NATIONAL ANTIMICROBIAL STEWARDSHIP GUIDELINES FOR HEALTH CARE SETTINGS

CONTENTS

ABBREVIATIONS

AIDS - Acquired Immunodeficiency Syndrome

AMC - Antimicrobial Consumption

AMR - Antimicrobial resistance

AMS - Antimicrobial stewardship

AMU - Antimicrobial use

AMRCC - Antimicrobial Resistance Coordinating Committee

AMS - Antimicrobial Stewardship

AMSPs - Antimicrobial Stewardship Programs

ASP - Antimicrobial Stewardship Program

BUFMAR - Bureau de Formation Medicales Agrées du Rwanda

CAP - Community-acquired pneumonia

CDI - Clostridioides difficile infections

CHUK - University Teaching Hospital of Kigali

CHUB - University Teaching Hospital of Butare

CPD - Continuing Professional Development

CPOE - Computerized Physician Order Entry

CST - Culture and Sensitivity Testing

DDD - Defined Daily Dose

FDA - Fund and Drugs Authority

GLASS - Global Antimicrobial Resistance and Use Surveillance System

HAI - Hospital Acquired Infections

HCWs - Health care workers

HIV - Human Immunodeficiency Virus

ICU - Intensive Care Unit

IEC - Information Education and Communication

IPC - Infection Prevention and Control

IT - Information Technology

IV - Intravenous

LMICs - Low- and middle-income countries

M&E - Monitoring and evaluation

MDROs - Multi-Drug Resistant Organisms

MRSA - Methicillin-Resistant Staphylococcus Aureus

MOH - Ministry of Health

MTCs - Medicine and Therapeutic Committees

NAP - National Action Plan

QI - Quality Improvement

QMS - Quality Management System

RBC - Rwanda Biomedical Centre

RMS - Rwanda Medical Supply

Rwanda FDA - Rwanda Food and Drugs Authority

SSA - Sub-Saharan Africa

STG - Standard Treatment Guidelines

STI - Sexually Transmitted Infections

SWOT- Strengths, Weaknesses Opportunity and Threats

UTIs - Urinary tract infections

WHO - World Health Organization

GLOSSARY OF TERMS

Antibiogram - a periodic summary of the susceptibility patterns of local bacterial isolates to available antibiotics

Antibiotic - a medicine that either kills or inhibits the growth of bacteria.

Antimicrobial - a medicine that kills or inhibits the growth of specific microorganism(s) (such as bacteria, virus, fungi or protozoa).

Antimicrobial resistance – defined as the development of resistance in a microorganism, -bacteria, virus, fungi or parasite to an antimicrobial agent to which it was previously sensitive (http://www.who.int/mediacentre/factsheets/fs194/en/)

Antimicrobial stewardship - refers to coordinated set and programmed interventions designed to improve and measure the appropriate use of antimicrobials by promoting the timely selection of the optimal regimen, dose, duration of therapy, and route of administration.

Antimicrobial use monitoring - refers to the evaluation of the quantities of antimicrobials used in a specified patient group or population, and the indications for their use over a specified period of time.

Culture and sensitivity testing - laboratory tests that are used to determine whether a particular microorganism or group of microorganisms is susceptible to inhibition or destruction by antimicrobials.

AMS Champion: Is a local person, within a health facility or institution, selected by hospital leadership who can be a familiar face to local staff and communicates between the AMS team and the health care providers

Empiric treatment - refers to the choice by a clinician to treat using antimicrobials based on their clinical judgment and expertise in the absence of supporting laboratory data and other confirmatory microbiological information about the causative agent.

Rationale use of antimicrobials- the appropriate utilization of the right patient, right antimicrobial agent, at the right time, right dose, right route of administration, and for the right duration.

Hospital-acquired infection - an infection acquired during the period of admission to a hospital facility and excludes any infection contracted before admission.

Inappropriate use of antimicrobials - the use of antimicrobials where they are not indicated, not prescribed, or for non-therapeutic purposes.

Infection Prevention and Control - the interventions intended to minimize the spread of disease-causing microorganisms and reduce the likelihood of infection.

National Action Plan - a detailed document outlining the scheduled actions needed to attain the set objectives. It provides a comprehensive strategic framework and priority activities to contain the emergence and spread of antimicrobial resistance.

One Health - One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent.

Surveillance - the detection and monitoring of trends and threats in antimicrobial resistance and antimicrobial use patterns to inform interventions and strategies to reduce antimicrobial resistance.

FOREWORD

Over the recent years, Antimicrobial Resistance (AMR) has become an increasingly important aspect for both animal and human health. Bacterial resistance to antimicrobials has shown to have serious economic impact in such a way that potent medicines are becoming ineffective resulting in loss of life for humans and animals as well as loss in agricultural product within the food chain. Trend has shown an increase in usage of Antimicrobials in human health, animal health and animal food production. Misuse and overuse of these antimicrobials directly impact on the environment with negative ecosystem health. In recognition of this problem, the Government of Rwanda realized the need to join global initiatives to combat AMR by ratifying different consensus as agreed at different global levels through multi-sectoral approach. Development of this AMR surveillance framework has been a collaborative effort from various partners and stakeholders and was spearheaded by the Ministries responsible for human health, animal health and environment (Ministry of Health, Ministry of Agriculture and Animal Resources and Ministry of environment) in close collaboration with other key stakeholders at local and international level. The framework will help to streamline AMR surveillance activities in human health, animal health and environment sectors in the country. It is therefore anticipated that, this framework will be effectively implemented, monitored, and reviewed regularly in response to the experiences gathered from its utilization. Besides, the sustainability of this framework depends on the extent to which new practices on antimicrobial use will be embedded in the whole society.

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CHAPTER 1

INTRODUCTION TO ANTIMICROBIAL STEWARDSHIP

BACKGROUND

Antimicrobials have played a significant role in reducing morbidity and mortality rates from infectious diseases like pneumonia, influenza, and tuberculosis, thus increasing life expectancy (Aminov et al., 2017; Cook and Wright, 2022). However, antimicrobial resistance (AMR) is now one of the top ten global health threats facing humanity (WHO, 2021). It is a natural or induced phenomenon which refers to the ability of a microorganism (such as a bacteria, viruses, fungi, or protozoa) to persist and multiply in the presence of antimicrobial agents that would normally inhibit its growth or kill it (Hall et al. 2020). Although the development of AMR is a natural phenomenon, irrational use of antimicrobials in livestock, human medicine, and agriculture accelerates this resistance (Kimera et al., 2020). Therefore, collaboration of different stakeholders composing the One Health is needed to address this public health concern. AMR threatens to reverse the major gains made in combating major infectious diseases. Apart from deaths, AMR is associated with long hospitalizations, treatment failure, and the use of second/third-line antimicrobials which are expensive for poor individuals (Laxminarayan, 2022; Gahamanyi et al., 2020). Without effective antimicrobials, processes like surgery, organ transplantation, and cancer treatment would become riskier (Cook et al., 2022). Furthermore, the use of antimicrobials, particularly broad-spectrum antimicrobials, negatively affects the gut microbiome (reduced microbial diversity, changes in formation and roles of the microbiota, and selection of AMR strains), thus giving a way to the predominance of AMR pathogens (Patangia et al., 2022).

The major drivers of AMR include: (i) overprescription of antimicrobials, (ii) self-medication & patients not completing prescribed dose, (iii) overuse of antimicrobials in livestock (growth promotion, prevention and treatment of infections), (iv) poor infection and prevention control (IPC), (v) poor water, sanitation, and hygiene (WASH), (vi) lack of access to newer and effective antibiotics, (vii) over-the-counter access to antimicrobials, (viii) lack of AMR surveillance systems and weak antimicrobial stewardship programs, (ix) weak supply chain management and proliferation of substandard and falsified antimicrobials (Holmes et al, 2016; Vikesland et al., 2019). Moreover, AMR is exacerbated by inadequate health system infrastructure and limited diagnostic capacity promoting empirical antimicrobial prescription.

To reverse the AMR trends, the Global Action Plan on AMR set the goal to deal with AMR by ensuring continuity of successful treatment and prevention of infectious diseases with effective and safe medicines that are quality-assured, used in a responsible way, and accessible to all who need them via five strategic objectives (WHO, 2016). These objectives were: (i) Improve awareness and understanding of AMR; (ii) Strengthen knowledge through surveillance and research; (iii) Reduce the incidence of infection; (iv) Optimise the use of antimicrobial agents; and (v) Develop the economic case for sustainable investment through research and development.

SITUATION ANALYSIS

Antimicrobial resistance issue

Globally, antimicrobial resistance (AMR) is recognized as one of the most serious public health challenges of the twenty-first century (Murrary et al., 2022). AMR has become a global pandemic that threatens human health, healthcare systems, food production, and life expectancy. It is responsible for an estimated five million deaths globally, surpassing the deaths associated with HIV/AIDS, cancer, and malaria (Murrary et al., 2022). If appropriate actions are not taken, AMR has the potential to cause 10 million deaths annually by 2050 (World Bank, 2016). The economic impact of AMR is also significant, with projected costs ranging from $300 billion to over $1 trillion per year worldwide by 2050 (World Bank, 2016). Furthermore, AMR could force up to 24 million people into extreme poverty by 2030 (World Bank, 2016).

In low- and middle-income countries (LMICs), the problem of AMR is less documented due to limited resources and diagnostic capacities, leading to the use of broad-spectrum antibiotics without determining the underlying pathogens (Gahamanyi et al., 2020; Jansen et al., 2018). In Africa, AMR data are missing in 42.6% of countries, but available findings confirm resistance to commonly used antibiotics (Tadesse et al., 2017). Moreover, the majority of AMR-related studies in Sub-Saharan Africa (SSA) focus on urban areas, neglecting the fact that 60% of the human population resides in rural areas (Tompkins et al., 2021). The scarcity of AMR data in SSA is associated with the lack of real-time data recording, surveillance, and poor regulations (Elton et al., 2020). A recent study in 14 SSA countries revealed that only 1.3% of the 50,000 medical laboratories in the laboratory networks perform bacteriology testing, highlighting insufficient laboratory capacity and the resulting misuse of antibiotics (Africa CDC, 2022). Western Africa, specifically, bears the highest burden of AMR-related deaths in SSA, with 114.8 deaths per 100,000 population associated with AMR (Murrary et al., 2022). Therefore, efforts to tackle AMR threat should be doubled in SSA because the region is prone to heavy consequences.

In Rwanda, there are limited data on AMR, but available evidence indicates high rates of resistance among pathogens such as Escherichia coli and Klebsiella pneumoniae to third-generation cephalosporins (Ntirenganya et al., 2015; Carrol et al., 2016). Studies have reported resistance of Gram-negative isolates to ceftriaxone and a high prevalence of extended-spectrum beta-lactamase (ESBL) producers (Sutherland et al., 2019). A recent survey conducted in 2022 by a Multisectoral team led by the Rwanda Biomedical Center (RBC) to the facilities performing antimicrobial susceptibility testing including University Teaching Hospital of Butare (CHUB), University Teaching Hospital of Kigali (CHUK), Rwanda Military Hospital (RMH), King Faisal Hospital (KFH) and Rubirizi National Veterinary Laboratory (RNVL showed that Escherichia coli (E. coli) was the predominant pathogen with 37.5%. The resistance of E. coli to cefotaxime, ceftriaxone, ceftazidime, and cefixime was 21.4%, 21.4%, 10.1%, and 9.7%, respectively. Of the pathogens as per WHO list, 14.9 % and 42.8% Pseudomonas aeruginosa were resistant to imipenem and meropenem, respectively; 15.8% were methicillin-resistant Staphylococcus aureus (MRSA), 3.1% were vancomycin intermediate and resistant Staphylococcus aureus (RBC, unpublished data).

Barriers to implementing Antimicrobial Stewardship Programs in Rwanda

Several factors could pose a barrier to implementing AMS programs in Rwanda: (i) Inadequate human resource capacity for example doctors are overwhelmed due to the high ratio of patient-doctor affecting the time spent on patients at clinical settings; (ii) Awareness: awareness of

AMR threat was reported to be low even among healthcare students (Nisabwe et al., 2020); (iii) Weak laboratory Microbiology capacity- only four public hospitals (3 in Kigali and one in South) perform antimicrobial susceptibility testing (AST); (iv) Financing for Laboratory diagnostics tests- AST is not covered by the Community-Based Health Insurance (CBHI) at district hospital level; (v) Lack of unified standardized AMR surveillance system to determine the burden of AMR pathogens countrywide, (vi) Healthcare settings possess medicine and therapeutic committees (MTCs) but the component of antimicrobial stewardship (AMS) is still nascent; (vii) Antimicrobials being dispensed by pharmacies without prescription; (viii) Weak supply chain and distribution of AST kits. Therefore, developing an AMR surveillance system and establishing a functional AMS program would be important to curb the increasing trend of AMR and later feed national AMR data into regional and international platforms including Global Antimicrobial Resistance and Use Surveillance System (GLASS).

Antimicrobial stewardship

Implementing effective antimicrobial stewardship (AMS) program in LMICs, including Rwanda, faces several challenges including difficulties in forming multidisciplinary teams, inadequate funding support, lack of infection specialists, challenges in diagnosing and treating infections in immunocompromised patients, limited laboratory capacity, lack of AMS reporting, education, and accountability, and poor attitudes and behaviours of healthcare providers and communities (Nisabwe et al., 2020).

Challenges of diagnostics and treatment in Rwanda

- Inadequate laboratory capacity, resources, staffing, infrastructure, and data management
- Commercially driven prescribers
- Lack of community prescribing algorithms to mitigate access issues and stewardship
- Turnaround time for receipt of lab results
- Insufficient knowledge and skills on AMR
- Inadequate sharing and utilisation of AMR data
- Insufficient training and supervision of health personnel,
- Lack of access to rapid diagnostic facilities to support treatment decisions

To address these challenges, Rwanda developed a National Action Plan on AMR and established a One-Health AMR committee hosted by the Rwanda Biomedical Centre (RBC) that incorporates stakeholders from various sectors to address various facets of AMR. Recently, Rwanda undertook an assessment of the situation of AMS and AMR surveillance in selected facilities to inform the development of AMS guidelines (RBC, unpublished data). The findings of this survey can be found on Appendix 2.

In conclusion, Rwanda faces challenges in implementing AMS programs due to limited resources, diagnostic capacities, multidisciplinary teams, funding's, laboratory capacity, reporting mechanisms, and healthcare provider attitudes. Addressing these challenges through the development of a comprehensive AMS program and collaboration with stakeholders is crucial for effective AMR management in the country.

PURPOSE OF THE RWANDA ANTIMICROBIAL STEWARDSHIP GUIDELINES

Currently Rwanda does not have comprehensive national guidelines on antimicrobial stewardship. The main purpose of this AMS guideline is to provide guidance and direction to health workers and institutions in Rwanda on how to operationalize AMS in healthcare settings and the community at large to promote optimal use of antimicrobials.

Healthcare facilities and users of this guideline will follow best practices to improve appropriate antimicrobial use and combat AMR according to the national mission, goals, and objectives. The guidelines are aligned to and will be implemented in accordance with actions within the National Action Plan and the National Medicines and Therapeutic Guidelines. The nature and scope for implementation, target audiences, and the roles and responsibilities at various implementing levels are also specified. In addition, this guideline provides relevant resources (tools, checklists, etc.) to facilitate implementation of AMS. These guidelines will address the full spectrum of AMS, including the development, governance and systems, infrastructure, and key interventions as well as measures of improvements.

Overview of the Antimicrobial Stewardship Guidelines

This national guideline provides simplified guidelines on the country's approach to AMS. The guideline is structured into eight (08) chapters. **Chapter 1** introduces the subject of AMR and provides the situational analysis from a global to local perspectives and why AMS is a key area of focus in Rwanda. **Chapter 2** introduces AMS as a concept and practice as a national programme. **Chapter 3** outlines the components of AMS programs at the different levels: national, province, district, and health facility. **Chapter 4** explains the core elements of AMS and ASPs at all levels, including key indicators, governance and operational requirements of AMS at the various levels. The actions and effective interventions to support implementation of AMS are provided in **Chapter 5. Chapter 6** talks about situational/SWOT analysis. In the **Chapter 7,** monitoring and evaluation of ASPs is explained to provide guidance to implementers and facilities to monitor progress and evaluate outcomes of their AMS interventions. The last **Chapter 8** deals with potential pitfalls and their mitigation.

Antimicrobial stewardship

Antimicrobial Stewardship is defined as a coherent set of integrated actions which promote the responsible and appropriate use of antimicrobials to help improve patient outcomes across the continuum of care (WHO, 2022). It is designed to optimise antimicrobial use, improve patient outcomes, and reduce the emergence of AMR.

In clinical practices, it entails the provision of "the right antimicrobial, for the right indication (right diagnosis), the right patient, at the right time, with the right dose and route and duration, causing the least harm to the individual patient (Majumder et a., 2020).

In this guideline, AMS refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobial agents by promoting the timely selection of the optimal antimicrobial regimen of dose, duration of therapy, and route of administration. This is based on current scientific literature and best practices.

Framework for antimicrobial stewardship

WHO recommends the implementation of integrated AMS activities at country and institutional levels based on five pillars as described below:

- Establish national coordination mechanisms for AMS and develop guidelines.
- Ensure access to and regulation of antimicrobials.
- Improve awareness, education and training.
- Strengthen water, sanitation and hygiene and infection prevention and control.
- Surveillance, monitoring and evaluation.

A successful AMS Program will require implementation of all the five pillars. Linking all five pillars to other key components of infection management and health systems strengthening is crucial for achieving the universal health coverage.

AMS principles also apply to the use of antimicrobials in the animal and agriculture sectors, typically with an emphasis on the responsible and prudent use of these agents. However, this guideline focuses on implementation within the healthcare setting.

Goals of antimicrobial stewardship

The primary goals of AMS

- Improving patient outcomes by reducing infection rates (including surgical site infections) and reducing morbidity and mortality.
- Improving patient safety and minimizing unintended consequences of antimicrobial use, such as readmissions and adverse drug reactions (antibiotic adverse events).
- Reducing antimicrobial resistance through the rational use of antimicrobials.
- Reducing health care costs without compromising the quality of care.

Through the existing health facility MTCs, AMS Subcommittees will be established at hospitals to prevent inappropriate use (excessive use or unnecessary prophylaxis); incorrect use (wrong choice, wrong dose, wrong duration, wrong route, inappropriately broad spectrum, inappropriate combinations); non-prescription use of antibiotics by patients and/or their family members, or the use of leftover antibiotics or the use of prescribed antibiotics for a reason other than its intended; and the lack of use.

At the patient level, AMS indicates “the optimal selection, dosage and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance.”

At the system level, AMS refers to “an organizational or healthcare system-wide approach to promoting and monitoring judicious use of antimicrobials to preserve their future effectiveness.”

Strategies of Antimicrobial Stewardship:

- Improved techniques for the diagnosis of infection
- Improved dosing of antimicrobials
- Decreased duration of antimicrobial therapy
- Use of Combination of antimicrobial therapy
- Use of antimicrobial protocols and guidelines
- Scheduled antimicrobial rotation or cycling
- Hospital formulary based antimicrobial restriction
- Early involvement of Infectious diseases experts in the management of Infectious diseases

CHAPTER 2

COMPONENTS OF ANTIMICROBIAL STEWARDSHIP PROGRAMS

Introduction

Antimicrobial resistance (AMR) is a global public health threat that has led to increased morbidity, mortality, and healthcare costs. Antimicrobial Stewardship programs have been developed to optimise antimicrobial use, improve patient outcomes, and reduce the emergence of AMR. The core elements of Antimicrobial Stewardship programs include leadership commitment, accountability of health care workers, drug expertise, tracking, reporting, research and education with action for all. The Centre for Disease Control and Prevention (CDC), the World Health Organization (WHO) and other organisations has developed guidelines and availed the resources to support the implementation of Antimicrobial Stewardship Programs.

Component 1

Supply chain: Selection, Procurement, Supply, and Distribution

Supply chain is an organised network of personnel, institutions, system activities, resources, and technologies involved in the delivery of a product from the source to the intended institutions (healthcare facilities).

Selection of essential medicines and laboratory commodities

The selection of medicines is a crucial factor in ensuring access to appropriate antimicrobials. It should involve assessing the evidence or reasons for the medicine choice and conducting pharmacoeconomic evaluations. When choosing medications for formularies or essential medicines lists, accessibility and implementation considerations should be considered. Uninterrupted access to high-quality medications is essential.

Development of essential medicines lists based on standard treatment guidelines should be done through an evidence-based mechanism. Clinical decisions regarding medicine selection should involve a multidisciplinary team of evaluators including (i) medical practitioners, (ii) nurses, (iii) pharmacists, and (iv) clinical microbiologists. For high-cost medicines, a more thorough evaluation process is necessary, considering clinical efficacy, cost-effectiveness, and budget implication.

Rwanda procurement, supply and distribution system for essential medicines and laboratory commodities

In Rwanda, the procurement of essential medicines and laboratory consumables is managed by central supplying organizations such as Rwanda Medical Supply (RMS) and other authorized private suppliers.

The Rwanda health supply chain system is an integrated system whereby the Ministry of Health coordinates the supply of medical products and technologies through the Rwanda Medical Supply (RMS) and other central authorized private suppliers and private pharmaceutical wholesalers which procure and distribute products to public, private pharmacies and health facilities.

Medical products are stored and distributed through RMS branches to health facilities including district hospitals and health centres which distribute to health posts and community health workers with the aim to ensure that the right medicine is given to the right patient at the right time and at the right price.

The health supply chain information flow is done in reverse direction from community health to health centres, district hospitals which report to RMS branches. After aggregation of information, all RMS branches report to the national level (the flow of health products and Information is shown on Annex 4).

Despite increased investments in procurement, the availability of essential medicines and medical supplies, including laboratory commodities, at health facilities remains inadequate. There are several factors affecting the availability of essential medicines and medical supplies. These include:

i. Low manufacturing capacity,
ii. Scarcity of pharmaceutical raw materials,
iii. Dependence on a limited number of producers for certain antimicrobials,
iv. Poor forecasting and product selection, distribution, and storage challenges,
v. Delays in procurement, inflexible procurement processes,
vi. Limited funds, and
vii. Lack of stock compliance with standards.

To achieve an optimal supply chain, key focus areas should include demand planning that ensures sufficient and uninterrupted supply of consumables to strengthen the distribution chain. Efficient systems for drug procurement, storage, and distribution must be established to avoid wastage or interruptions in supply.

Directions for the future plan

To improve the supply chain for antimicrobial stewardship in Rwanda, the following directions should be considered:

1. **Strengthening procurement processes** including exploring local manufacturing options to reduce dependence on external suppliers.
2. **Developing strategies for shortage mitigation**, such as establishing backup suppliers, exploring alternative sourcing options, and implementing effective forecasting and inventory management systems.
3. **Enhancing stock management practices**, including regular monitoring of stock levels, reducing stockouts and overstocking, and ensuring compliance with quality standards.

4. **Improving communication and collaboration** among stakeholders involved in the supply chain, including healthcare facilities, procurement agencies, suppliers, and regulatory authorities.
5. **Investing in capacity building and training programs** for supply chain personnel to enhance their skills in managing antimicrobial procurement, storage, and distribution.

Effective communication among key institutions in the supply chain is essential, and engagement with supporting stakeholders and partners is crucial for shortage mitigation.

Component 2:

Diagnostics, prescribing, dispensing and responsible use

In the Rwandan context, rapid and accurate identification of disease-causing organisms as well as antimicrobial susceptibility testing are critical elements in improving antimicrobial stewardship (AMS). It is essential to develop facility-specific treatment recommendations based on national guidelines and local current antimicrobial susceptibilities to optimize antibiotic selection.

Prescription of antimicrobials should strictly adhere to national treatment guidelines and the manufacturer's indications. Prescribers should provide clear instructions regarding the dose, duration, frequency, and route of administration on the prescription.

Dispensing and administration of antimicrobials must follow the prescription. If there is any ambiguity or hesitations, the dispensing staff should consult the prescriber for clarification. Patients should receive clear explanations on the prescribed medicines (storage conditions, possible interactions, side effects, and other relevant information) to improve adherence.

The antimicrobial users should respect the prescribed dose, duration, frequency, route of administration, and any other relevant instructions.

Future plan directions for diagnostics

1. **Strengthen laboratory capacity**: Invest in infrastructure, equipment, and staffing to enhance diagnostic capabilities, including antimicrobial susceptibility testing. This should focus on increasing the number of health facilities able to conduct antimicrobial susceptibility testing.
2. **Improve data management systems:** Establish robust data management systems to facilitate timely collection, analysis, and sharing of antimicrobial resistance data.
3. **Develop community prescribing algorithms:** Create standardised guidelines and algorithms for antimicrobial prescribing in community healthcare settings to ensure appropriate and evidence-based use of antimicrobials.
4. **Enhance laboratory-result turnaround time:** Implement strategies to expedite the delivery of laboratory results to facilitate prompt decision-making for antimicrobial therapy. A system should be put in place to alert the clinician by SMS or call once the lab results are available for improving patient care.
5. **Promote sharing and utilization of antimicrobial resistance data:** Establish mechanisms for effective sharing and utilization of antimicrobial resistance data among healthcare facilities, public health agencies, and relevant stakeholders. This will lead to antimicrobial resistance surveillance and learning from health facilities performing well.

6. **Enhance knowledge and skills on antimicrobial resistance:** Provide comprehensive training programs and continuous education to healthcare personnel to improve their understanding of antimicrobial resistance and promote responsible antimicrobial use.

There is a need to strengthen diagnostics, prescribing practices, dispensing procedures, and responsible use of antimicrobials, leading to improved antimicrobial stewardship and better patient outcomes.

Component 3:
Regulation and manufacturing

Regulation

Ensuring sustainable access to quality essential and efficient antimicrobials is important to successfully reduce the development of AMR. Consuming substandard or falsified (SF) antimicrobials due to lack of supply or limited access to antimicrobials contributes to the emergence of AMR.

Rwanda has a public institution, Rwanda FDA, in charge of protecting the public health against falsified and substandard medicines to ensure that marketed medicines and allied substances are safe, efficacious and of acceptable quality for the public. This includes:

- Investigating safety concerns and act to prevent and minimize medicine-related harms.
- Enforcing policies that ensure the manufacture, import, and trade of medicines and allied substances is done according to best practices and internationally accepted guidelines.
- Regulating the quality of medicines and allied substances.
- Develop a policy on collecting leftovers of antimicrobials from the community to the central level
- Regulating the conduct of clinical trials.

In Sub-Saharan African countries, AMS was the least prioritized with only 32% of the countries reporting a national guideline towards proper antibiotic administration, while other countries reported uninhibited use of counterfeit and unregulated antibiotics [4]. Most African countries still need to strengthen their implementation of the AMS programs through collaboration with other stakeholders, including non-state actors.

Manufacturing

Pharmaceutical manufacturing processes can contribute to AMR through two key routes:

- Releasing antimicrobial residues into the environment in pharmaceutical waste.
- Manufacturing substandard antimicrobials.

Regulation and manufacturing fundamentally support the AMS access pillar because they serve as the gatekeepers for the influx of new antimicrobials. Manufacturing needs to be monitored to prevent environmental release of antimicrobials and ensure production of standard antimicrobials. This should be done without impeding the manufacturing process through stringent regulation.

Good Manufacturing Practice (GMP) regulations are a vital component of AMR containment strategies, certifying the quality of pharmaceutical products, and thus preventing the sale of substandard medicines which can accelerate the emergence of resistant pathogens.

In Rwanda, the FDA has approved a Pharmaceutical company, Apex Biotech which has been given a license to manufacture beta-lactam antibiotics. Also, the BioNTech will be manufacturing vaccines in Rwanda but there is a possibility to also manufacture antimicrobials including antibiotics. In the local context, the manufacturing domain is not yet well developed and what is done is manufacturing documents analysis for drugs to be imported. For few locally manufactured pharmaceutical products, Rwanda FDA regulates the process.

Component 4:

Research and development

WHO has encouraged countries to participate in international collaborative research to support the development of new medicines, diagnostic tools and vaccines. This can be achieved through prioritisation and support of basic scientific research on infectious diseases, and promoting partnerships between research institutions in developed and developing countries.

Health facilities should have a system for regular analysis of available data on antimicrobial resistance and use it to generate regular reports that can guide in decision making. The University of Rwanda through its College of Medicine and Health Sciences has a laboratory used for quality control and assurance of drugs including antimicrobials. The laboratory checks if available antimicrobials in Rwanda are not sub-standard. This helps the Rwanda FDA in its pharmacovigilance. Also, the government of Rwanda accepted to host the African Medicines Agency (AMA) which ensures the quality of health products.

CHAPTER 3

CORE ELEMENTS OF A SUCCESSFUL ANTIMICROBIAL STEWARDSHIP PROGRAM

NATIONAL CORE ELEMENTS FOR AMS PROGRAMS

To successfully implement an AMS program, four core elements at the national level shall be considered:

1. National Plan and Strategies
2. Regulations and Guidelines
3. Awareness, education, and training
4. Supporting technologies and data

1. National Plan and Strategies

National action plan on AMR states that AMS is a priority within the five strategic objectives and dedicated funding for the national action plan on AMR. The activities of the NAP on AMR shall be costed for a period of 5 years and reviewed after 3 years of implementation. Technical working group on AMS shall be established with clear terms of reference; develop a national plan for antimicrobial stewardship or policy endorsement, designate centres for antimicrobial stewardship, avail regulation on the use of antimicrobial products in all sectors.

The Rwanda NAP on AMR has defined goals, outcomes, timelines, structures and responsibilities on AMS as well as monitoring and evaluation. The NAP on AMR ensures there is an on-going collection and analysis of AMR data to determine the effectiveness of AMS and IPC activities that were implemented.

2. Regulations and Guidelines

The following actions will be considered:

a. Integration of the AWaRe classification of antibiotics within the national EML and formulary. Develop and adapt the antibiotics contained in the national EML and the national formulary with reference to the WHO EML AWaRe groups of antibiotics and outline AMS strategies for each group.

b. Define the list of Critically important antibiotics for Human medicine

c. Update clinical guidelines to include AMS principles and integrate the WHO AWaRe classification of antibiotics.

d. Endorse and make available up-to-date standard treatment guidelines with antibiotic selection for common clinical conditions based on national susceptibility data. Where

guidelines exist, the first step is to review them and identify missing guidelines with an initial focus on empirical treatment. Where guidelines do not exist, the government and its partners combine human and financial resources to support the development of such national standard treatment guidelines and their dissemination as a priority activity.

e. Regulations on fixed-dose combinations of antibiotics and control their effectiveness.

f. Regulations on sale of prescription only antimicrobials.

g. Legislation or regulation are actively implemented and enforced that requires antibiotics to be dispensed only on prescription by a qualified health-care professional.

h. Put measures in place to ensure continued availability of quality-assured antibiotics.

3. Awareness, education, and training.

a. Regular public antibiotic awareness campaigns.

b. Antibiotic awareness campaigns such as World Antimicrobial Awareness Week and other targeted campaigns are regularly organized to address specific national or local issues and communities.

c. Education in schools on basic infection principles.

d. Ensure provision of education on basic IPC principles, including hand hygiene.

e. Education and training on AMS competencies for AMS team members and all healthcare professionals.

f. The AMRCC and/or healthcare facilities shall ensure facilitation of education and training of staff in AMS.

g. All healthcare facilities have to provide possible support for the implementation of AMS programs, including staffing standards, training, and accreditation.

Adhere to set roles and responsibilities for the AMS program in all facilities (public and private) a requirement.
Ensures the AMS core elements are in place in a health-care facility and sets criteria to mainstream AMS activities in routine healthcare programs.
Trainings on AMS awareness to be planned at the level of healthcare facility (public and private) from lowest level.

4. Supporting technologies and data.

a. Enhance the National surveillance system on AMR with laboratory capacity and capacity for AMC and AMU surveillance to guide optimal use of antimicrobials in clinical practice and to update clinical guidelines.

Ensure that capacity is in place at the health-care facility or off-site to

- Identify pathogens and their antibiotic susceptibility, to guide optimal use of antibiotics in clinical practice and to update guidelines.
- Capture AMR, AMU and AMC data
- Support identification of key pathogens or syndromes to target AMS interventions.
- Support programmes to collect, compile and compare data from different facilities to identify trends over time and possibly to identify facilities that are outliers and might warrant investigation and assistance.

b. Diagnostic tests available and capacity building undertaken to optimize antimicrobial use.

- Public and private health care facilities to ensure the procurement and promote the use of relevant diagnostic tests to optimize antibiotic use.
- Relevant and essential investigations (e.g., microbiology, imaging) are available made for all health-care facilities (either on-site, or with available access off-site).

AMS CORE ELEMENTS FOR HEALTH CARE FACILITIES

The following nine core elements are contextualized and provide a framework for a successful AMS program:

1. **Leadership and governance**
2. **Accountability**
3. **Pharmacy expertise**
4. **Action**
5. **Tracking**
6. **Reporting**
7. **Education**
8. **Communication**
9. **Quality improvement**

Flowchart on core elements for AMS program

1. Leadership and governance:

The hospital leadership must dedicate the necessary human, financial and IT resources to the program. Support from hospital leadership (such as Director General, Clinical Director, Director of Nursing, Pharmacist and others) is critical to the success of the hospital AMS Program. The hospital leadership should demonstrate their support and endorsement of the committees through:

- ✓ Appointing AMS members and issue letters with specific terms of reference.
- ✓ Supporting training and education in health facility
- ✓ Ensuring staff from relevant departments are given sufficient time to contribute to AMS

activities

- ✓ Facilitating financial support for the program
- ✓ Recognizing staff for their contributions to AMS activities e.g. including AMS in the annual performance appraisals.
- ✓ Establish criteria of selecting AMS performer for appraisals.

Governance Structure

Following an organization's declared commitment to AMS, healthcare facility leadership needs to establish the governance structure for the stewardship programme. The AMS Committee should be embedded within the healthcare facility existing structures such as the MTC. Program leadership should have regularly scheduled meetings with senior executives and the board to report activities and outcomes.

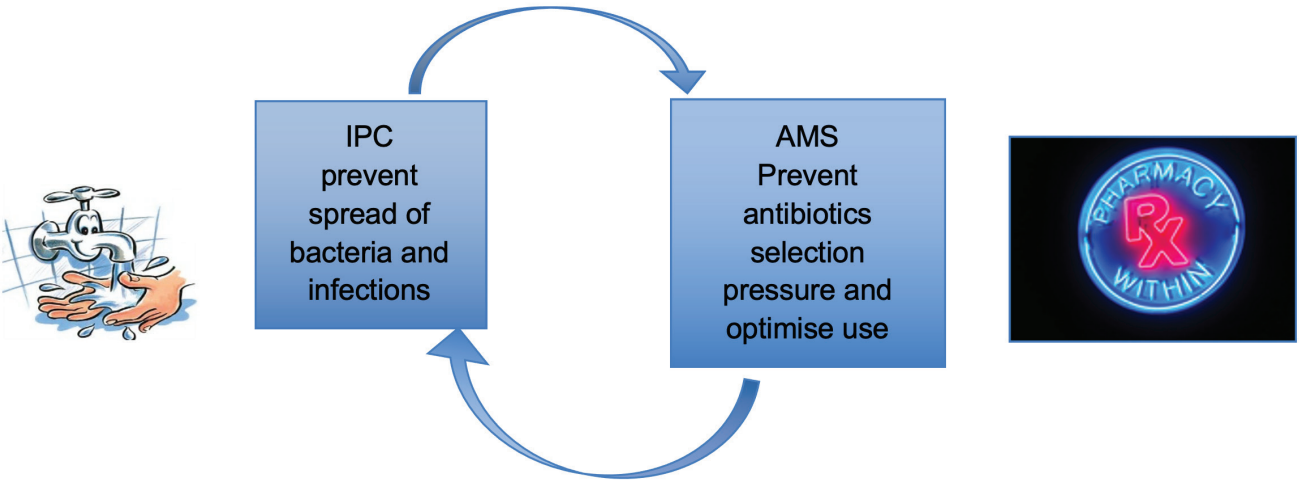


Figure 1: Links between IPC and AMS in delivering quality health care and optimising antibiotic use

Source: **A WHO Practical Toolkit**

Both IPC and AMS are interdependent programmes that require coordinated efforts and interventions to achieve the greatest impact.

2. Accountability:

Appoint a leader responsible for program management and outcomes e.g. physician or pharmacist with AMS skills and interest.

3. Pharmacy expertise: A

ppointing a single pharmacist leader who will assist in the implementation to improve antibiotic use shall be very important in ensuring an effective AMS. The pharmacy expert shall vary according to the Healthcare level.

4. Action:

Implement at least one intervention (based on gaps identified from drug audits, reviews or pilot studies) that will have a significant impact on the institution to improve antibiotic use. Examples of some interventions to be implemented may be one of the following but not limited:

- Enhancing Infection Prevention and control interventions

- Infection-based interventions targeting respiratory tract infections, urinary tract infections, and skin and soft tissue infections. Examples may include improving diagnostic testing, review of microbiology results and adjusting therapies, and monitoring duration of therapies.
- Provider-based interventions such as antibiotic timeouts at 48 hours and allergy assessments.
- Pharmacy-based interventions such as making the switch to oral antibiotic therapy from intravenous when appropriate, dose optimization, documentation of indications, and duplicative therapy alerts.
- Microbiology-based interventions such as selective reporting of susceptibilities and adding comments in reports to help clinicians interpret the results.
- Nursing-based interventions such as education on proper techniques in obtaining specimens to reduce contamination.

5. Tracking:

Monitor antibiotic prescribing (e.g., adherence to guidelines), impact on interventions (e.g. IV to oral use), antibiotic use and resistance.

6. Reporting:

The facility should make a routine reporting to AMRCC. All information should also be disseminated to doctors, nurses, and relevant staff. AMRCC should avail a standardized reporting tool.

7. Education:

Promote health education to the health workers on AMS, infection prevention and control; Educate clinical teams on adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing. An on-going education is a critical component of all high-performing AMS programs.

8. Communication

Communication frameworks should contain clear, straightforward core clinical messages on the vision and the benefits of the AMS program to the health-care workers, patients and the community at large. In addition, this should include mechanisms for internal and external communication with stakeholders. Internal mechanisms can include clinical meetings and memoranda.

Health facilities should also develop multipronged communication plans involving a mix of media channels, such as community radio programs, social media, campaign activities, and involvement of key opinion leaders.

9. Quality improvement

Quality improvement (QI) should be a key component of an AMS program to ensure that interventions are continuously improved, and efforts are sustained. Any method should be used to test interventions e.g. PDCA and others.

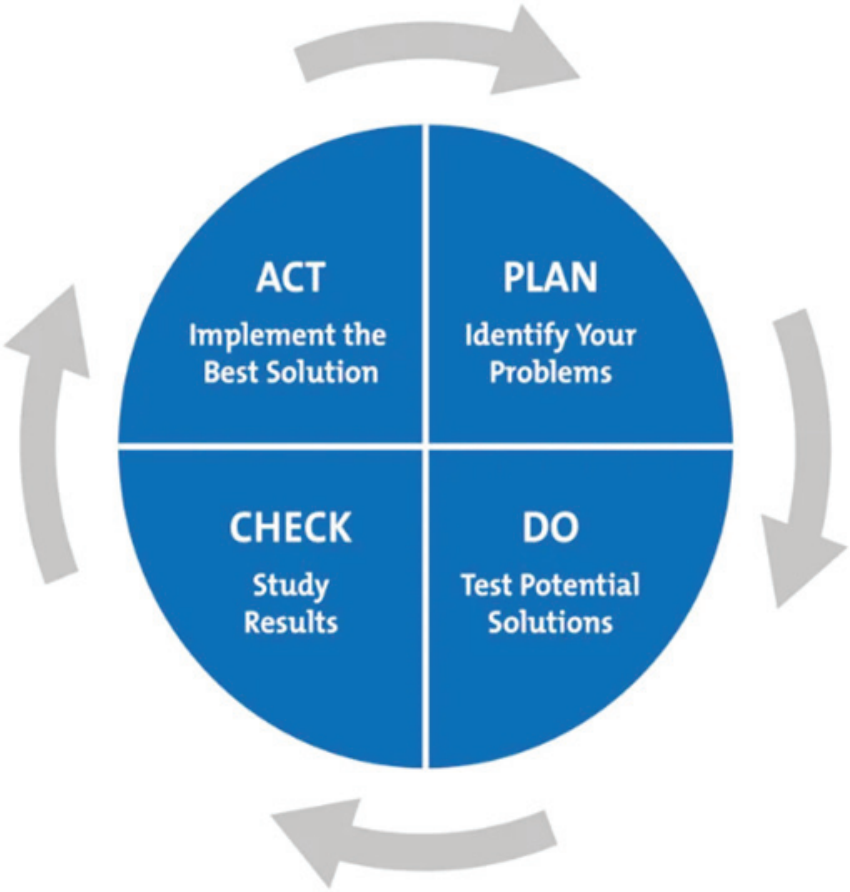


Figure 2: The Plan-Do-Check-Act Cycle

CHAPTER 4

ACTIONS AND EFFECTIVE INTERVENTIONS TO SUPPORT AMS

Antimicrobial Stewardship (AMS) actions and interventions are categorized as National, Referral, Teaching, Second level teaching, Provincial District, health centre, Health post, Community pharmacies, community health workers and community-based interventions (Figure 3). All actions and interventions require varying levels of expertise, capacity, and resources to be implemented.

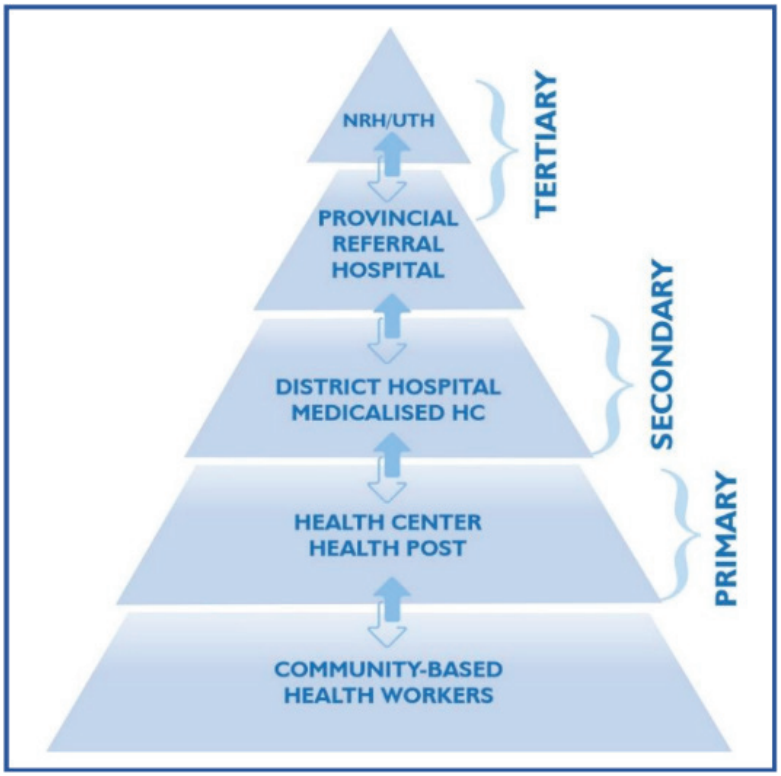


Figure 3: Levels of services provided within the Public Healthcare System

Source: Ministry of Health, National guidelines for establishment and functionality of Health post in Rwanda, January 2022

NATIONAL LEVEL ACTIONS AND INTERVENTIONS

The antimicrobial resistance coordinating committee (AMRCC), comprising technical directors and experts from relevant ministries, shall be responsible for overseeing the implementation of the AMR National action plan (AMR-NAP). The TWG responsible for optimization of drug use shall formulate, monitor, and evaluate the implementation of AMS activities.

National level actions

- Developing an Operational Plan on AMS activities.
- Participate in the updating of the Rwanda National formulary and the Rwanda Essential

medicines list (EML) to include the AWaRe categorization.

- Support the development of evidence-based treatment guidelines for common clinical syndromes.
- Support AMR awareness campaigns
- Support facilities in conducting the situation analysis
- Promoting diagnostic stewardship.
- Advocate for the inclusion of AMS training in pre-service curricula, in-service programs, continuing professional development programs, and stand-alone courses.
- Advocate for the enforcement of policies addressing AMR
- Tracking antimicrobial use and consumption
- Reviewing quality data and reports of imported and locally manufactured antimicrobials
- Advocate for integration of AMS, infection prevention control (IPC) and AMR surveillance activities
- Provide technical support to sub-national structures
- Ensure implementation of AMS guidelines by including AMS as a performance indicator.

Referral level action and interventions

- Coordinating AMS activities at referral level
- Ensuring that the AMS activities are embedded in the clinical care services
- Support AMR awareness campaigns in the catchment area of the referral hospital
- Monitoring compliance to standard treatment guidelines
- Ensure the integration of AMS, infection prevention control (IPC) and AMR surveillance activities
- Ensure all health facilities, private and public, in the catchment area are conducting AMS activities by including AMS as a performance indicator.

PROVINCIAL LEVEL ACTION AND INTERVENTIONS

- Coordinating AMS activities at provincial level
- Ensuring that the AMS activities are embedded in the clinical care services
- Support AMR awareness campaigns in the catchment area of the provincial hospital
- Monitoring compliance to standard treatment guidelines
- Ensure the integration of AMS, infection prevention control (IPC) and AMR surveillance activities
- Ensure all health facilities, private and public, in the catchment area of the provincial hospital are conducting AMS activities by including AMS as a performance indicator.

DISTRICT LEVEL ACTIONS AND INTERVENTIONS

- Coordinating AMS activities at district level
- Ensuring that the AMS activities are embedded in the clinical care services
- Support AMR awareness campaigns in the district
- Monitoring compliance to standard treatment guidelines
- Ensure the integration of AMS, infection prevention control (IPC) and AMR surveillance activities
- Ensure all health facilities, private and public, in the district are conducting AMS activities by including AMS as a performance indicator.

Facility level interventions

To fully benefit from an AMS program, private and public health facilities (Hospitals, Clinics, Dispensaries, Health centres and health posts) should aspire to put core elements in place, including to secure antimicrobials listed in the EML(Essential Medicine List), establishing well functional laboratories, provide treatment guidelines and establish a multidisciplinary AMS team.

Core interventions

Each facility should have an action plan and adopt the national AMS guideline/policy

The facility AMS policy should clearly outline the strategies to be implemented. The strategies include;

- Pre-authorization and antimicrobial restrictions for the reserve group
- Prospective audit and feedback: The method allows the AMS program to interact directly with prescribers, in order to tailor their prescribing behavior on antimicrobial therapy.
- Health facility antimicrobial prescribing guidelines shall include a list that stipulates which antimicrobials are Access, Watch, and Reserve (AWaRe classification).
- Criteria for Reserve antimicrobials shall include spectrum of activity, potential toxicity, misuse, cost, and high resistance potential, among others.
- The list of Reserve antimicrobials shall be reviewed on a regular basis in light of the hospital's antimicrobial usage data and rates of AMR.
- Reserve antimicrobials shall only be available from the hospital pharmacy and not included in ward drug stocks. However, hospitals should ensure they have a mechanism for accessing Reserve agents, whenever they are required.
- Where pre authorisation is not possible, there should be a system for identifying when Reserve antimicrobials have been prescribed and for early review of such prescriptions by at least two competent prescribers.

However, a combined approach in implementation of strategies is recommended

- The AMS team shall conduct regular clinical audits (Knowledge, Attitude and Practices surveys, Point Prevalence Survey, pharmacy audits).
- The multidisciplinary AMS team will conduct regular antimicrobial stewardship ward rounds.
- Set up a collection points for unused and expired antimicrobials from the public.

Complementary interventions

Additional AMS interventions that are dependent on available resources and expertise include:

FACILITY LEVEL INTERVENTIONS

- Development or review of healthcare specific and up-to date guidelines
- Antibiogram based on local AMR data
- Develop AMS specific prescription drug chart
    - Automatic stop order- automatically apply stop dates for antimicrobial orders when the duration of therapy is not specified.
    - By day 3, patient antimicrobial prescription should be reviewed, based on laboratory report and/or clinical response
- Development of Prescriber aids-e.g. antibiotic algorithm, antibiotic chart, handbook, etc.
- Display visual aids to illustrates principles of AMS e.g., collection of blood cultures
- The presence of a laboratory to support AMS interventions
    - Restrictive and interpretative laboratory reporting
    - Implementation of Diagnostic stewardship
    - Access to rapid diagnostic tests and inflammatory markers
    - Implementation of quality management system (QMS)
    - Integrate bacteriology testing and reporting standards
- Include AMS messages in health-related talks or in the patients waiting areas
- Collaborate with other healthcare facilities to facilitate the necessary structures, expertise, and skills to implement more AMS interventions. The areas of collaborations can include: Developing clinical treatment guidelines or antibiograms, technical support on how to conduct AMS ward rounds, Microbiology laboratory services, etc.

Patient and Clinician level interventions

Switching antimicrobial therapy from Intravenous (IV) to oral

- Promote bacteriology sample collection before initiating antibiotherapy
- De-escalation (From broad spectrum antimicrobials to narrow spectrum)
- Optimization of antimicrobial dosage, based on the renal, liver function, site of infection and weight of the patient. Optimization strategies include:
  - Optimizing loading dose
  - Continuous infusion
  - Extended infusion
  - Increased dosing frequency
- Reduce hang time (time interval from request/prescription to administration of the antimicrobials)
- Incorporate IPC practices in AMS interventions

Community pharmacy interventions

- Raise awareness by displaying posters, fliers, or other forms of information about the appropriate use and disposal of antimicrobials
- Involve community Pharmacists in AMR awareness activities
- Liaise with the pharmacy regulatory bodies to enhance AMS
- Liaise with medical insurances in conducting prescription audit and feedback to the institutions
- Liaise with medical insurances to submit antimicrobial CP annual consumption data to the AMS district coordinator (District hospital).
- Set up a collection points for leftover antimicrobials from the public
- Consider as continuous professional development (CPD) courses on AMR or AMS completed by members of healthcare bodies (nurses, lab technicians, pharmacists, medical doctors.

COMMUNITY-BASED INTERVENTIONS

The AMS team at the health centre will be responsible for the implementation of the following interventions in their catchment area;

- Raise awareness about the prevention of common conditions such as malaria, diarrhoea diseases, and viral respiratory infections
- Integrate AMS messages in established community-based programs such as improved

water, sanitation, and hygiene practices (WASH), vaccination, Tuberculosis, HIV.

- Advocate for appropriate use of antimicrobial agents (e.g., completion of treatment as prescribed, proper storage practices).
- Disseminate information, education, and communication (IEC) materials through various platforms like community radios, political leaders, drama groups, social media, traditional leaders, and religious leaders.
- Promote multisectoral collaboration at the community level in seeking sustainable solutions to limit the use of antimicrobials in interconnected field (e.g., agriculture, veterinary, environment, human health) .

AMS actions and interventions are categorized as national, referral, provincial and district, healthcare facility, community pharmacies and community-based interventions. All actions and interventions require varying levels of expertise, capacity, and resources to be implemented.

CHAPTER 5

STEPWISE APPROACH TO ESTABLISHING A STEWARDSHIP PROGRAMME AT A HEALTHCARE FACILITY

INTRODUCTION

Establishing an antimicrobial stewardship program (ASP) at a healthcare facility requires a systematic and stepwise approach to ensure its successful implementation and sustainability. The implementation of an ASP helps optimize antimicrobial use, reduce the emergence and re-emergence of antimicrobial-resistant organisms, and minimize adverse effects associated with antimicrobial use. This chapter outlines the steps involved in establishing a robust stewardship program adapted to Rwandan context.

5.1. Obtain Leadership Support

Obtaining leadership support is a crucial step in establishing an antimicrobial stewardship program (ASP) at a healthcare facility. Here are some key strategies to obtain leadership support for the program:

1. **Raise Awareness:** Educate hospital administrators and key decision-makers about the significance of antimicrobial resistance and its impact on patient outcomes, healthcare costs, and public health. Present data and evidence demonstrating the need for an ASP to address this critical issue.
2. **Highlight Patient Safety:** Emphasize the importance of patient safety and how inappropriate antimicrobial use can lead to adverse events, treatment failures, and increased healthcare-associated infections. Discuss the potential risks and consequences of antimicrobial resistance for patients within the facility.
3. **Demonstrate Cost Savings:** Showcase the economic benefits of implementing an ASP. Provide evidence that appropriate antimicrobial use can lead to cost savings by reducing the length of hospital stays, minimizing unnecessary diagnostic tests, and preventing the need for expensive broad-spectrum antimicrobials.
4. **Present Regulatory and Accreditation Requirements:** Highlight any regulatory or accreditation requirements related to antimicrobial stewardship. Many healthcare regulatory bodies and accreditation organizations now mandate or strongly recommend the implementation of ASPs as a part of quality improvement initiatives.
5. **Share Success Stories:** Share success stories and examples of effective ASPs from other healthcare facilities. Demonstrate how these programs have improved patient outcomes, reduced antimicrobial resistance rates, and enhanced the overall quality of care.
6. **Engage Infectious Disease Specialists and Clinical Pharmacists:** Involve infectious disease specialists, clinical pharmacists, and other healthcare professionals who have expertise in antimicrobial stewardship. Their input and support will strengthen the case for establishing an ASP and help address any concerns or misconceptions that leadership may have.

7. **Provide a Comprehensive Proposal:** Develop a comprehensive proposal that outlines the goals, objectives, and strategies of the proposed ASP. Clearly define the roles and responsibilities of the multidisciplinary team, highlight the anticipated outcomes, and present a plan for implementation and evaluation of the program.
8. **Address Resource Needs:** Assess and clearly articulate the resource requirements for implementing the ASP, such as personnel, training, data collection and analysis tools, and potential technology investments. Demonstrate how the benefits of the program outweigh the associated costs.
9. **Offer Collaboration and Support:** Show willingness to collaborate with hospital leadership and other departments to integrate the ASP seamlessly into existing workflows and quality improvement initiatives. Assure them that the ASP team will work closely with other departments, such as pharmacy, microbiology, infection control, and information technology, to ensure successful implementation.
10. **Engage in Ongoing Communication:** Maintain open lines of communication with hospital administrators throughout the process. Keep them informed about the progress of the program, share updates on emerging resistance trends, and regularly report on the impact and outcomes of the ASP.
11. **Relationship building with leadership:** Remember that building relationships and engaging in ongoing dialogue with hospital leadership is essential. Tailor your messaging to align with the organization's priorities and emphasize how the ASP aligns with their goals of improving patient care, safety, and cost-effectiveness.

5.2 Establish Multidisciplinary Team:

The team should consist of health professionals with diverse backgrounds, expertise, training and roles relevant to antimicrobial stewardship. According to the Rwanda Medicine and Therapeutic Manual, AMS is a subcommittee of MTC. The goal of an AMS sub-committee is to assist the MTC in dealing with the management of antimicrobials, and to ensure that:

- There is availability of safe, effective, cost-effective antimicrobials
- Antimicrobials are used only when clinically indicated, at the correct dose and route, and for an appropriate duration of time.
- Correct information is given to patients and takes antimicrobials correctly.

Composition of the AMS Sub-Committee

- The sub-committee should be composed of clinicians, pharmacists, laboratory staff, and a representative from the IPC committee.
- It should be a small but agile team that will work within the MTC and the wider QI framework to promote the AMS agenda.

Functions of the AMS Sub-Committee

The functions of the AMS sub-committee are similar to those of the MTC, but with an emphasis

on antimicrobial drugs.

- Advise the MTC and medical staff on all aspects of antimicrobial use and misuse.
- Assist in evaluating and selecting antimicrobials for the formulary and STGs.
- Develop and implement existing policies concerning the use of antimicrobials use within the hospital.
- Monitor and assess consumption and use through prescribing quality assurance programs and medicine
- Use evaluations to ensure effective use of antimicrobials of adequate quality only when clinically indicated, in the correct dose and route, and for the appropriate duration.
- Participate in the educational programs for healthcare staff.
- Collaborate with the IPC committee and laboratory departments to monitor and prevent/ limit emergence and spread of resistant microorganisms.

Here are some key considerations when establishing the hospital AMS team:

1. **Infectious Disease Specialists or Physicians:** Include infectious disease physicians who have expertise in antimicrobial use, infectious diseases, and infection control. Their clinical knowledge and experience will be valuable in guiding the program's development and implementation.

1. **Clinical Pharmacists or Pharmacists with drug expertise:** Involve clinical pharmacists with expertise in infectious diseases or pharmacotherapy. Clinical Pharmacists contribute to safe medication uses including the provision of advice on prescribing, medication reviews, guidance on appropriate antibiotic selection, prescription and dosing, and monitor medicine therapy for optimal outcomes of the patient by participating in major and minor world round with the other clinicians.

2. **Microbiologists:** Engage microbiologists or laboratory specialists who can provide insights into local antimicrobial resistance patterns, interpret microbiology results, and assist in optimizing laboratory testing protocols.

3. **Laboratory Scientist:** They can provide insights into local antimicrobial resistance patterns, interpret microbiology results, and assist in optimizing laboratory testing protocols.

4. **Infection Prevention and Control Specialists:** Collaborate with infection prevention and control professionals who can contribute to strategies for preventing healthcare-associated infections, surveillance of resistant organisms, and implementation of infection control measures.

5. **Nursing Representatives:** Include nursing representatives who are involved in patient care, as they can provide valuable perspectives on the practical implementation of antimicrobial stewardship initiatives and engage frontline staff.

6. **Information Technology Experts:** Involve individuals with expertise in health information technology to support the development of electronic tools and systems for data collection, monitoring, and feedback.

7. **Quality Improvement Specialists:** Consider including quality improvement specialists who

can assist in the design and implementation of quality improvement initiatives related to antimicrobial stewardship.

8. **Hospital Administrators:** It is beneficial to have representation from hospital administration to provide leadership support, secure necessary resources, and ensure alignment with overall organisational goals.
9. **Education and Training Experts:** Include individuals with expertise in education and training to develop educational materials, deliver training sessions, and promote ongoing education on antimicrobial stewardship for healthcare providers.
10. **Data Analysts:** Involve individuals who can analyze and interpret antimicrobial usage data, resistance patterns, and clinical outcomes to provide meaningful feedback to the multidisciplinary team and support evidence-based decision-making.
11. **Environmental Health Specialists:** Collaborate with infection prevention and control professionals who can contribute to strategies for preventing healthcare-associated infections, surveillance of resistant organisms, and implementation of infection control measures including environmental hygiene within the healthcare facility.

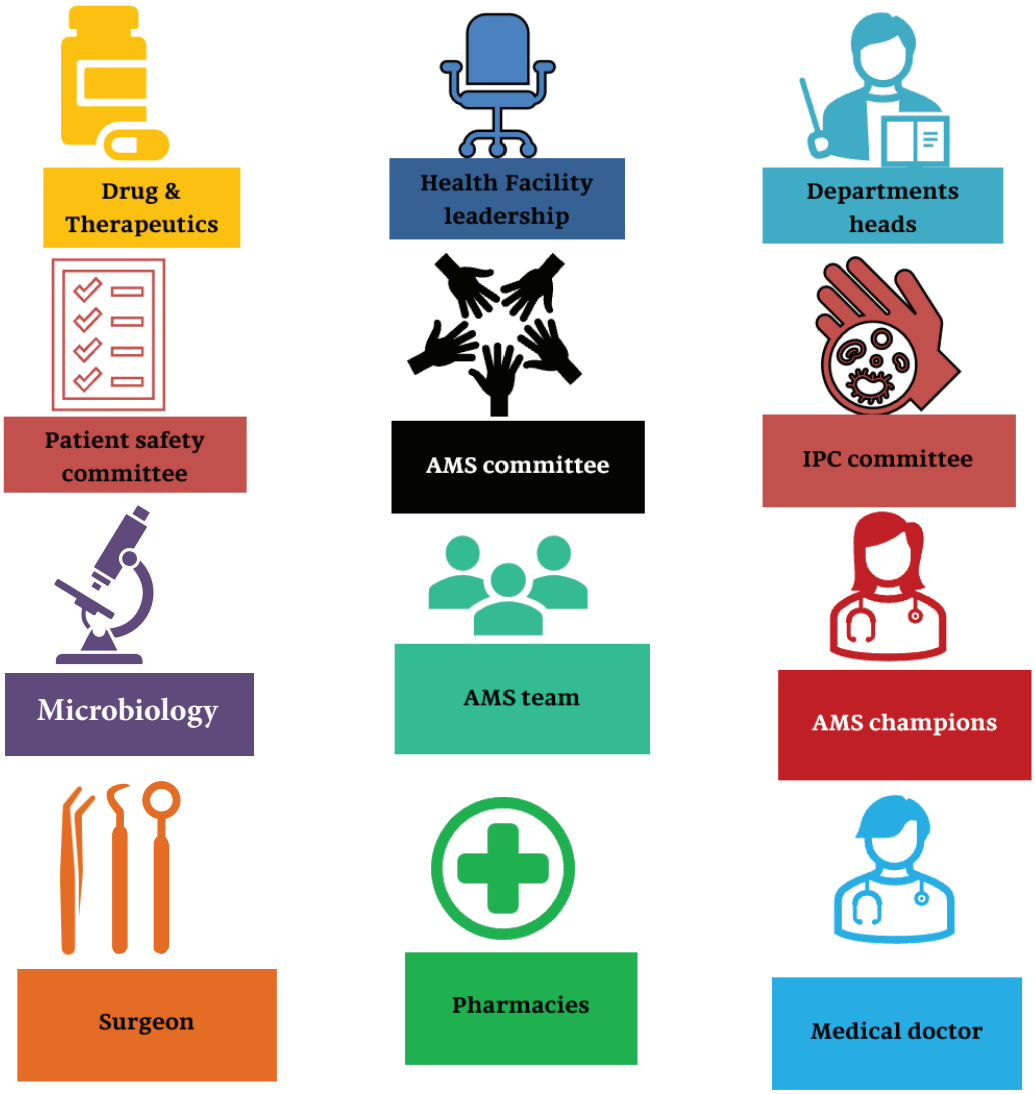


Figure 4: Members to consider when establishing hospital AMS team

5.3 Assess Current Practices and Resources:

Assessing current practices and resources related to antimicrobial stewardship is a crucial step in establishing an effective program. It helps identify areas of strength and areas that need improvement, as well as determine the resources available for implementing the program. Here are some key considerations for assessing current practices and resources:

- **Antimicrobial Use and Prescribing Patterns:** Evaluate the current patterns of antimicrobial use within the healthcare facility. Review prescribing practices, including the types of antimicrobials commonly prescribed, indications for use, duration of therapy, and adherence to treatment guidelines.
- **Data Collection and Documentation:** Assess the availability and quality of data related to antimicrobial use and resistance. Determine whether there is a system in place for collecting and documenting data on antimicrobial prescriptions, including information on indications, dosage, duration, and prescriber details.
- **Information Technology Systems:** Evaluate the existing information technology infrastructure and systems in place for antimicrobial management. Assess whether electronic health records or other clinical information systems capture relevant antimicrobial data and support decision-making related to antimicrobial use.
- **Laboratory Support:** Review the capabilities of the microbiology laboratory in the facility. Evaluate whether the laboratory can provide timely and accurate susceptibility testing and assist with the interpretation of results. Assess the availability of resources for detecting and monitoring antimicrobial resistance.
- **Education and Training:** Determine the extent of education and training programs on antimicrobial stewardship available to healthcare providers. Assess whether there are educational materials, guidelines, or training sessions in place to promote appropriate antimicrobial prescribing practices and raise awareness about antimicrobial resistance.
- **Antimicrobial Stewardship Policies and Guidelines:** Evaluate the existence and effectiveness of any existing antimicrobial stewardship policies or guidelines within the facility. Assess the clarity, comprehensiveness, and adherence to evidence-based recommendations.
- **Resources and Staffing:** Assess the availability of resources, both human and financial, dedicated to antimicrobial stewardship activities. Determine the staffing levels and expertise of healthcare professionals involved in antimicrobial management, such as infectious disease specialists, clinical pharmacists, microbiologists, and infection prevention specialists.
- **Collaboration and Communication:** Evaluate the existing collaboration and communication channels between different departments involved in antimicrobial stewardship, such as pharmacy, microbiology, infection control, and information technology. Assess the effectiveness of multidisciplinary collaboration in promoting appropriate antimicrobial use.
- **Performance Monitoring and Quality Improvement:** Review any existing performance monitoring or quality improvement initiatives related to antimicrobial use and resistance. Assess the methods used to measure and monitor antimicrobial prescribing practices, antimicrobial resistance rates, and patient outcomes.

- **Regulatory and Accreditation Requirements:** Determine whether there are any specific regulatory or accreditation requirements related to antimicrobial stewardship that the facility must adhere to. Assess the facility's compliance with these requirements.

5.3.1 Developing a facility-specific action plan.

According to the SWOT analysis, develop a healthcare facility AMS action plan to ensure accountability, prioritize activities and measure progress. This should include the following key components:

• **Core-elements:** Identify the essential components that require urgent and medium-term attention, such as assigning responsibility, establishing a timeframe, and defining measurable criteria.

• **Governance**: Recognize the importance of leadership involvement and supervision and create an AMS committee (either newly formed or integrated into an existing structure) and an AMS team with the endorsement of facility leadership.

• **AMS activities:** Pinpoint areas that require enhancement, execute AMS interventions (including details on who, what, where, when, and how), oversee progress and evaluation, and communicate outcomes and feedback.

• **Health-care facility-wide engagement:** Promote participation from all areas of the facility in the AMS program and authorize the AMS committee and/or AMS team to carry out AMS interventions and oversee their execution

• **Education and training:** Recognize the skills that require improvement for successful AMS implementation and create an AMS education and training plan for the facility

• **Budget:** Prepare a comprehensive AMS program budget, covering the necessary human and financial resources for the program's daily operations, and the education and training of the AMS team and healthcare professionals. The budget must have the approval of the facility's leadership

5.4. Develop Program Policies and Guidelines:

Develop evidence-based policies, guidelines, and treatment algorithms for antimicrobial use. These should include principles for appropriate prescribing, dosage recommendations, duration of therapy, and guidelines for managing common infectious diseases. These policies and guidelines provide a framework for healthcare providers to follow when making decisions about antimicrobial use. Here are some key considerations for developing program policies and guidelines:

- ✓ **Use Evidence-Based Guidelines:** Base your policies and guidelines on current evidence-based guidelines, such as those from reputable organizations like the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC), or specialty-specific guidelines from professional societies. Consider local resistance patterns and the specific needs of your healthcare facility.
- ✓ **Define Goals and Objectives:** Clearly articulate the goals and objectives of your antimicrobial stewardship program. Examples may include optimizing patient outcomes, reducing antimicrobial resistance, improving the appropriateness of antimicrobial use, and minimizing adverse events related to antimicrobial therapy.
- ✓ **Promote Appropriate Prescribing Practices:** Develop guidelines that promote appropriate

antimicrobial prescribing practices. This may include indications for antimicrobial use, dosage recommendations, treatment durations, and considerations for de-escalation or discontinuation of therapy. Emphasize the importance of culture and susceptibility testing before initiating antimicrobial therapy.

- ✓ **Select Preferred Antimicrobials:** Identify preferred antimicrobial agents for specific infections based on their efficacy, safety profile, cost-effectiveness, and local susceptibility patterns. Consider developing an antimicrobial formulary or restricted antimicrobial list to guide prescribers in their choices.
- ✓ **Implement Antimicrobial Stewardship Interventions:** Define the specific antimicrobial stewardship interventions that will be implemented within your health facility. These may include prospective audit and feedback, pre-authorization or pre-approval processes, dose optimization strategies, and guidelines for antimicrobial prophylaxis.
- ✓ **Provide Recommendations for Special Populations:** Consider special populations, such as pediatrics, elderly patients, pregnant women, and immunocompromised individuals, when developing guidelines. Provide specific recommendations and considerations for antimicrobial use in these populations.
- ✓ **Address Common Infectious Syndromes:** Develop guidelines for common infectious syndromes encountered in your healthcare facility. This can include guidelines for community-acquired pneumonia, urinary tract infections, skin and soft tissue infections, intra-abdominal infections, and bloodstream infections.
- ✓ **Include Infection Control Measures:** Incorporate infection control measures into your guidelines to prevent the transmission of multidrug-resistant organisms. This can include recommendations for isolation precautions, hand hygiene, and environmental cleaning and disinfection.
- ✓ **Consider Local Resistance Patterns:** Take into account local antimicrobial resistance patterns when developing guidelines. Review local susceptibility data and adjust guidelines accordingly to ensure optimal treatment choices and minimize the development of resistance.
- ✓ **Communicate and Educate:** Clearly communicate the developed policies and guidelines to all healthcare providers involved in prescribing and administering antimicrobial agents. Conduct regular educational sessions and provide ongoing updates to ensure awareness and compliance with the ASP guidelines.

5.5 Implement Education and Training

Implementing education and training initiatives is a critical component of an effective antimicrobial stewardship program (ASP). It helps raise awareness among healthcare providers about the importance of appropriate antimicrobial use, builds knowledge and skills related to antimicrobial prescribing, and fosters a culture of stewardship. Here are some key steps to implement education and training for an ASP:

- ➢ **Identify Target Audience:** Determine the target audience for your education and training initiatives. This may include physicians, nurses, pharmacists, other healthcare providers, and even patients and their families, depending on the specific goals of your program.

- **Develop Educational Materials:** Create educational materials that are tailored to the needs of your target audience. These may include presentations, brochures, handouts, infographics, posters, or online modules. Ensure that the materials are evidence-based, user-friendly, and accessible.
- **Provide Initial Training Sessions:** Conduct initial training sessions to introduce healthcare providers to the principles of antimicrobial stewardship. Cover topics such as the impact of antimicrobial resistance, appropriate antimicrobial use, principles of prescribing, strategies for de-escalation and discontinuation, and the role of the ASP team.
- **Offer Continuing Education:** Provide ongoing educational opportunities to reinforce key concepts and address emerging issues in antimicrobial stewardship. This can be achieved through regular meetings, webinars, workshops, or grand rounds presentations. Collaborate with professional societies and organizations to leverage their expertise and resources.
- **Include Practical Case Studies:** Incorporate practical case studies and scenarios into the educational materials and training sessions. These real-life examples can help healthcare providers apply stewardship principles in their practice and enhance decision-making skills.
- **Utilize Interactive and Engaging Methods:** Utilize interactive and engaging teaching methods to enhance learning and retention. These may include group discussions, role-playing exercises, simulations, and interactive online platforms. Encourage active participation and provide opportunities for questions and discussions.
- **Incorporate Technology:** Leverage technology to facilitate education and training initiatives. Develop online modules, web-based resources, or mobile applications that provide convenient access to educational materials, guidelines, and decision-support tools. Utilize electronic health record systems to provide real-time feedback and alerts related to antimicrobial prescribing.
- **Foster Collaboration and Interprofessional Learning:** Encourage collaboration and interprofessional learning by bringing together healthcare providers from different disciplines for joint educational activities. This promotes a team-based approach to antimicrobial stewardship and facilitates shared decision-making.
- **Monitor and Evaluate Impact:** Regularly assess the impact of education and training initiatives on healthcare providers' knowledge, attitudes, and behaviors related to antimicrobial use. Use surveys, pre- and post-tests, or other evaluation methods to measure the effectiveness of the educational interventions. Modify and improve the educational activities based on feedback and evaluation results.
- **Patient Education:** Recognize the importance of patient education in antimicrobial stewardship. Develop patient-centered educational materials to increase awareness about appropriate antimicrobial use, the importance of completing prescribed courses of treatment, and the potential risks of unnecessary antibiotic use.

5.6. Implement Prospective Audit and Feedback:

Implementing prospective audit and feedback is an essential component of an antimicrobial stewardship program (ASP) at a healthcare facility. It involves systematically reviewing antimicrobial prescriptions, providing feedback to prescribers, and facilitating appropriate interventions to

optimize antimicrobial use. Here are the key steps to implement prospective audit and feedback:

- **Establish Clear Criteria:** Define the criteria or indicators for evaluating antimicrobial prescribing practices. These criteria can include appropriateness of indication, choice of antimicrobial agent, dose and duration of therapy, and adherence to local guidelines or formulary restrictions.
- **Develop a Monitoring System:** Implement a system for prospective monitoring of antimicrobial prescriptions. This can involve reviewing electronic health records or other relevant documentation to identify patients receiving antimicrobial therapy that meets the predetermined criteria.
- **Form an Audit Team:** Establish a multidisciplinary team responsible for conducting the audits and providing feedback. This team may include infectious disease specialists, clinical pharmacists, and microbiologists. Clearly define the roles and responsibilities of team members.
- **Conduct Audits:** Regularly review the identified antimicrobial prescriptions using the established criteria. Evaluate the appropriateness of antimicrobial use and identify any opportunities for improvement or interventions. Document the findings and recommendations for each case.
- **Provide Feedback:** Develop a structured feedback mechanism to communicate the audit results to prescribers. This can be done through personalized reports, face-to-face meetings, or electronic communication. Provide constructive feedback that highlights areas of improvement and reinforces appropriate prescribing practices.
- **Collaborate with Prescribers:** Engage prescribers in a collaborative manner to discuss the audit findings, recommendations, and opportunities for optimizing antimicrobial therapy. Offer evidence-based guidance and resources to support their decision-making. Address any questions or concerns raised by prescribers during the feedback process.
- **Track and Document Interventions:** Monitor the implementation of interventions resulting from the audit and feedback process. Document the interventions made, including changes in antimicrobial therapy, de-escalation or discontinuation of therapy, and any clinical outcomes observed. This helps evaluate the impact of the audit and feedback activities.
- **Evaluate Outcomes:** Regularly assess the outcomes and impact of the prospective audit and feedback interventions. Measure indicators such as appropriateness of antimicrobial use, adherence to guidelines, antimicrobial resistance rates, clinical outcomes, and cost-effectiveness. Use these data to refine and improve the ASP over time.
- **Provide Ongoing Education:** Offer educational resources and training sessions to support prescribers in improving their antimicrobial prescribing practices. Address common challenges and provide updates on new evidence, guidelines, and best practices related to antimicrobial use.
- **Continuous Quality Improvement:** Continuously evaluate and refine the prospective audit and feedback process based on feedback from prescribers, outcomes data, and changing antimicrobial resistance patterns. Regularly review and update the criteria and protocols used for auditing to ensure they align with current evidence and guidelines.

5.7. Develop Surveillance and Data Collection

Establish a system for monitoring antimicrobial use and resistance patterns within the healthcare facility. Surveillance helps monitor antimicrobial usage patterns, identify trends in antimicrobial resistance, and assess the impact of stewardship interventions. Here are the key steps to develop surveillance and data collection for an ASP:

- ✓ **Define Surveillance Objectives:** Clearly define the objectives of your surveillance activities. These objectives may include monitoring antimicrobial consumption, detecting emerging resistance patterns, evaluating the impact of interventions, or identifying opportunities for improvement in antimicrobial prescribing practices.
- ✓ **Determine Data Elements to Collect:** Identify the necessary data elements that need to be collected for your surveillance activities. This may include information such as patient demographics, antimicrobial agent(s) prescribed, indications for use, dosage and duration of therapy, and relevant microbiological data. Ensure compliance with privacy and data protection regulations.
- ✓ **Select Data Sources:** Determine the sources from which you will collect the required data. This may include electronic health records, pharmacy dispensing systems, microbiology laboratory reports, or other relevant databases. Collaborate with IT and informatics experts to ensure data extraction and integration from various sources.
- ✓ **Develop Data Collection Tools:** Design data collection tools to capture the required information. This can involve developing standardized forms, electronic data capture systems, or utilizing existing data extraction capabilities from electronic health records. Ensure data collection is user-friendly, efficient, and minimizes the burden on healthcare providers.
- ✓ **Establish Data Management Processes:** Define the processes for data management, including data entry, cleaning, validation, and storage. Ensure appropriate security measures are in place to protect patient confidentiality and comply with relevant regulations. Consider data anonymization or aggregation techniques when necessary.
- ✓ **Implement Data Collection and Entry:** Train relevant staff members on data collection protocols and provide clear instructions for data entry. Regularly collect the required data elements from the identified sources and ensure accurate and timely data entry.
- ✓ **Monitor Data Quality:** Establish procedures to monitor and ensure the quality of collected data. Conduct regular audits and quality checks to identify and address any data inconsistencies or errors. Implement data validation processes to enhance data accuracy and reliability.
- ✓ **Analyze and Interpret Data:** Utilize appropriate statistical and analytical techniques to analyze the collected data. Identify trends, patterns, and outliers related to antimicrobial usage and resistance. Generate reports and visualizations that effectively communicate the findings to key stakeholders.
- ✓ **Provide Feedback and Reporting:** Develop a system for providing regular feedback and reporting based on the surveillance data. Disseminate the findings to healthcare providers, administrators, and other relevant stakeholders to create awareness, support decision-making, and drive quality improvement initiatives.

- ✓ **Continuous Improvement:** Continuously evaluate and refine the surveillance and data collection processes. Seek feedback from users, monitor the effectiveness of data collection tools, and update data elements and processes as needed. Stay informed about emerging surveillance methods and technologies to enhance the efficiency and accuracy of data collection.

5.8. Collaborate and Communicate:

Collaboration and effective communication are crucial components of a successful antimicrobial stewardship program (ASP) at a healthcare facility. Engaging with various stakeholders fosters a multidisciplinary approach and ensures the implementation of stewardship practices across different departments. Here are the key steps to collaborate and communicate effectively for an ASP:

1. **Establish Collaborative Partnerships:** Collaborate with other departments and services within the healthcare facility to ensure the integration of stewardship practices. This includes working closely with pharmacy services, laboratory services, infection prevention and control teams, quality improvement departments, and clinical departments such as critical care and surgery.
2. **Communicate Program Goals and Benefits:** Clearly communicate the goals, objectives, and benefits of the ASP to all healthcare providers, staff members, and relevant stakeholders. Utilize various communication channels, such as staff meetings, newsletters, email updates, intranet portals, and bulletin boards. Highlight the potential impact on patient outcomes, cost savings, and reduction in antimicrobial resistance.
3. **Develop Communication Channels:** Establish effective communication channels within the stewardship team and with other departments. This can include regular team meetings, email updates, shared online platforms for document sharing and collaboration, and designated communication liaisons. Ensure open lines of communication for feedback, suggestions, and reporting of issues or challenges.
4. **Collaborate on Guidelines and Protocols:** Engage relevant stakeholders in the development and revision of antimicrobial prescribing guidelines, protocols, and policies. Seek input from clinicians, pharmacists, microbiologists, and infection preventionists to ensure consensus and buy-in. This collaborative approach enhances guideline adherence and improves acceptance among healthcare providers.
5. **Conduct Educational Sessions:** Organize educational sessions and workshops to enhance awareness and understanding of antimicrobial stewardship principles among healthcare providers. Collaborate with the stewardship team and educational departments to develop educational materials and deliver effective training sessions.
6. **Support Decision-Making and Feedback:** Provide healthcare providers with timely feedback and support in their decision-making process. Offer resources such as clinical guidelines, antimicrobial susceptibility data, and expert consultations. Foster a culture of shared decision-making, where stewardship team members are accessible for questions, discussions, and guidance.
7. **Share Outcomes and Best Practices:** Regularly share outcomes, success stories, and best practices achieved through the ASP. This can be done through presentations, newsletters,

quality improvement forums, or institutional reports. Celebrate achievements and acknowledge the efforts of individuals and departments involved in stewardship initiatives.

8. **Collaborate Externally:** Collaborate with external stakeholders, such as local public health agencies, neighboring healthcare facilities, and professional organizations, to share best practices, exchange experiences, and contribute to regional or national antimicrobial stewardship initiatives. Participate in networks and collaborative projects to learn from others and contribute to broader stewardship efforts.

CHAPTER 6

MONITORING AND EVALUATION OF ANTIMICROBIAL STEWARDSHIP PROGRAMMES

6.1. Background

A robust monitoring and evaluation of the AMS programs is a key in determining outcomes and decision making for the health facility's AMS programs. Successful AMS programs include all the elements of quality improvement (QI) programs and measuring the effectiveness of activities. In AMS programs, this usually includes measuring antimicrobial use, auditing the quality of prescribing, and monitoring process and outcome indicators. The information can then be used to provide feedback to prescribers, hospital leadership, policy makers and other key stakeholders of the effect of stewardship initiatives on antimicrobial use and antimicrobial resistance (AMR) patterns. This chapter discusses the monitoring and evaluation of the AMS programs for quality improvement at National level as well as within the health facilities for informed and evidence-based decision making.

6.2. Evaluate and Improve

Evaluating and continuously improving your antimicrobial stewardship program (ASP) is essential to ensure its effectiveness and sustainability. Regular assessment helps identify areas for improvement, measure outcomes, and refine strategies to optimize antimicrobial use. Here are the key steps to evaluate and improve your stewardship program:

- **Define Evaluation Objectives:** Clearly define the objectives of your evaluation process. This may include assessing the impact of the ASP on antimicrobial prescribing practices, antimicrobial resistance rates, patient outcomes, cost savings, and healthcare-associated infections. Identify specific metrics and indicators to measure.
- **Collect Relevant Data:** Gather the necessary data to evaluate the program. This may include antimicrobial utilization data, microbiological surveillance data, clinical outcomes data, patient satisfaction surveys, and financial data related to antimicrobial expenditures. Ensure data collection aligns with privacy and data protection regulations.
- **Analyze Data:** Utilize appropriate statistical and analytical methods to analyze the collected data. Compare the data against baseline or benchmark values, as well as predetermined targets or goals. Identify trends, patterns, and areas for improvement. Consider seeking assistance from data analysts or epidemiologists if needed.
- **Assess Adherence to Guidelines:** Evaluate the extent to which healthcare providers adhere to antimicrobial prescribing guidelines and protocols. This can be done through chart reviews, audits, or electronic health record analysis. Identify any barriers or challenges to adherence and develop strategies to address them.
- **Measure Clinical Outcomes:** Assess the impact of the ASP on patient outcomes, such as rates of healthcare-associated infections, mortality, length of hospital stay, and readmission

rates. Compare outcomes before and after implementing the stewardship program or against a control group if feasible. This helps determine the program's effectiveness in improving patient care.

- **Monitor Antimicrobial Resistance:** Continuously monitor antimicrobial resistance patterns in your healthcare facility. Analyze data from microbiology laboratory reports to identify changes in resistance rates over time. Determine whether the ASP has led to a reduction in antimicrobial resistance or the emergence of new resistant strains.
- **Evaluate Cost Savings:** Evaluate the economic impact of the ASP by assessing cost savings or cost-effectiveness. Compare antimicrobial expenditures before and after implementing the program, considering factors such as reduced unnecessary antimicrobial use, shorter durations of therapy, or conversion from expensive to cost-effective agents.
- **Seek Feedback from Stakeholders:** Solicit feedback from healthcare providers, patients, and other stakeholders involved in the stewardship program. Conduct surveys, focus groups, or interviews to gather their perspectives on the program's strengths, weaknesses, and areas for improvement. Use this feedback to refine program strategies and address any concerns.
- **Share Findings and Generate Reports:** Share evaluation findings with key stakeholders, including healthcare providers, administrators, and the stewardship team. Present the data in clear and concise reports, highlighting key outcomes, trends, and recommendations for improvement. Use visualizations, such as graphs or infographics, to effectively communicate the results.
- **Implement Continuous Improvement Strategies:** Use the evaluation findings to guide ongoing improvement efforts. Develop action plans to address identified gaps, modify strategies, and implement targeted interventions. Regularly reassess and adapt the program based on new evidence, emerging resistance patterns, and changing healthcare needs.

6.3. Maintain Sustainability:

Ensure the long-term sustainability of the ASP by incorporating it into the facility's quality improvement programs, aligning it with existing initiatives, and securing necessary resources and support from hospital leadership. Regularly monitor and report on the program's outcomes to demonstrate its value and maintain ongoing support.

6.4. Establishment of an M&E National Team

The team should be a multidisciplinary team as follows:

1. M&E Coordinator
2. Infectious Disease Specialists
3. Clinical Pharmacist
4. Microbiologist
5. Laboratory Scientist
6. Data analyst
7. Public Health Specialist

8. Environmental Health Specialist
9. Stakeholder Representative
10. Quality Improvement Specialist
11. Pharmacist
12. Veterinary Doctor
13. Nurse with experience in Infection Prevention and Control or infectious disease management

6.5. Key Performance Indicators (KPIs) at national level

The following table shows the KPIs and the process of monitoring:

Table 1: KPIs and the process of monitoring

Indicators	Outputs	Timeline
Put in place AMS technical working group and ToRs	Availability of AMS Technical working group with clear ToRs	2023-2024
Policies and guidelines for the AMS	Availability of Policies and guidelines for the AMS	2023-2024
Strategic plan and action plan for AMS	The approved strategic plan and action plan available for implementation	2023-2024
Stakeholders involvement	Availability of identified Stakeholders	2023-2024
AMS Data collection and reporting tools	Availability of AMS data collection and reporting tools.	2023-2024

6.6. M&E at Health facility level

The M&E activities at the health facility level should be coordinated by the QI Department/Unit.

6.6.1. Establishment of an M&E at health facility level

When establishing a monitoring and evaluation team for an antimicrobial stewardship program at a health facility level, it's important to include individuals with the relevant expertise and responsibilities; the team's composition may vary depending on the size and resources of the healthcare facility. In some cases, certain roles may be combined or additional experts may be included based on specific needs and available resources.

6.6.2 Define the KPIs and Evaluation chart

The KPIs and Chart to assess and improve an antimicrobial stewardship program at a healthcare facility should include the following:

Table 2: The KPIs and Chart to assess and improve an antimicrobial stewardship program at a healthcare facility

Aspect of Stewardship Program	Evaluation Criteria	Assessment Results	Intended Improvement Plan
Policy and Guidelines	Availability and clarity of antimicrobial stewardship policies and guidelines	Existence of policies, accessibility, adherence	Review and update policies, ensure clear guidelines for antimicrobial use
Education and Training	Training programs on appropriate antimicrobial use, awareness campaigns	Training coverage, feedback from staff, awareness levels	Enhance training programs, develop targeted awareness campaigns, provide regular updates
Antimicrobial Use Monitoring	Monitoring and tracking antimicrobial use, adherence to prescribing guidelines	Data on antimicrobial use, compliance rates with guidelines	Strengthen monitoring systems, improve data collection and analysis, address non-compliance issues
Infection Control Practices	Adherence to infection control measures, prevention of healthcare-associated infections	Compliance with protocols, infection rates	Review and reinforce infection control measures, provide additional training and resources
Collaboration and Communication	Interdisciplinary collaboration, communication with healthcare teams	Frequency of communication, involvement of relevant departments	Foster collaboration among healthcare teams, establish regular communication channels
Resistance Surveillance	Surveillance of antimicrobial resistance patterns	Data collection and analysis, tracking resistant organisms	Enhance resistance surveillance systems, utilize data for targeted interventions
Audit and Feedback	Regular audits of prescribing practices, feedback to healthcare providers	Frequency of audits, effectiveness of feedback mechanisms	Improve audit processes, provide timely and actionable feedback to providers
Evaluation and Outcomes	Monitoring program outcomes, evaluating impact on antimicrobial use and resistance	Outcome measures, data on antimicrobial resistance rates	Establish comprehensive evaluation metrics, track outcomes, assess impact on resistance patterns
Continuous Education and Updates	Continuing education for healthcare providers, staying updated with research and guidelines	Availability of resources, participation rates	Provide ongoing education opportunities, ensure access to up-to-date resources

CHAPTER 7

POTENTIAL PITFALLS AND MITIGATION

An AMS program may face pitfalls that can slow down its implementation. This is especially exacerbated in resource limited settings, which presents unique challenges. However, these are not insurmountable with use of ingenuity and team work.

Table 3 below shows potential pitfalls (stumbling blocks) or unexpected difficulties and proposed mitigation measures when establishing an Antimicrobial Stewardship Program.

Table 3: Potential pitfalls and proposed mitigation measures

Pitfalls identified	Proposed Mitigation
Lack of leadership support and coordination at facility level	Use of action plans to provide guidance on leadership and coordination of AMS activities Involve hospital leadership from inception on resource needs of AMS program Educate on AMS advantages to the facility leadership highlighting its benefits. Identify areas of possible impact and focus on a single priority; avoid implementing numerous interventions at once and duplication. Provide regular feedback on AMS activities and their impact.
Lack of laboratory capacity in terms of infrastructure, human resources, skills, equipment and consumables.	Provide continuous on and off-site capacity building, mentorship training programs for healthcare workers on microbiology. Prioritize procurement of lab commodities Network with other labs with better capacities.
Lack of awareness of AMS at facility levels	Raise awareness and sensitisation amongst staff through posters, clinical, departmental meetings and other available platforms.
Lack of awareness of AMS at community level	Raise awareness amongst community members via concerted effort through health promoters through campaigns, antimicrobial awareness weeks, radio shows, billboards, social media and other platforms.
Competing responsibilities for AMS team members	Involve hospital management to facilitate dedicated time for AMS activities. AMS intervention to be included as part of yearly appraisal/job description. Formalizing appointment of AMS committee/team.

Pitfalls identified	Proposed Mitigation
Resistance to Change: Resistance to change among healthcare professionals can hinder the adoption of new stewardship practices and guidelines.	Foster a culture of collaboration and open communication, involving key stakeholders in the development and implementation of stewardship programs. Highlight the evidence-based benefits of antimicrobial stewardship and address concerns or misconceptions through continuous education and feedback mechanisms.
Limited financial and human resources for implementing AMS activities	Advocate for allocation of funds towards AMS activities. Advocate for adequate facility staffing levels. Advocate for AMS champion in lower health facility levels (e.g. nurse, clinical officers, pharmacy technologist, EHP) Capacity building by training available staff on AMS. Prioritise high impact, low input activities (eg. AMS sensitisation, education, AMS ward rounds, pharmacy audit Network with experts from other facilities on guidance.
Poor documentation and record keeping	Strengthen documentation (e.g., demographics, indications) and document management skills (e.g., filing/backups) through training of healthcare workers and support staff. Introducing AMS modules in the existing electronic health information systems.
Inadequate utilisation of IT systems	Build capacity in IT skills. Expand available IT systems to accommodate the AMS program. Dedicated IT staff to maximise utilisation of IT systems and to increase efficiency of data collection and analysis. Enhance data utilisation (e.g.: research and developing antibiograms)
Lack of committed staff	Incentivise positive behaviour feedback (e.g.: training, commending hard work, CPD points, and recognition certificates).
Inadequate research for evidence-based decision making.	Promote AMS research at facility level in line with the national research agenda. Prioritise operational research and timely release of findings. Establish national AMS data management systems. Capacity building in research. Network with other researchers.
Lack of Feedback and Audit: Failure to provide regular feedback and audit antimicrobial prescribing practices may result in a lack of accountability and awareness of inappropriate use.	Implement regular audit and feedback mechanisms to monitor antimicrobial prescribing practices, identify areas for improvement, and provide individualized feedback to healthcare providers. Develop performance indicators and benchmarks to assess the impact of stewardship interventions and promote accountability

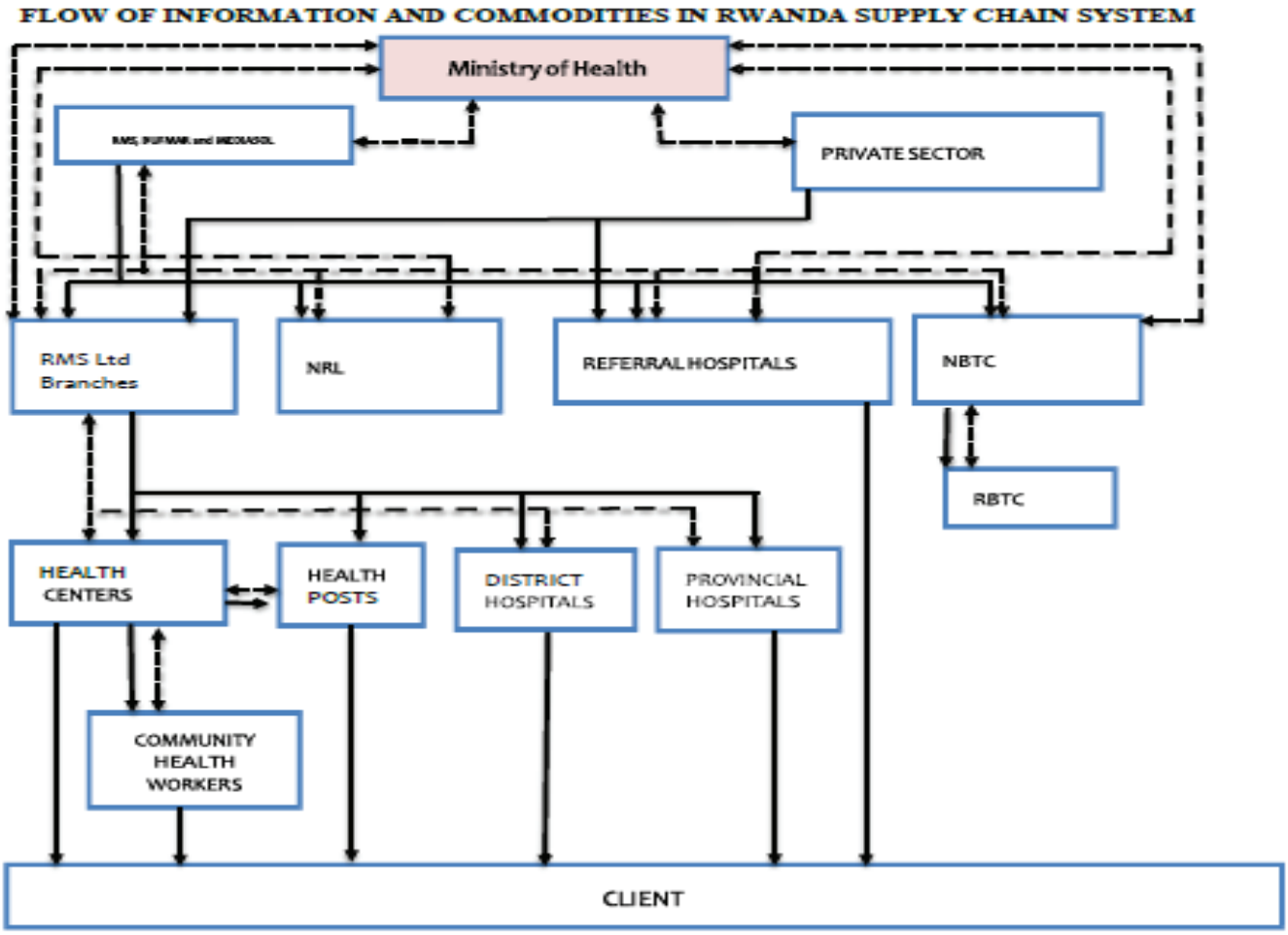
ANNEXES

Annex 1: Core Elements by Level of Health Care

Core element	Health Facility	District Hospital	General Hospital	Central	Tertiary/Teaching Hospital
Leadership	AMS Champion (Nurse, clinical officer, Environmental Health Technologist, Pharmacy technologist)	AMS committee led by a medical officer/ pharmacist	AMS committee led by a physician/ pharmacist	AMS committee led by a physician/ pharmacist	AMS committee led by ID physician/physician
Governance	Nurse/clinician officer/pharmacy /Lab Technologist Reports to District Health Office	Core team: medical officer, Biomedical/ La b scientist, pharmacist, IT staff, IPC, nurse Reports to management/ MTC	Core team: physician, Biomedical/Lab scientist, pharmacist, IT staff, IPC, nurse, EHT Reports to management/ MTC	Core team: physician, Biomedical scientist, pharmacist, IT staff, IPC, nurse Reports to management/ MTC	Core team: ID physician, clinical microbiologist, clinical pharmacist, IT staff, IPC, nurse Reports to management/MTC
Accountability	Designated staff	Medical Officer/Pharma cist	Chaired by Physician/ pharmacist	Chaired by Physician/ pharmacist	Chaired by ID physician/Physician

Core element	Health Facility	District Hospital	General Hospital	Central	Tertiary/Teaching Hospital
Pharmacy Expertise	Pharmacy Technologist	Pharmacist	Clinical pharmacist/ Expert pharmacist in AMS	Clinical pharmacist/ Expert pharmacist in AMS	Clinical pharmacist/Expert pharmacist in AMS
Monitoring and evaluation	Nurse Clinician Pharmacy Technologist EHT	Pharmacist Biomedical/lab Scientist EHT	Pharmacist Biomedical/ lab Scientist	Clinical Pharmacist Biomedical Scientist Public Health Specialist	Clinical Pharmacist Microbiologist Public Health Specialist
Education	AMS Champion	AMS Champion	AMS Team, AMS Champion	AMS Team, AMS Champion	AMS Team, AMS Champion

Annex 2. Flow of Health Products and Information



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