IV infusion 50 mL as fast drip
  - 25% albumin + 200 mL Plain LR to run for 1 hour

- If MAP ≤ 65 mmHg and no pressors yet:
  - Start Norepinephrine 16 mcg in 250 mL D5W IV at ___ mcg/kg/min
  - Titrate to achieve MAP ≥ 65 mmHg
  - (0.03-2 mcg/kg/min, initial 0.15 mcg/kg/min)
  - May add:
    - Vasopressin 40 units in 100 mL D5W at ___ units/min
    - Epinephrine 5 mcg in 250 mL D5W at ___ mcg/kg/min
    - (0.1-2.0 mcg/kg/min)
  - If scVO₂ < 70%:
    - Consider additional fluids
    - Consider Dobutamine Infusion
    - Consider RBC transfusion for Hgb = 10 mcg/dL
    - If with evidence of inadequate cardiac contractility on bedside echocardiography
    - Consider Dobutamine Infusion

- If intubated, start Stress-related GI Mucosal Disease Prophylaxis:
  - Deep Vein Thrombosis Prophylaxis: REFER TO DVT Prophylaxis

### A - Assessment

**GOALS OF TREATMENT**
- Monitor for the following patient goals:
  - MAP ≥ 65 mmHg, Time at target:
  - scVO₂ > 70%, Time at target:
  - Urine Output > 0.5 mL/kg/hr
  - SaO₂ ≥ 93%
  - CBF 125-175 mg/dL

**CONSULTS**
- REFER TO Dr for management
- Dr for management

### P - Plan of Care

**NUTRITIONAL RISK LEVEL AND RECOMMENDED ACTION**
- LEVEL 3 (High Risk) - Nutrition support highly recommend

**ACTIVITY/SAFETY**
- Reassess fall risk, REFER TO Fall Assessment Form
- Others:

**PSYCHOSOCIAL**
- Assess patient and family psychosocial needs, REFER TO Nursing Patient Assessment Form

**PATIENT / FAMILY EDUCATION**
- Appraise patient and family of condition
- Encourage family/caregiver involvement
- Provide patient information material
- May discuss DNR orders with family/relatives

**ACTIVATED BY**
- Signature Over Printed Name / Date / Time

**ACKNOWLEDGED BY**
- Signature Over Printed Name / Date / Time
### Appendix C

**Example of a Pneumonia Clinical Pathway**

(Source: Research Institute For Tropical Medicine)

<table>
<thead>
<tr>
<th>Criteria for Diagnosis</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moderate Risk CAP</strong></td>
<td><strong>High Risk CAP</strong></td>
</tr>
<tr>
<td>- unstable VS</td>
<td>- Any of the criteria of moderate risk</td>
</tr>
<tr>
<td>- altered mental status</td>
<td>- CAP plus severe sepsis and/or</td>
</tr>
<tr>
<td>- no suspected aspiration</td>
<td>septic shock and need for</td>
</tr>
<tr>
<td>- decompensated</td>
<td>mechanical ventilation</td>
</tr>
<tr>
<td>- comorbid condition</td>
<td></td>
</tr>
<tr>
<td>- CXR: multilobar infiltrates; pleural effusion or abscess</td>
<td></td>
</tr>
<tr>
<td><strong>Activation Date/Time:</strong></td>
<td></td>
</tr>
</tbody>
</table>

**TREATMENT**

**Mild Risk CAP**

- IV non antipseudomonal B lactam
- Macrolide
- OR
- IV non antipseudomonal B lactam + fluoroquinolone

**High Risk CAP**

- No risk for pseudomonas:
  - IV non antipseudomonal B lactam + IV macrolide or IV fluoroquinolone
- With risk for pseudomonas:
  - IV antipseudomoccal antipseudomonal B lactam + IV macrolide + aminoglycoside
  - OR
  - IV antipseudomoccal antipseudomonal B lactam + IV ciprofloxacin or levofloxacin (high dose)

**DATE/TIME**

**PHYSICIAN'S PROGRESS NOTES**

**PHYSICIAN'S ORDERS**

**S-O-A-P**

- Please admit patient to:

- Diet:

  Monitor the following:

- Vitals signs every ___hour/s

- Fluid intake and output every ___hour/s

**VARIANCE CODES**

<table>
<thead>
<tr>
<th>A. Patient/Family</th>
<th>B. Healthcare Provider</th>
<th>C. Healthcare System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient’s condition</td>
<td>4. availability of funds</td>
<td>1. result/data availability</td>
</tr>
<tr>
<td>2. Patient/family’s decision</td>
<td>5. others</td>
<td>2. supplies/ equipment related</td>
</tr>
<tr>
<td>3. Physician’s response time</td>
<td>4. others</td>
<td>5. others</td>
</tr>
<tr>
<td>2. Physician’s decision</td>
<td>3.1 nurse response time</td>
<td>4. holiday/off days</td>
</tr>
<tr>
<td>2. Physician’s decision</td>
<td>3.2 allied personnel response time</td>
<td>5. others</td>
</tr>
</tbody>
</table>
RESEARCH INSTITUTE FOR TROPICAL MEDICINE  
Filinvest Corporate City, Alabang, Muntinlupa City  
HEALTH CARE DELIVERY  
CLINICAL MANAGEMENT  

<table>
<thead>
<tr>
<th>PATIENT NAME: ___________________________</th>
<th>HOSPITAL NO. ___________________________</th>
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<table>
<thead>
<tr>
<th>DATE OF BIRTH: ___________________________</th>
<th>AGE: ___________________________</th>
<th>SEX: ___________________________</th>
</tr>
</thead>
</table>

☐ Spot O2 every ___ hour/s

Diagnostics (please check):

- CBC with platelet
- CXR PA and lateral
- Sputum/ETA GS/CS
- Blood CS x 2 sites

Optional labs (pls check)

☐ ABG
☐ AST, ALT
☐ urinalysis

☐ serum Na, K, BUN
☐ serum Crea
☐ legionella urine antigen test

☐ 12 L ECG

☐ Others:
- Start antibiotics as follows:

<table>
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<tbody>
<tr>
<td>A. Patient/Family</td>
</tr>
<tr>
<td>-------------------</td>
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<tr>
<td>1. Patient’s condition</td>
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<tr>
<td>2. Patient/family’s decision</td>
</tr>
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<td>3. Physician’s response time</td>
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Page 60
PATIENT NAME: ___________________________ HOSPITAL NO. ___________________________

<table>
<thead>
<tr>
<th>(Last name)</th>
<th>(First name)</th>
<th>(M.I.)</th>
</tr>
</thead>
</table>

DATE OF BIRTH: ___________________________ AGE: _______ SEX: _______

| | | |
| | | |

☐ Others:

☐ Start paracetamol 500 mg/tab 1 tab every 4 hours for temp ≥ 37.8°C

☐ Refer accordingly

<table>
<thead>
<tr>
<th>Variance Codes</th>
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<tbody>
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<tr>
<td>2. Patient/family’s decision</td>
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<tr>
<td>4. others</td>
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# Pediatric Community Acquired Pneumonia Pathway

## Criteria for Diagnosis

<table>
<thead>
<tr>
<th>History</th>
<th>PCAP C</th>
<th>PCAP D</th>
<th>Activation Date/Time:</th>
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</thead>
<tbody>
<tr>
<td>Cough (may be absent in 24% of cases)</td>
<td>Tachypnea and retractions plus 1 or more of the following:</td>
<td>PCAP C Criteria</td>
<td>Plus 1 or more of the following:</td>
</tr>
<tr>
<td>Physical Examination:</td>
<td>□ (+) Co-morbid</td>
<td>□ (+) Cyanosis</td>
<td>□ (+) Lethargy/</td>
</tr>
<tr>
<td>▪ Tachypnea and retractions</td>
<td>□ Non-compliant caregiver</td>
<td>□ (+) Grunting/Apnea</td>
<td>Stuporous/Comatose</td>
</tr>
<tr>
<td>▪ Rales, rhonchi or wheeze</td>
<td>□ Follow-up not possible</td>
<td>□ (+) Irritability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Unable to feed</td>
<td>□ (+) Pulmonary Complications</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ Age &lt; 11 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ (+) Head Bobbing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ (+) Irritability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ (+) Pulmonary Complications</td>
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<td></td>
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## Treatment

<table>
<thead>
<tr>
<th>PCAP C</th>
<th>PCAP D</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Admit to regular ward</td>
<td>▪ Admit to ICU</td>
</tr>
<tr>
<td>▪ Give O2 support</td>
<td>▪ Give O2 support</td>
</tr>
<tr>
<td>▪ Manage dehydration</td>
<td>▪ Assess need for intubation</td>
</tr>
<tr>
<td>▪ Start antibiotics:</td>
<td>▪ Manage Dehydration</td>
</tr>
<tr>
<td>▪ Pen G [100,000 U/kg/day] every 6 hours (if w/o previous antibiotic and (+) complete Hib vaccination)</td>
<td>▪ Start antibiotics:</td>
</tr>
<tr>
<td>OR</td>
<td>▪ Ceftriaxone [100 mg/kg/day] every 24 hours IV infusion for 10-30mins</td>
</tr>
<tr>
<td>▪ Ampicillin [100,000 U/kg/day] every 6 hours (if with incomplete Hib Vaccination)</td>
<td>OR</td>
</tr>
<tr>
<td>▪ Refer to consultant of the month</td>
<td>▪ Chloramphenicol [100 mg/kg/day] every 6 to 8 hours IV infusion for 10-30mins</td>
</tr>
<tr>
<td></td>
<td>▪ Refer to consultant of the month</td>
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</tbody>
</table>

## Variance Codes

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<td>1. Physician’s order</td>
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<tr>
<td>2. Patient/family’s decision</td>
<td>5. others</td>
<td>2. Physician’s decision</td>
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</tbody>
</table>
**RESEARCH INSTITUTE FOR TROPICAL MEDICINE**  
Filinvest Corporate City, Alabang, Muntinlupa City

**HEALTH CARE DELIVERY**  
CLINICAL MANAGEMENT

---

**DATE/TIME** | **PHYSICIAN’S PROGRESS NOTES** | **PHYSICIAN’S ORDERS**
---|---|---
| | *S-O-A-P* | *Pls. indicate License No. with Printed Name & Signature at end of chart order*
| | | **VC**
| | | **Please admit patient to:**
| | | **Diet:**
| | | **Monitor the following:**
| | | **Vitals signs every ____hour/s**
| | | **Fluid intake and output every ____hour/s**
| | | **Spot O2 saturation every ____hour/s**
| | | **Diagnostics:**
| | | **CBC with platelet**
| | | **CXR PA and lateral**
| | | **Blood Culture x 2 sites**
| | | **Others if indicated:**
| | | **☐** **Gram stain/Culture and Sensitivity of:**
| | | **☐** **Throat/Nasopharyngeal swab**
| | | **☐** **Thoracentesis fluid**

**VARIANCE CODES**

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<td>2. Supplies/ equipment related</td>
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<tr>
<td>4. others</td>
<td>4. others</td>
<td>5. others</td>
</tr>
</tbody>
</table>

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**PATIENT NAME:**  
(Last name)  (First name)  (M.I.)  
**HOSPITAL NO._**

**DATE OF BIRTH:**  
**AGE:**  
**SEX:**
PATIENT NAME: ___________________________  HOSPITAL NO. __________

(Last name) (First name) (M.I.)

DATE OF BIRTH: ________________  AGE: _____  SEX: ________

☐ Bronchoalveolar lavage

☐ Tracheal aspirate

Start antibiotics as follows:

Other supportive care:

<table>
<thead>
<tr>
<th>A. Patient/Family</th>
<th>B. Healthcare Provider</th>
<th>C. Healthcare System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient’s condition</td>
<td>4. Availability of funds</td>
<td>1. Result/data availability</td>
</tr>
<tr>
<td>2. Patient/family’s decision</td>
<td>5. Others</td>
<td>2. Supplies/equipment related</td>
</tr>
<tr>
<td>4. Others</td>
<td>2. Physician’s decision</td>
<td>4. Others</td>
</tr>
<tr>
<td>2. Physician’s decision</td>
<td>1. Physician’s order</td>
<td>4. Holiday/off days</td>
</tr>
<tr>
<td>2. Physician’s decision response time</td>
<td>3.1 Nurse response time</td>
<td>5. Others</td>
</tr>
</tbody>
</table>
**RESEARCH INSTITUTE FOR TROPICAL MEDICINE**  
Fилинвест Корауэрт Сити, Алаабанг, Мантилупа Сити

**HEALTH CARE DELIVERY**  
**CLINICAL MANAGEMENT**

**PATIENT NAME:** ___________________  
(Last name)  
(First name)  
(M.I.)  

**HOSPITAL NO.**  

**DATE OF BIRTH:** ___________________  

**AGE:** _______  

**SEX:** _______

---

### DENGUE PATHWAY

**CRITERIA FOR DIAGNOSIS**

<table>
<thead>
<tr>
<th>History</th>
<th>Warning signs</th>
<th>Co-existing Conditions</th>
<th>Activation Date/Time:</th>
</tr>
</thead>
</table>
| ▪ Fever  
Presence of any 2 of the following:  
- nausea, vomiting  
- rash  
- aches and pains  
- (+) tourniquet test  
- leukopenia  
- any warning sign ➔ |  
- Abdominal pain or tenderness  
- Persistent vomiting  
- clinical fluid accumulation  
- mucosal bleed  
- lethargy, restlessness  
- liver enlargement > 2 cm  
- increase in hct with rapid decrease in platelet |  
- pregnancy  
- diabetes  
- hypertension  
- obesity  
- others | Presence of any of the ff:  
- Severe plasma leakage  
- Severe bleeding  
- Severe organ involvement |

---

### DATE/TIME  

<table>
<thead>
<tr>
<th>PHYSICIAN’S PROGRESS NOTES</th>
<th>PHYSICIAN’S ORDERS</th>
</tr>
</thead>
</table>
| *S-O-A-P*  
Pls. indicate Lic No. w/ Printed Name & Signature | VC. |
|  
- Please admit patient to  
- Diet: ___________________  
- Monitor vital signs every ___ hours and record  
- Monitor input and output volume per volume and record  
- Start IV fluid ____________ to run for ________  

Diagnostics (please check):  
- CBC with Platelet Count  
- Dengue NS1  
- Dengue IgM, IgG  
- Dengue PCR |

---

### VARIANCE CODES

<table>
<thead>
<tr>
<th>A. Patient/Family</th>
<th>B. Healthcare Provider</th>
<th>C. Healthcare System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient’s condition</td>
<td>4. availability of funds</td>
<td>1. Physician’s order</td>
</tr>
<tr>
<td>2. Patient/family’s decision</td>
<td>5. others</td>
<td>2. Physician’s decision</td>
</tr>
</tbody>
</table>
PATIENT NAME: ________________________  HOSPITAL NO. ________________________

(Last name)  (First name)  (M.I.)

DATE OF BIRTH: ________________________  AGE: ________  SEX: __________

- AST, ALT
- PTT
- Serum Creatinine
- Chest x ray
- Urinalysis
- Others:

Medications

- Start paracetamol _______ every 4 hours for temp ≥ 37.8°C

- Others:

<table>
<thead>
<tr>
<th>A. Patient/Family</th>
<th>B. Healthcare Provider</th>
<th>C. Healthcare System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient’s condition</td>
<td>4. availability of funds</td>
<td>1. result/data availability</td>
</tr>
<tr>
<td>2. Patient/family’s decision</td>
<td>5. others</td>
<td>4. holiday/off days</td>
</tr>
<tr>
<td>3. Physician’s response time</td>
<td>4. others</td>
<td>3. schedule/appointment availability</td>
</tr>
</tbody>
</table>

VARIANCE CODES
### Appendix D

**Antimicrobial Resistance Surveillance Report Form**

A. **Antibiogram for each of the following key organisms in tabular form**

   1. *Enterococcus faecium*
   2. *Enterococcus faecalis*
   3. *Staphylococcus aureus*
   4. *Streptococcus pneumoniae*
   5. *Acinetobacter baumanii*
   6. *Escherichia coli*
   7. *Haemophilus influenzae*
   8. *Klebsiella pneumoniae*
   9. *Neisseria gonorrhoeae*
   10. *Pseudomonas aeruginosa*
   11. *Salmonella enterica*
   12. *Nontyphoidal Salmonella*
   13. *Shigella*

   **Ex.** *Enterococcus faecium* (n=___) where n is the total number of isolates undergoing AST

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Percent resistance (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. **Analysis of surveillance data**

Description of highlights of surveillance data to include notable resistant pathogens and AMR trends. The more important trends are best projected using a line graph where the X axis is the year and the Y axis is the percent resistance.

C. **Plan of Action/Action taken regarding resistant pathogens**

Describe any accounts of investigations such as outbreaks of antimicrobial resistant microorganisms, containment and other measures done upon identification of resistant pathogens and AMR trends.

D. **Quality Control (QC) Data**

Data of testing done on quality control strains for ID and AST using the format in letter A above.

E. **References**

(Laboratory standards, i.e. CLSI, and other references utilized for ID and AST.)

**Note:**

1. The report shall be single spaced using Calibri font size 11.
2. The report must be duly signed by the bacteriology laboratory staff, head of the laboratory and chief of hospital/hospital director.
3. Soft copy of the AMR surveillance report in pdf can be submitted to secretariat@arsp.com.ph on or before the end of the first quarter of the succeeding year with a copy provided to Pharmaceutical Division.
### Appendix E

**Critically Important Antimicrobials for Human Medicine**

The World Health Organisation categorizes an antimicrobial as critically important for human medicine when it meets both of the following criterions:

**Criterion 1:** An antimicrobial agent which is the sole, or one of limited available therapy, to treat serious human disease.

**Criterion 2:** Antimicrobial agent is used to treat diseases caused by either: (1) organisms that may be transmitted to humans from non-human sources or, (2) human diseases causes by organisms that may acquire resistance genes from non-human sources.

#### List of Critically Important Antimicrobials for Human Medicine

( WHO, 3rd revision, 2011)

<table>
<thead>
<tr>
<th>Aminoglycosides</th>
<th>Fluoro- and other quinolones</th>
<th>Penicillins</th>
</tr>
</thead>
<tbody>
<tr>
<td>amikacin</td>
<td>cinoxacin</td>
<td>amoxicillin</td>
</tr>
<tr>
<td>arbekacin</td>
<td>ciprofloxacin</td>
<td>ampicillin</td>
</tr>
<tr>
<td>bekamycin</td>
<td>enoxacin</td>
<td>azidocillin</td>
</tr>
<tr>
<td>dibekacin</td>
<td>floroxacin</td>
<td>azlocillin</td>
</tr>
<tr>
<td>dihydrostreptomycin</td>
<td>flumequine</td>
<td>bacampicillin</td>
</tr>
<tr>
<td>gentamicin</td>
<td>garenoxacin</td>
<td>carbencillin</td>
</tr>
<tr>
<td>isepamicin</td>
<td>gatifloxacin</td>
<td>carbenicillin</td>
</tr>
<tr>
<td>kanamycin</td>
<td>gemifloxacin</td>
<td>carbenicillin</td>
</tr>
<tr>
<td>neomycin</td>
<td>grepafloxacin</td>
<td>carbenicillin</td>
</tr>
<tr>
<td></td>
<td>levofloxacin</td>
<td>clomectocillin</td>
</tr>
<tr>
<td></td>
<td>lomefloxacin</td>
<td>ticarcillin</td>
</tr>
<tr>
<td></td>
<td>moxifloxacin</td>
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</tr>
<tr>
<td></td>
<td>nalidixic acid</td>
<td>ticarcillin</td>
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<td>norfloxacin</td>
<td>ticarcillin</td>
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<tr>
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<td>oxolinic acid</td>
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<td>pefloxacin</td>
<td>ticarcillin</td>
</tr>
<tr>
<td><strong>Carbapenems</strong></td>
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<td><strong>Glycylcyclines</strong></td>
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<td>biapenem</td>
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<td>imipenem</td>
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<td>meropenem</td>
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<td></td>
</tr>
<tr>
<td>panipenem</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cephalosporins (3rd and 4th generations)</strong></td>
<td><strong>Lipopeptides</strong></td>
<td><strong>Polymyxins</strong></td>
</tr>
<tr>
<td>cefcapene</td>
<td>daptomycin</td>
<td>colistin</td>
</tr>
<tr>
<td>cefdinir</td>
<td></td>
<td>polymyxin B</td>
</tr>
<tr>
<td>cefditoren</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cefepime</td>
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<td>cefetanil</td>
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<td>cefixime</td>
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</tr>
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<td>cefmenoxime</td>
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<td></td>
</tr>
<tr>
<td>cefozolinamide</td>
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</tr>
<tr>
<td>cefpodoxime</td>
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<td></td>
</tr>
<tr>
<td><strong>Cyclic Esters</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fosfomycin</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Glycopeptides</strong></td>
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<td></td>
</tr>
<tr>
<td>dalbavancin</td>
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<td></td>
</tr>
<tr>
<td>oritavancin</td>
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<td></td>
</tr>
<tr>
<td>teicoplanin</td>
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<td></td>
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<tr>
<td>telavancin</td>
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<td></td>
</tr>
<tr>
<td>vancomycin</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Macrolides and Ketolides</strong></td>
<td><strong>Monobactams</strong></td>
<td><strong>Rifamycins</strong></td>
</tr>
<tr>
<td>azithromycin</td>
<td>azetromycin</td>
<td>rifabutin</td>
</tr>
<tr>
<td>clarithromycin</td>
<td>clarithromycin</td>
<td>rifampicin (=rifampin)</td>
</tr>
<tr>
<td>erythromycin</td>
<td>erythromycin</td>
<td>rifaximin</td>
</tr>
<tr>
<td>dirithromycin</td>
<td>dirithromycin</td>
<td>rifampetine</td>
</tr>
<tr>
<td>flurithromycin</td>
<td>flurithromycin</td>
<td>rifamycin</td>
</tr>
<tr>
<td>josamycin</td>
<td>josamycin</td>
<td><strong>Oxazolidinones</strong></td>
</tr>
<tr>
<td>midecamycin</td>
<td>midecamycin</td>
<td>Linezolid</td>
</tr>
<tr>
<td>miocamycin</td>
<td>miocamycin</td>
<td></td>
</tr>
<tr>
<td>oleandomycin</td>
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</tr>
<tr>
<td>rokitamycin</td>
<td>rokitamycin</td>
<td></td>
</tr>
<tr>
<td>roxithromycin</td>
<td>roxithromycin</td>
<td></td>
</tr>
<tr>
<td>spiramycin</td>
<td>spiramycin</td>
<td></td>
</tr>
<tr>
<td>telithromycin</td>
<td>telithromycin</td>
<td></td>
</tr>
<tr>
<td>troleandomycin</td>
<td>troleandomycin</td>
<td></td>
</tr>
<tr>
<td>Veterinary use only: Avoparcı</td>
<td>Veterinary use only: Linezolid</td>
<td>Veterinary use only: Fosfomycin</td>
</tr>
</tbody>
</table>

**Drugs solely used for treatment of mycobacterial diseases**
- calcium aminosalicylate
- capreomycin
- cycloserine
- ethambutol
- ethionamide
- isoniazid
- morinamide para-aminosalicylic acid
- prothionamide
- pyrazinamide
- sodium aminosalicylate
- terizidone
- ticarcilde
# Appendix F
## Restricted Antimicrobial Order Form

<table>
<thead>
<tr>
<th>Hospital No.</th>
<th>Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Name</td>
<td>Gender</td>
</tr>
<tr>
<td>Allergy</td>
<td>Age</td>
</tr>
<tr>
<td>Body Weight</td>
<td>Transaminases</td>
</tr>
<tr>
<td>Serum Creatinine</td>
<td>Creatinine clearance</td>
</tr>
<tr>
<td>Antimicrobial Requested</td>
<td></td>
</tr>
</tbody>
</table>

### Dosing Regimen

### Indication for use
(include reason for not using recommended antimicrobial)
- Prophylactic
- Empirical therapy
- Definitive therapy

### Microbiological results

<table>
<thead>
<tr>
<th>Date</th>
<th>Specimen</th>
<th>Pathogen identified &amp; susceptibility results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Outcome of verbal approval:

**Requesting Physician’s Name/Contact number:**

**PRE-AUTHORIZATION FOR RESTRICTED ANTIMICROBIALS ONLY**

- [ ] APPROVED
- [ ] NOT APPROVED

<table>
<thead>
<tr>
<th>No. of days approved for use:</th>
<th>Reason:</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______ days</td>
<td></td>
</tr>
</tbody>
</table>

**Approver**

<table>
<thead>
<tr>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name/Signature:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† This form may be modified according to the needs of individual hospitals
# Appendix G

**Seventh Day Automatic Stop Order Form**

<table>
<thead>
<tr>
<th>Republic of the Philippines</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEPARTMENT OF HEALTH</td>
</tr>
</tbody>
</table>

## 7th-DAY ANTIMICROBIAL FORM

<table>
<thead>
<tr>
<th>Date:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Hospital No.</th>
<th>Ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Name</td>
<td>Gender</td>
</tr>
<tr>
<td>Allergy</td>
<td>Age</td>
</tr>
</tbody>
</table>

### Previous (as relevant) and Concurrent Antimicrobial Therapy

<table>
<thead>
<tr>
<th>Date</th>
<th>Antimicrobial</th>
<th>Dosing Regimen</th>
<th>Start Date</th>
<th>Stop Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Details of Request

- **Antimicrobial:**
- **Duration requested:** ___ days

### Relevant Microbiological results

<table>
<thead>
<tr>
<th>Date</th>
<th>Specimen</th>
<th>Pathogen identified &amp; susceptibility results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Outcome of verbal approval:

- **Requesting Physician’s Name/Contact number:**

  - [ ] APPROVED
  - [ ] NOT APPROVED

  - **No. of days approved for use:** ___ days
  - **Reason:**

  - **Remarks:**

<table>
<thead>
<tr>
<th>Approver</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name/Signature:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

\[1\] This form may be modified according to the needs of individual hospitals
# Appendix H

**Standardized IV-to-PO Switch Intervention Form**

<table>
<thead>
<tr>
<th>Republic of the Philippines</th>
<th>DEPARTMENT OF HEALTH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTERVENTION FORM</strong></td>
<td></td>
</tr>
</tbody>
</table>

**INTRAVENOUS TO ORAL (IV-to-PO) ANTIMICROBIAL THERAPY SWITCH**

Dear Dr. ____________________  
Date: ____________________

<table>
<thead>
<tr>
<th>Patient Name:</th>
<th>Ward:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital No:</td>
<td></td>
</tr>
</tbody>
</table>

Current IV antimicrobial:
- [ ] IV Azithromycin
- [ ] IV Clindamycin
- [ ] IV Co-trimoxazole
- [ ] IV Fluconazole
- [ ] IV Linezolid

IV Ciprofloxacin
- [ ] IV Levofloxacin
- [ ] IV Moxifloxacin
- [ ] IV Fluconazole

Dose: ______________  
Start date: __________
Indication: __________

Your patient fulfills the following criteria to switch to oral (PO) antimicrobial:

- [ ] Afebrile
- [ ] Downward trend or normalization of inflammatory markers  
  (C-reactive protein, white blood cell count, procalcitonin)
- [ ] Stable vital signs  
  (No unexplained tachycardia, hypotension, tachypnea)
- [ ] Patient is not nil by mouth
- [ ] Tolerating oral intake
- [ ] Oral absorption is not compromised  
  (e.g. No vomiting or diarrhea, malabsorptive disorder)

Kindly consider switching to:
- [ ] PO Azithromycin  
  - [ ] PO Ciprofloxacin
- [ ] PO Clindamycin  
  - [ ] PO Levofloxacin
- [ ] PO Co-trimoxazole  
  - [ ] PO Moxifloxacin
- [ ] PO Fluconazole  
  - [ ] PO Fluconazole
- [ ] PO Linezolid

Dose: ______________  
End Date: __________

The above antimicrobials have excellent oral bioavailability. They are equally effective when given orally in patients who are clinically stable and able to tolerate orally. Oral administration reduces (a) nursing time for IV drug preparation and IV line care, (b) length of stay, (c) healthcare costs, and (d) potential complications from IV access; without adversely impacting clinical outcomes.

Thank you for reviewing the patient for IV-to-PO switch.

Yours sincerely,

Signature: ____________________  
Name: ____________________
Designation: ____________________  
Contact details: ____________________

† This form may be modified according to the needs of individual hospitals
## Appendix I Standardized Audit Form

### AMS Audit Form

<table>
<thead>
<tr>
<th>Patient Name &amp; identification no.</th>
<th>Department</th>
<th>Ward</th>
<th>Age</th>
<th>Gender</th>
<th>Weight</th>
<th>eGFR/CrCl</th>
<th>Allergy</th>
</tr>
</thead>
</table>

**Audit date:**

<table>
<thead>
<tr>
<th>Antimicrobial</th>
<th>Start date</th>
<th>End date</th>
<th>Route</th>
<th>Dose</th>
<th>Frequency</th>
<th>Indication documented</th>
</tr>
</thead>
</table>

**Indication:**
- [ ] Prophylaxis
- [ ] Empiric
- [ ] Culture-directed
- [ ] Empirical escalation
- [ ] Empirical de-escalation
- [ ] Empiric then culture-directed

**Type of Infection:**
- [ ] Urinary tract
- [ ] Pneumonia
- [ ] URTI
- [ ] Bloodstream
- [ ] Bone & joint
- [ ] Skin & soft tissue
- [ ] Intra-abdominal
- [ ] Eye, ear, nose, throat & mouth
- [ ] Cardiovascular
- [ ] Reproductive tract
- [ ] Central nervous system
- [ ] Febrile neutropenia
- [ ] Disseminated systemic infection
- [ ] Unspecified sepsis
- [ ] Multiple infections (tick all sites)
- [ ] Prophylaxis

**Compliance with Guidelines:**
- [ ] Compliant to guidelines
- [ ] Non-compliant to guidelines
- [ ] Guideline not available

#### Initial appropriateness: Yes / No

- [ ] No cultures taken within 48h of initiation, if indicated
- [ ] No infection
- [ ] Wrong choice
- [ ] Wrong route
- [ ] Wrong dose

#### Final appropriateness: Yes / No

- [ ] No infection
- [ ] Wrong choice
- [ ] Wrong route
- [ ] Wrong dose

#### Overall appropriateness: Yes / No

**Date:**

<table>
<thead>
<tr>
<th>Type of Intervention done</th>
<th>Accepted: Y / N</th>
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</thead>
<tbody>
<tr>
<td>[ ] Discontinue antibiotic</td>
<td>Date of acceptance:</td>
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<tr>
<td>[ ] IV to PO switch</td>
<td>Reason for rejection:</td>
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<tr>
<td>[ ] Dosing/administration</td>
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<tr>
<td>[ ] Further Investigations</td>
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<tr>
<td>[ ] Broaden empirical coverage</td>
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<tr>
<td>[ ] Narrow empirical coverage</td>
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<tr>
<td>[ ] Others:</td>
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<tr>
<td>[ ] Escalation based on culture results</td>
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<tr>
<td>[ ] De-escalation based on culture results</td>
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<tr>
<td>[ ] Refer to Infectious Diseases Specialist</td>
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<tr>
<td>[ ] Implement infection/source control</td>
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<tr>
<td>[ ] Optimization of other concurrent antimicrobials</td>
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</tbody>
</table>

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Concurrent antimicrobials:

Previous antimicrobials:

Past medical history / recent hospitalization:

Clinical progress

Radiological reports

**Microbiological cultures**

<table>
<thead>
<tr>
<th>Date</th>
<th>Specimen</th>
<th>Results &amp; Susceptibility</th>
<th>Date</th>
<th>Specimen</th>
<th>Results &amp; Susceptibility</th>
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**Laboratory results**