

# Guidelines on Implementation of the Antimicrobial Strategy in South Africa: One Health Approach & Governance

June 2017

MINISTERIAL ADVISORY COMMITTEE ON ANTIMICROBIAL RESISTANCE  
NATIONAL DEPARTMENT OF HEALTH AFFORDABLE MEDICINES DIRECTORATE



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**GUIDELINES ON IMPLEMENTATION OF THE ANTIMICROBIAL STRATEGY IN SOUTH AFRICA:  
ONE HEALTH APPROACH & GOVERNANCE**

JUNE 2017

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## Abbreviations and acronyms

BC	Blood Culture
BSI	Blood stream infection
AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
CA-UTI	Catheter-Associated Urinary Tract Infections
CLABSI	Central Line-associated Bloodstream Infection
CDDEP	Center for Disease Dynamics, Economics and Policy
CEO	Chief Executive Officer
CRE	Carbapenem-Resistant Enterobacteriaceae
CLABSI	Central Line-associated Bloodstream Infections
COO	Chief Operating Officer
DAMSC	District Antimicrobial Stewardship Committee
DBE	Department of Basic Education
DCST	District Clinical Specialist Team
DDD	Defined Daily Doses
DEA	Department of Environmental Affairs
DHEL	Department of Higher Education & Learning
DTI	Department of Trade and Industry
DHMO	District Health Management Office
DST	Department of Science and Technology
EDP	Essential Drugs Programme
EML	Essential Medicines List
EPI	Expanded Programme on Immunisation
ESBL	Extended Spectrum Beta-Lactamases
FIDSSA	The Federation of Infectious Diseases Societies of Southern Africa.
GAP	GAP Global Action Plan
GLASS	Global Antimicrobial Resistance Surveillance System
HAI	Healthcare-associated infection
HAMS	Hospital Antimicrobial Stewardship Committee
IPC	Infection Prevention and Control
IPCP	Infection Prevention and Control Practitioner
LIS	Laboratory Information System
MAC	Ministerial Advisory Committee
MCH	Maternal and Child Health
MDRO	Multi-drug Resistant Organisms
NAP	National Action Plan
NCS	National Core Standards
NDOH	National Department of Health
NEMLC	National Essential Medicines List Committee
NHLS	National Health Laboratory Service
NEMLC	National Essential Medicines List Committee
NMC	Notifiable Medical Conditions
OHSC	Office of Health Standards Compliance
PAMSC	Provincial Antimicrobial Stewardship Committee
PIPC	Provincial Infection Prevention Committee
PPE	Personal Protective Equipment
PTC	Pharmaceutical & Therapeutics Committee
QA	Quality Assurance
SAASP	South African Antibiotic Stewardship Programme
SASCM	South African Society for Clinical Microbiology
SSI	Surgical Site Infection
STC	Standard Treatment Guidelines
STG	Standard Treatment Guidelines
TB	Tuberculosis
VAP	Ventilator-associated pneumonia

## Definitions of Key Terms

**Antibiotic:** Natural, semi-synthetic or synthetic substance which is derived from other microorganisms. It may be bactericidal (kill bacteria) or bacteriostatic (inhibit bacterial growth). Classified into groups according to the mechanism of action e.g. beta-lactams.

**Antifungal:** Natural, semi-synthetic or synthetic substance, which may be fungicidal (kill fungi) or fungistatic (inhibit the growth of fungi) and are used to treat and prevent infections caused by fungi such as Candida, Pneumocystis and Cryptococcus.

**Antimicrobial:** A substance that may be natural, semi-synthetic or synthetic, which can kill or inhibit the growth of microorganisms. Includes antibiotics; antivirals; antifungals; antihelmithics; and antiprotozoals.

**Antimicrobial Stewardship (AMS):** is an individual or multi-disciplinary, systematic approach to optimising the appropriate use of one or more antimicrobials to improve patient outcome and limit emergence of resistant pathogens whilst ensuring patient safety.

**Antimicrobial resistance (AMR):** one or more changes occurring in a microorganism that renders an antimicrobial used to treat or prevent it, ineffective. When a microorganism is rendered resistant to the majority (or all antimicrobials), it is often referred to in the lay press as a 'superbug'.

**Biosecurity:** Represents a set of preventative procedures and measures that are designed to protect a given population (human or animal) against harmful biological organisms and products.

**Catheter-Associated Urinary Tract Infection (CA-UTI):** Urinary tract infection in a patient with an in-dwelling urinary catheter (see detailed definition in annexure C).

**Central Line-Associated Blood Stream Infections (CLABSI):** Primary bloodstream infection occurring in a patient with a central line (see detailed definition in annexure C).

**Diagnostic stewardship:** the coordinated intervention to improve and measure the appropriate use of microbial diagnostics to identify pathogens and guide therapeutic decisions by promoting: appropriate and timely selection and collection of specimens; accurate and timely testing; and reporting of results.

**Infection prevention and control:** A systematic approach to prevent infectious diseases and control their spread in the community and to patients and healthcare workers in healthcare establishments. Establishments. Infection prevention refers to measures, practices, protocols and procedures that are geared towards preventing the transmission of infection within a healthcare setting. Infection control refers to the investigation and management of an outbreak, thereby preventing further spread of infection within healthcare facilities.

**Hang time** – the time from prescription (be it hand written or as part of an electronic order) of an intravenous medication (in this case an antimicrobial), to the time of infusion of said medicine.

**Healthcare-associated infection:** an infection that is acquired in a healthcare facility by a healthcare user, healthcare worker or visitor to a health care facility. Such an infection should not have been clinically or radiologically apparent at the time of admission or at the time of initial contact with the healthcare facility. The term includes infections that appear after discharge, including any infection in a surgical site up to six weeks after the operation. Also included are occupational infections among staff of the facility.

**Healthcare provider:** A person providing health services in terms of any law including in terms of the Allied Health Professions Act; Health Professions Act; Nursing Act; Pharmacy Act; Dental Technicians Act.

**Health establishment:** the whole or part of a public or private institution, facility, building or place, whether for profit or not, that is operated or designed to provide treatment; diagnostic or therapeutic interventions; nursing; rehabilitative, palliative, convalescent, preventative or other health services.

**Health worker:** any person who is involved in the provision of health services to a health care user, but does not include a health care provider. Health workers include lay workers, administrative staff, cleaners and catering staff.

**Hygiene:** conditions and practices that help to maintain health and prevent the spread of diseases, for example environmental cleaning; sterilisation of equipment; hand hygiene; water and sanitation; and safe disposal of waste.

**Ministerial Advisory Committee on AMR (MAC-AMR):** a multi-disciplinary, intersectoral committee mandated to advise the Minister of Health on matters relating to Antimicrobial Resistance; to coordinate intersectoral efforts nationally; provide advocacy and awareness; as well as monitoring and evaluation of the implementation of the AMR Strategy Framework.

One Health approach: an integrative effort of multiple disciplines and multiple government sectors and partners working locally; nationally, and globally to attain optimal health for people, animals, and the environment.

Outbreak among animals: An outbreak among animals is characterised by the occurrence of a new infectious or parasitic diseases in a group of animals, or its occurrence in a new setting.

Outbreak among humans: An outbreak is the occurrence of cases of disease in excess of that which would normally be expected in a defined community, geographical area or season. An outbreak may occur in a restricted geographical area, or may extend over several countries. It may last for a few days or weeks, or for several years.

In the context of AMR, an outbreak is often defined as the occurrence of multiple cases of infection with a specific resistant microorganism, that is usually of the same strain, arising from a single (common) source or multiple sources.

Para-veterinarian is a person who renders services that supplement those deemed to pertain specifically to a veterinarian including Animal Health Technicians; Laboratory Animal Technologists; Veterinary Nurses; Veterinary Technologists; and Veterinary Physiotherapists.

Personal Protective Equipment (PPE): Items specifically used to protect healthcare personnel from exposure to body substances or from droplet or airborne organisms. This includes, but is not limited to, gloves; aprons; gowns; caps; face covers; and protective eye wear. Personal protective equipment for people handling animals refers to specific items used to protect personnel working with animals from such hazards as allergens; infectious/zoonotic diseases; physical hazards such as bites, noise, burns, chemical hazards; and to protect animals from the introduction of diseases from humans.

Prescriber: Any person authorised to prescribe medicines in terms of the Medicines Act (Act 101 of 1965).

Surgical site infection (SSI): An infection that occurs after surgery at the site of incision or deep structures related to it

Surveillance is the systematic, longitudinal collection, analysis and interpretation of data, closely integrated with timely dissemination of results to those who require them so that remedial action can be taken. The final phase in the surveillance chain is application of the information to disease control and prevention. Appropriate surveillance of AMR can be used to:

- Measure the burden of disease: to estimate the incidence rates of infections caused by resistant and non-resistant pathogens;
- Monitor trends in infections caused by resistant and non-resistant pathogens as a basis for treatment guidelines;
- Identify high-risk areas for further interventions;
- Detect and monitor outbreaks and epidemics in order to mount appropriate responses;
- estimate the case-fatality rates from infections caused by resistant and non-resistant pathogens;
- Determine the effectiveness of control measures and;
- Provide data for research on transmission and the susceptibility of isolates to antimicrobial agents.

Veterinarian: any person who is registered in terms of the Veterinary and Para-veterinary Professions Act to practice the profession of veterinarian.

Ventilator-Associated Pneumonia (VAP): A pneumonia in a patient who has been intubated and ventilated for at least 48 hours before onset of pneumonia.



## Foreword and introduction by the director general of health



South Africa pledged its commitment to the World Health Assembly resolution EB134/37 “Combating antimicrobial resistance including antibiotic resistance”, adopted in May 2014 to develop a National Action Plan (NAP) on antimicrobial resistance (AMR). By October 2014 our Antimicrobial Resistance National Strategic Framework, 2014-2024 (AMR Strategic Framework)<sup>1</sup> was developed and launched with the commitment of most of the key stakeholders within the human and animal health; agriculture; as well as science and technology sectors; to support interventions to combat antimicrobial resistance in the country.

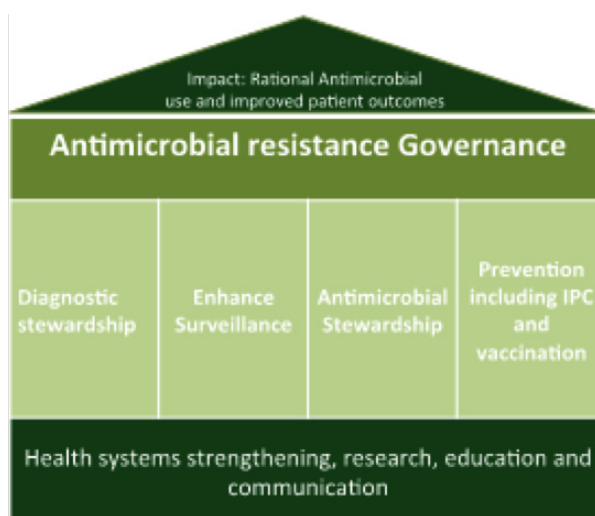
The AMR Strategic Framework, defines South Africa’s approach to manage AMR and limit further increases in resistant microbial infections, and improve patient outcomes and livestock production and health. The vision is “to ensure the appropriate use of antimicrobials by healthcare and animal health professionals in all health establishments in South Africa to conserve the efficacy of antimicrobials for the optimal management of infections in human and animal health”.

As outlined in the Global Action Plan (GAP) of the World Health Organisation (WHO), Food and Agriculture Organisation (FAO) and World Organisation for Animal Health (OIE)<sup>2</sup>, the NAP must follow a “One Health” approach. Therefore these guidelines seek to introduce the One Health approach firstly at a governance level, both at national and provincial levels, by describing the interconnected, interdisciplinary, intergovernmental nature of the governance structures and framework embedded within the AMR Strategy Framework for animals and humans. Future guidelines will address the implementation of AMS interventions at health facility level.

The AMR Strategy Framework consists of five interconnected strategic objectives to tackle antimicrobial resistance (AMR)(Figure 1)

**Figure 1 - The South African AMR Strategy Framework with the strategic objectives and key enablers (Use this as a footnote to the Figure)**

1. Promote understanding and cooperation on AMR as a One Health issue across human, animal, agricultural, veterinary and environmental health sectors; and to strengthen, coordinate and institutionalise inter- and multi-disciplinary efforts through national, provincial, district and health establishment level governance structures;
2. Foster the appropriate use of diagnostics to identify pathogens and guide treatment by promoting appropriate and timely selection and collection of specimens, accurate and timely testing, accurate and timely reporting of results;
3. Optimise and report on surveillance of AMR in indicator organisms from humans and livestock at local, district, provincial and national levels; in order to provide reliable resistance data at health establishment and farm level; and to optimise empiric or targeted antibiotic choice.
4. To intensify infection prevention and control, biosecurity and animal husbandry to prevent the spread of microbes to patients and amongst animals respectively. To reinforce the importance of vaccination programs in prevention;
5. Promote appropriate use of antimicrobials in humans and animals through antimicrobial stewardship.



**Strategic framework for the AMR National Strategy**

Four strategic enablers, including legislation; education; communication; and research; support development of the five objectives. These enablers are described in the ‘Implementation Plan for the Antimicrobial Resistance Strategy Framework in South Africa: 2014-2019’<sup>3</sup> (hereafter termed the ‘Implementation Plan’).

As we embark on this challenging journey to combat AMR, we continue learning from our successes and challenges, and those of our collaborative partners in all sectors - human, animal, agriculture, environmental, public and private sectors- as well as finance, science and technology, trade and industry and education. Working together we can change direction to contain AMR and ensure that people have access to safe and effective antimicrobials. And to this end, we are committed as the NDOH to driving these actions.

**Ms Precious Matsoso**  
**Director General: National Department of Health**

## **Purpose of the Guide**

Guidelines on Implementation of Antimicrobial Stewardship in South Africa: One Health Approach & Governance (hereafter termed AMS One Health & Governance Guide) is intended to act as a blueprint for the steps to be taken by South African healthcare and veterinary workforce to enact AMS at national, provincial, district and health establishment levels as appropriate, in line with the Strategic Framework and Implementation Plan. It aims to provide a practical, step-by-step or 'how to' guide, addressing the governance framework at each level of the health system.

National guidelines for management of multi-drug-resistant tuberculosis and HIV are already the subjects of national programs and updated regularly. Although this guide pertains to the stewardship of all antimicrobials, its focus will be on stewardship of antibiotics used to treat bacterial infections other than tuberculosis, addressing the gaps relating to antibiotic stewardship from an overarching, national perspective. As the approach to stewardship of antifungals shares the same principles as that of antibiotics, the suggested interventions can be applied equally to antifungals.

## **How to use the guide**

This guide is divided into six sections:

Section I focuses on the One Health approach towards tackling the AMR Strategic Framework and how this will be effected through the intersectoral partnership between the National Departments of Health; Agriculture Forestry and Fisheries (DAFF); and Environmental Affairs (DEA). Areas where potential synergies and collaboration between the sectors may occur are highlighted.

Section II describes the national governance structure for AMR i.e., the MAC-AMR. It speaks to the interdisciplinary and intergovernmental nature of this governance structure ensuring a national One Health response.

Section III discusses provincial governance structures including their responsibilities and actions in terms of conducting a situational analysis on AMR to inform Provincial policy and implementation.

Section IV provides guidance to district health systems to incorporate the AMR interventions within existing structures and programs such as the District Clinical Specialist Teams (DCST's).

Section V provides guidance to health establishments, specifically hospitals, in establishing governance for AMR within existing structures and includes the specific roles and responsibilities of these governance structures.

Section VI describes the Monitoring and Evaluation system for determining progress towards achievement of Implementation Plan activities and sets out the necessary reporting imperatives and indicators.



## SECTION II: GOVERNANCE AT NATIONAL LEVEL

Governance at national level through the MAC-AMR provides strategic oversight. Structures within the provinces, districts and health establishments (dealt with separately in subsequent sections) play a vital role in operational oversight in support of national governance as shown in figure 4.

It is important to note that whilst these AMR guidelines focus on antibiotic and antifungal resistance, governance structures already exist for other programs such as HIV, TB and malaria. Antibiotic resistance activities should be incorporated wherever possible into existing governance structures with clear lines of communication and reporting.

### 1. The Role of National Departments

#### **National Department of Health**

The NDOH is primarily responsible for setting the AMR strategy, vision, mission and directing the country towards a specific outcome. It is also the key stakeholder to ensure a “One Health” approach is followed for this strategy by constituting the intersectoral governance structure.

#### **Department of Agriculture, Forestry and Fisheries (DAFF)**

DAFF is the key partner with the NDOH in ensuring a collaborative, integrated approach to animal and human AMR interventions. It will promote surveillance in the agricultural sector specifically in livestock for AMR and align the AMR Strategy Framework with the South African Veterinary Strategy and DAFF’s policy development.

#### **Department of Environmental Affairs (DEA)**

Another key partner alongside the NDOH and DAFF is the DEA, ensuring a One Health approach to management of antimicrobials and AMR organisms in waste, water and the environment.

#### **Department of Science & Technology (DST)**

The DST will identify and fund AMR as a national health priority through its statutory funding agencies. In addition, the DST will set up integrated platforms to support research into AMR and develop strategic partnerships with industry for novel diagnostics and antimicrobials.

#### **National Treasury**

The National Treasury will earmark funding for activities of importance to AMR from a One Health approach within the relevant national departmental budgets for AMR.

#### **Department of Trade & Industry (DTI)**

The DTI will support the implementation of this AMR Strategy by controlling and monitoring the import of antimicrobials for the pharmaceutical and agriculture sectors as well as the export and import of animal products to ensure the absence of antibiotic residues and microbial contamination, particularly contamination by antibiotic resistant bacteria so that only high quality products enter and leave the country.

#### **Department of Basic Education (DBE)**

The DBE will be key partners in developing programs to educate school children and, by extension, their parents on appropriate hygiene, food safety, and antimicrobial use.

#### **Department of Higher Education & Learning (DHEL)**

Ensure that AMR knowledge forms part of the core curriculum and scopes of practice of relevant healthcare professionals via the Higher Education Quality Committee of the Council for Higher Education in collaboration with the relevant statutory Professional Councils.

### 2. Governance Structure at National level

The primary national governance structure for antimicrobial resistance is the MAC-AMR, a multi-disciplinary committee within the NDOH, which includes intersectoral members from DAFF, DEA, DST, DTI, and DBE/DHEL working together to optimise the national One Health response to AMR.

#### 2.1 Composition of the MAC-AMR

The composition of the committee as per the Terms of Reference and the types of specialities are described below. The MAC-AMR shall consist of not more than 25 core members and additional co-opted members to attend meetings as their expertise is required.

The Committee may appoint, subject to the approval of the Minister, subcommittees as it may deem necessary, to investigate and report to it any matter within the purview of the Committee in terms of the AMR Strategy Framework.

**Figure 3 - MAC composition**

Representation from Government departments	Regulatory bodies and government institutions	Human and animal health professionals	Other
<b>Core Members</b>			
Department of Health: Sector Wide Procurement	National Health Laboratory Services	Microbiologists/Pathologists (public sector and private sector)	Information systems or data warehouse specialist (communicable diseases)
Department of Health: Communicable Diseases	National Institute for Communicable Disease	Infectious Disease Specialist	Epidemiologist
Representative of Agriculture, Forestry and Fisheries		Infection Control Specialist	Health Economist
Representative of Science and Technology		Veterinarian	
Representative of Department of Higher Education & Learning		Paediatrician specialised in Infectious Diseases	
		Hospital Pharmacist – (public sector and private sector)	
		Community Pharmacist	
		District Pharmacist	
		Family Physician	
<b>Co-opted Members</b>			
Representative of Minister of Basic Education	Medicines Control Council		HIV Drug resistance committee
Representative of Minister of Trade and Industry	South African Nurses Council		TB Drug resistance committee
Representative of Minister of Correctional Services	Health Professional Council of South Africa		Malaria committee
Representative of Military Services	South African Pharmacy Council		
Representative of Department of Health: Hospital Services and Health Workforce	South African Veterinary Council		
Representative of Department of Health: Primary Health Care	Civil Societies		

## 2.2 Role and function of MAC-AMR

The MAC-AMR will:

- Advise the minister on the appropriate approach for the country to improve antimicrobial use (focusing on antibiotics) to reduce resistance in humans, animals and the environment;
- Set minimum standards of activities or interventions that are to be implemented by the institutions/health establishments and determine the monitoring and evaluation system to track outcomes and impact;
- Advise the minister on appropriate communication messages for public awareness campaigns and health science professional education strategies on AMR.

The MAC-AMR will effect the following work package:

- I. The institutionalisation of effective systems of public and private sector stewardship at national, provincial and institutional level, across the One-Health spectrum.
- II. National structured surveillance and reporting systems for antimicrobial use and resistance in human and animal sectors. This will include:
  - a. Surveillance of national antibiotic consumption using provincially reported data and antibiotic use data from other sources including import and supplier data.
    - An annual, national antimicrobial consumption point prevalence survey will be completed in sentinel surveillance centres.
  - b. Surveillance of countrywide antibiotic resistance including public and private sector to document trends in resistance for the essential 'Bug-Drug' combinations (Appendix A), directed by WHO GLASS, or those organisms considered of importance or as part of the Notifiable Medical Conditions (NMC) regulations by province. This will include:
    - Updating and publication of the South African antibiotic resistance maps produced by the NHLS/ NICD and benchmarked internationally through collaboration with the CDDEP;
    - Evaluation of the threat and communicating the epidemiological and clinical consequences of new multi-drug resistant organisms (MDRO) introduced into South Africa to Provincial Heads of Department and other key stakeholders as NMC.
- III. Ensure access to appropriate antimicrobials and vaccines in the following areas:

- a. Human health; provide recommendations to the National Essential Medicines List Committee (NEMLC) for alterations to the Essential Medicines List (EML) in line with changes in antibiotic resistance levels in the country based on surveillance data.
  - b. Animal health includes adopting the OIE List of Antimicrobial Agents of Veterinary Importance to enable comparison with the WHO's list of critically important classes of antimicrobials for humans. Overlap of the lists will provide further information, allowing an appropriate balance to be struck between animal health needs and public health considerations.
- IV. Ensure access to appropriate diagnostic tests and national guidance on their appropriate use (diagnostic stewardship).
  - V. Review progress towards achieving the implementation of these guidelines as well as compliance to the standards for AMS and Infection Prevention and Control (IPC) within the NCS in all health establishments. Collaboration will be sought with the Office of Health Standards Compliance (OHSC) to identify health establishments where poor or inappropriate AMS and IPC practices are creating a risk for the safety of patients.
  - VI. Develop national antibiotic stewardship prescribing guidelines for South African prescribers, which are harmonised to the EML and Standard Treatment Guidelines (STGs), providing algorithms for treatment of common bacterial infections in adults and in children.
    - a. Regular review, of these guidelines to ensure that changes in national antibiotic resistance patterns are reflected in the recommendations.
  - VII. National community advocacy, awareness and education campaigns to reduce inappropriate use of antibiotics in human and animal health. This will include the development of public health messaging on good antibiotic practices and conservation of the antibiotic resource, working with NDOH communications and the media. An annual campaign for World Antibiotic Awareness Week will be developed.
  - VIII. The phased in, appropriate use of antimicrobials in animal husbandry and/or the optimal use of antimicrobials critical to humans based on appropriate risk assessments and in line with the recommendations of the WHO and OIE.
  - IX. Development and implementation of prevention strategies focusing on infection prevention and control and enhanced vaccination programmes.
  - X. Development of core curricula on antibiotic resistance for health and veterinary professionals. This will include oversight of National and Regional AMS training courses and training delivery process including the review of implementation progress, changes to training materials, and directing priority geographic areas for training.
  - XI. Research into molecular mechanisms of resistance, dissemination of resistance, new drugs and diagnostics including rapid and/or point-of-care diagnostics.

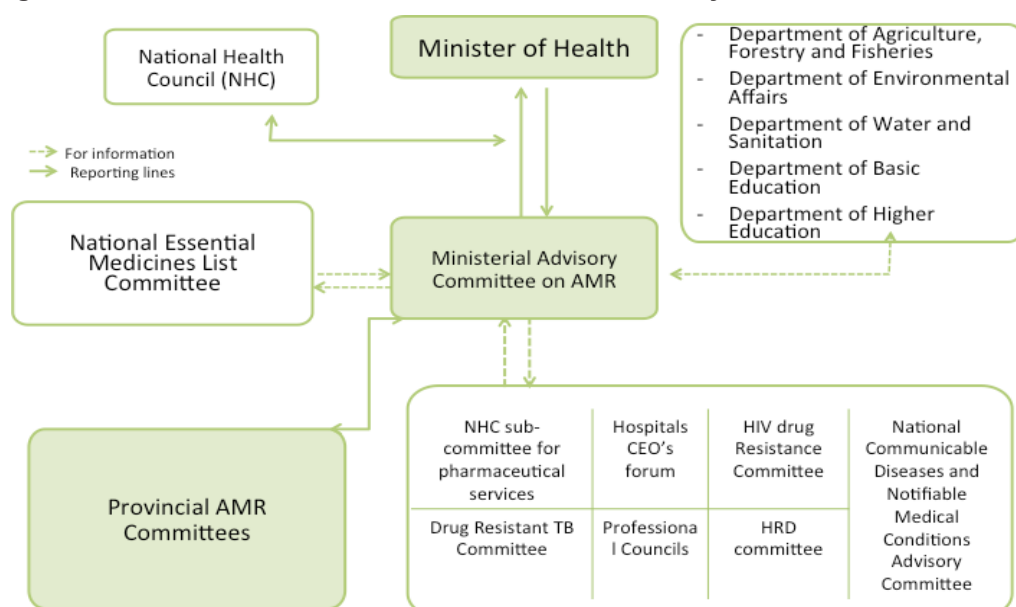
### 3. Focal point for implementation at National level

Currently the Affordable Medicines Directorate within the NDOH is the focal point for coordinating the implementation of the AMR Strategy Framework. This aligns with this Directorate's focus on rational medicine use. It also acts as the Secretariat for the MAC-AMR and monitors the implementation efforts and status through meetings with the Provincial Heads of Pharmaceutical Services on a quarterly basis.

### 4. Communication and reporting lines

The MAC-AMR will establish a communication framework to ensure that all issues related to AMR management are communicated timeously and effectively to internal and external stakeholders.

**Figure 4: Communication channel for Ministerial Advisory Committee on AMR**



## SECTION III: GOVERNANCE AT PROVINCIAL LEVEL

### Roles and responsibilities of the Provincial Departments

Provinces are responsible for taking the strategic objectives and standards set at National level and adapting them to suit their operational model and existing health, operational and governance structures.

Responsibilities of the Provincial Department of Health include:

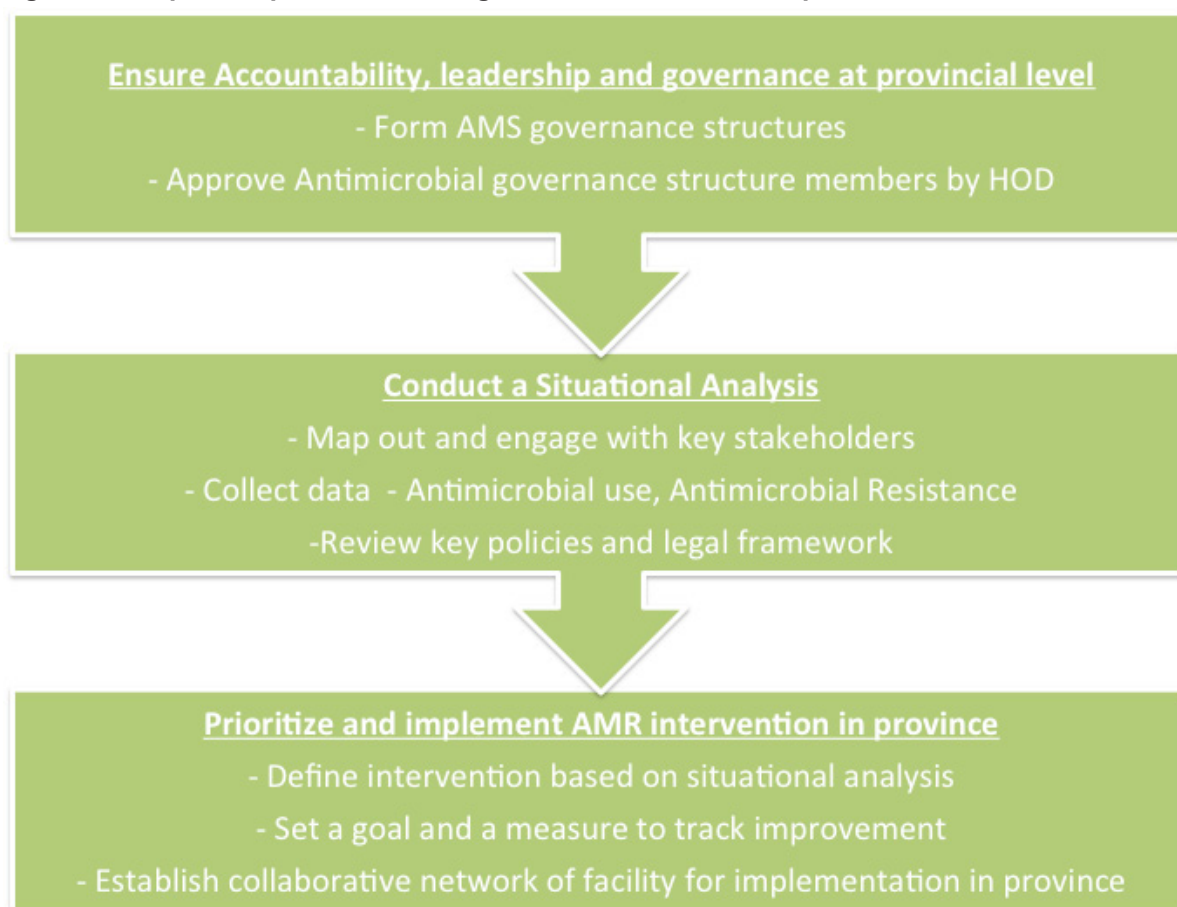
- Implementation and application of minimum standards for AMR and AMS;
- Rolling out of activities across districts and health establishments in order to meet these standards;
- Ensuring that budgets are set up to support the implementation of AMR activities;
- Providing the monitoring and evaluation functions to determine progress towards achieving the AMR actions and activities whilst monitoring and supporting the institutions/health establishments to implement.

The Head of Health oversight role will mainly be focused on human health, although strong ties need to be developed with the environment, sanitation and water departments as part of the National Development Plan in each province.

Responsibilities of the Provincial Veterinary Services include <sup>1</sup> :

- Strengthening and maintaining provincial veterinary laboratories to support appropriate use of antibiotics and by implication food safety;
- Ensuring collaboration between Communicable Disease Control (CDC) at provincial level and with state veterinarians at district level;
- Promoting disease prevention through optimal vaccination of animals against both viral and bacterial infections to limit primary and secondary bacterial infections and the concomitant use of antibiotics;
- Setting safety standards for food of animal origin for local consumption at the same level as for international consumers through a National Food Control Agency and residue and AMR testing through a residue monitoring programme in collaboration with NDOH;
- Biosecurity, hygiene and cleanliness measures for farms.

**Figure 5 - Steps in implementation of governance structures at provincial level**



<sup>1</sup> As articulated in the South African Veterinary Strategy (2016 – 2026); March 2016 DAFF

## 1. Ensuring accountability, leadership and Governance at Provincial Level

Governance of the Provincial AMR response sits with the Head of Department of Health and is facilitated through a Provincial AMS Committee (PAMSC) or structure.

The role of the PAMSC is to provide oversight and coordination for provincial AMS activities, and to provide 6-monthly progress reports to the MAC-AMR.

### 1.1 Formation and positioning of the PAMSC Governance Structure

The formation and position of the PAMSC within the provincial management structure is at the discretion of the Provincial Head of Health; the PAMSC should form a stand-alone, independent committee with clearly defined lines of communication between the Pharmaceutical and Therapeutics Committee (PTC), the Provincial Infection Prevention Committee (PIPC), and the Quality Committees. A representative from PTC and IPC should serve on the PAMSC to ensure communication channels between the committees.

It may be beneficial for the Provincial governance structures from the public sector to have representation within the AMS committees from the Private Sector. This will allow the PAMSC to have an understanding of what is happening within a city / region and not just what is happening within the public health facilities. Alternatively, the private sector can be invited to attend the PAMSC on a regular basis to present their AMS activities and surveillance information.

### 1.2 Composition of the PAMSC

Should include the following key members as the core team (i.e. minimum):

- a. Infectious disease specialist or prescribing specialist clinician, and paediatric infectious disease specialist or prescribing paediatrician;
- b. Medical microbiologist;
- c. Provincial head of Pharmaceutical Services;
- d. Provincial head of IPC ;
- e. Provincial head of Nursing;
- f. Head of Procurement for medicines and medical supplies;
- g. District health services representative or family physician working in the district
- h. Provincial Director of Veterinary Services;
- i. Environmental affairs representative (water and sanitation).

In provinces with additional resources the following additional members can be added:

- a. Clinical Pharmacist;
- b. Intensive Care Specialist;
- c. Quality Improvement/Assurance practitioner;
- d. Clinician representative from private sector;
- j. Representation from Provincial Lab and Blood Services;
- k. Representation from the Provincial EPI Programme;
- e. Provincial Epidemiologist;
- f. Quality Improvement/Assurance practitioner;
- g. Provincial Data Manager.

### Functions of the chairperson and members of the PAMSC

Ensuring that the PAMSC is functional requires all members and the chair to fulfil their functions adequately, attend meetings as required, and provide the necessary input and advice needed. Therefore, guidance of the functions of these individuals is defined here to ensure the chair and members are aware of their responsibilities.

#### The functions of the Chairperson:

- Articulating the goal of the committee and ensuring that the decisions and interventions determined by the committee are in line with these goals, the policies of the province and the relevant National Drugs Policy and AMR Strategy Framework;
- Foster an evidence-based culture for decisions and interventions whilst still encouraging the exploration of new methods and ideas;
- To encourage a multidisciplinary approach to be taken to the decision and interventions of the committee and ensure that each discipline's views are sought when issues are identified or new goals and interventions are designed;
- To support the involvement of veterinary health professionals and other co-opted members from different sectors and ensure they are able to enhance the decisions of the committee through their inputs, views and knowledge;
- To ensure that all members follow the code of ethics, confidentiality and disclosure of interest procedures and principles in their work within the committee.



**The chair should be the** highest ranking provincial manager under whose brief AMS falls.

The chair should garner respect in terms of decisions and their status in the health community, they should have the authority to make decisions and act with integrity and should be passionate about AMR.

#### **The functions of the members**

- Be conversant with the documentation pertaining to scheduled meetings, minutes of meetings and other reports to ensure that discussions at the committee are fruitful and informed decisions are taken;
- Provide expert advice and knowledge when called for;
- Ensure that as representatives of their discipline or designation i.e. pharmacist or clinician, they represent the views of that discipline and not only their specific role or function, institution, or organisation;
- Provide inputs as required in relation to the decisions, reports and documents developed by the committee; in relation to interactions, presentations or communications with provincial staff in the institutions which will be implementing the improvements.

#### **Role of the Provincial AMR Champion**

- Appointed by the HOD to guide the establishment of governance structures, provide secretariat support initially and facilitate implementation of AMR activities within the province;
- Play a vital advocacy role throughout the province to gather support, buy-in, generate awareness and help overcome barriers to implementation;
- Be an energetic, motivated individual who is passionate about AMS and who will drive its implementation with enthusiasm and commitment;
- The province should ensure that this individual is given the authority and mandate to work freely within the province, the necessary resources, training and budget to undertake the activities needed to implement and drive improvement work going forward;
- Provide secretariat functions if required to the Committee by ensuring that the necessary information, documents and reports are disseminated to all members; maintain records of meetings and decisions taken; and communicate decisions to all members and other committees with which the PAMSC has close ties such as the PTC, IPC and Quality committees.

#### **The functions of the Secretariat**

- Develop and maintain an annual schedule for the meetings;
- Convene and make all the necessary logistics arrangements for the meetings;
- Advise on administrative and regulatory matters;
- Compile and maintain minutes and other records of the meeting in consultation with the Chair;
- Coordinate and facilitate any research required for the committee to perform its functions;
- Compile relevant documents to be tabled at the Head of Department meetings communicating work of the PAMSC;
- Maintain information regarding the performance of the committee.

### **1.3 Responsibilities of the PAMSC**

Each PAMSC is responsible for the following set of activities:

- I. Surveillance of AMR and antimicrobial use in the province** – PAMSC must report to the Head of Department and the MAC-AMR every 6 months on the following:
  - a. Antimicrobial (antibiotic and antifungal) consumption using data available from the Head of Pharmacy (listed in Appendix A). The level of detail will vary depending on the source of data. Wherever possible, consumption should be expressed in defined daily doses / 100 patient days (DDD/100 patient days) for inpatients, to account for differences in bed occupancy and size of facilities. Volume of antibiotics dispensed from the pharmacy or the amount of antibiotics ordered by the Hospital may be reported if pharmacy-dispensing data is not available. Outpatient data can be reported as defined daily doses without a denominator;
  - b. Antimicrobial (antibiotic and antifungal) resistance – utilising the reports from the NICD (pathologist-microbiologist or epidemiologist) and private sector pathologist from designated laboratory groups. Antibiotic resistance profiles must include the bug-drug combinations defined by WHO GLASS (listed in Appendix B) with at least annual review with feedback of important trends to health establishments and districts.
  - c. Outbreaks of MDRO (defined in the Health Act as an NMC using Category 3 reporting) in Provincial institutions should be reviewed by the PAMSC, which should work closely with the provincial outbreak response team and NICD/NMC team to control the outbreak.
  - d. Healthcare-Associated Infections (HAI) – reports from hospital-level AMS committees and from the Provincial Infection Prevention and Control Practitioner (IPCP) detailing rates for Central Line-Associated Bloodstream Infection (CLABSI), CA-UTI, surgical site infection (SSI), and Ventilator-Associated Pneumonia (VAP) at tertiary and secondary level hospitals, each quarter. It is therefore very important that the PAMSC has access to, and communicates with, the Provincial IPC Committee if it is a separate committee;

- II. Provide guidance to the health establishments to support their development of AMS activities, and ensure there is mentorship to these hospitals. This must occur in relation to these guidelines plus the NCS for health establishments. The PAMSC should also support the rollout of, and compliance with, HAI control bundles<sup>9</sup>, at all hospitals. This mentorship may be accomplished via provincial visiting teams, the DCST's or through agreement with partners with expertise in AMR supporting the health system in the province;
- III. Monitor and track progress towards achievement of implementation activities and targets set against indicators and Quality Improvement Programmes for AMR;
- IV. Provide access to tools to support implementation of AMR activities including antimicrobial prescription charts, EML, STGs and national antibiotic prescribing guidelines in all hospitals, and tools for monitoring AMS implementation measures;
- V. Assist in allocating funding and budgets for AMR within existing sources and monitor and account for budget use for AMR interventions;
- VI. Provide access to in-service training for clinicians, nurses, pharmacists and allied health care professionals in the province in AMS and related IPC, through workshops at regional training centres (see below);
- VII. Ensure collaboration between Communicable Disease Control (CDC) at provincial level and with state veterinarians at district level to manage outbreaks and also to improve the use of antibiotics important in humans following the One Health approach.

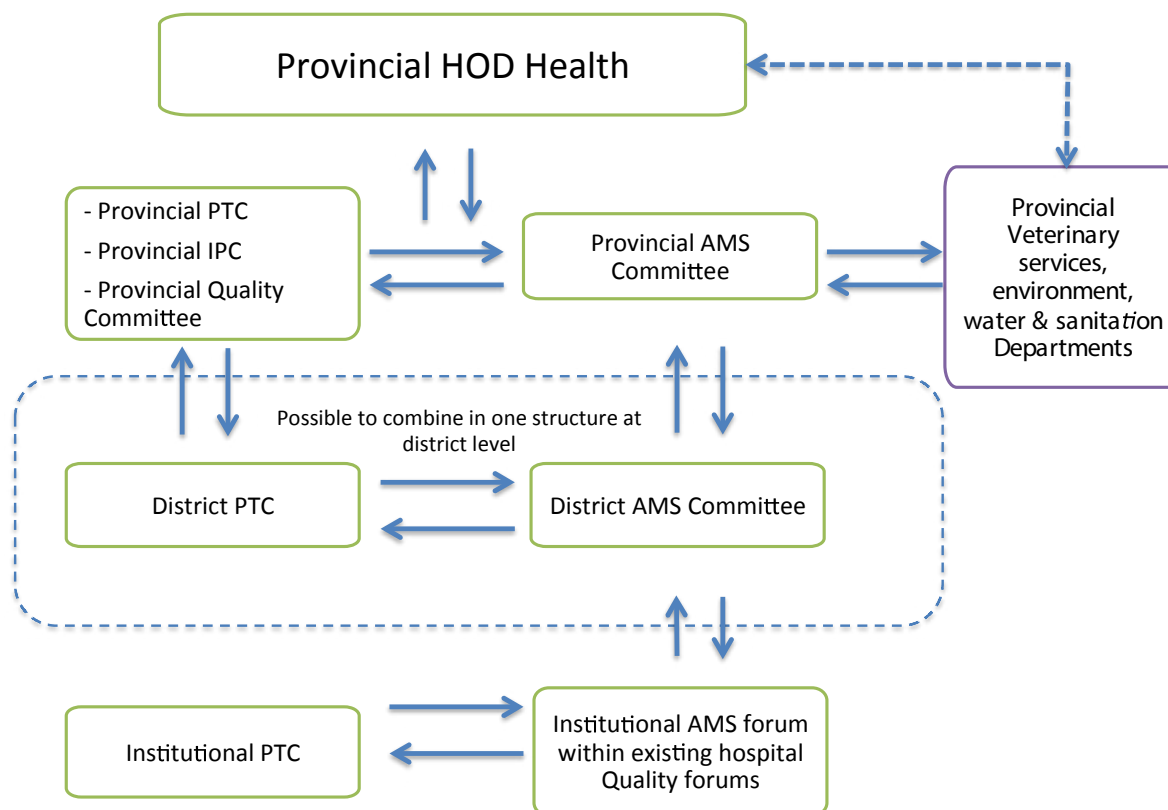
**Figure 6 – Role and Responsibilities of the PAMSC**



## 2. Communication and reporting lines

The PAMSC shall establish a communication framework to ensure that all issues related to AMR management are communicated timeously and effectively to internal stakeholders.

Figure 7 – Communication and reporting lines for PAMSC



## 3. Conduct a situational analysis to determine baselines and priorities for AMR

The purpose of a situation analysis is to provide an overview of current status of AMR and its drivers in the province. It will help to underpin the provincial strategic vision and operational planning for AMR and will provide the basis for setting priorities and implementation activities. It includes the following:

- i. Stakeholder mapping: compiling a list of key stakeholders on AMR from human and animal health, environment (Table 1);
- ii. Collection of retrospective data - on antimicrobial use as per Appendix A and AMR for key organisms as per Appendix B. Understanding the current capacity and structures for surveillance in health establishments, for IPC and for similar biosecurity in animal health and environment to define the One Health approach for the province;
- iii. Reviewing key policies and legal frameworks - such as the provincial waste management and environmental legislation and other legislation dealing with AMR;
- iv. Prioritise AMR interventions – firstly define implementation interventions based on AMR status and key areas of gaps and challenges and identify interventions with the most impact.

### 3.1 Stakeholder mapping

Ensuring that AMR activities follow the One Health approach requires the relevant stakeholders within each sector to be identified. It is also important to identify the expertise within each sector to cover AMS, IPC, education and other aspects of support for AMR interventions. Categories of stakeholders to be identified are contained in Table 1.

**Table 1 - Stakeholders at provincial level**

Human health	Animal Health	Environment
DOH representatives in IPC, pharmacy, clinical services, inspectorate, quality assurance	DAFF Provincial veterinarian Public Health veterinarian, veterinary pathologists	Water Sanitation Housing
Education institutions in the province	Veterinary teaching institutions Agricultural colleges	
Public and private sector clinicians	Public and private sector veterinarians Veterinary public health experts	

### 3.2 Collection of retrospective data

In order to define priority interventions for AMR in the province, it is critical to first understand what the current status or situation of antimicrobial use and resistance is, what the IPC practices are, and where there are challenges in implementation with respect to AMR. Data should be collected from existing sources to determine baselines and interviews should be held with key stakeholders to identify the AMR status and interventions in place (Table 2).

**Table 2 - Baseline information for situational analysis**

Situational Analysis			
Surveillance data	Source	Clinical care practices	Source
<b>AMR</b> Levels of resistant bacteria as per the WHO GLASS drug/bug combinations in Annexure B, Hospital acquired infection rates	NHLS/NICD IPCP and health facilities	<b>IPC against the NCS* &amp; ICAT tool<sup>9</sup></b> <ul style="list-style-type: none"> <li>Environmental cleaning practices</li> <li>Hand hygiene practices</li> <li>Screening of patients</li> <li>Isolation practices</li> <li>Decolonisation practices</li> </ul> Immunisation coverage	IPCP EPI and Districts
<b>Antimicrobial use</b> Antibiotic use as per Annexure A, DDD's calculation included in Appendix A Antimicrobial availability % availability of antimicrobial in the facility over a period of a year defined as the proportion of all fixed clinics, that had stock-out of ANY antimicrobial item for any period	Provincial Pharmacist/depot Provincial Pharmacist/depot	<b>Governance structures</b> Audit – governance structures in sample of facilities AMR committees that are functional * IPC committees that are functional * * functional = members appointed, TOR available, meetings held as per TOR, minutes of meetings with actions being addressed <b>AMR strategies in place</b> Formulary restrictions Preauthorisation Prospective audits with feedback Multidisciplinary stewardship teams and rounds Trend analysis of use and resistance	Provincial Pharmacist/ Hospital CEO's and Clinical managers Provincial Pharmacist/ Hospital CEO's and Clinical managers
IPC supplies Hand hygiene product availability over a period of a year PPE available over a period of one year Cleaning products and cleaning equipment availability over a period of a year Decontamination & sterilisation of medical devices over a year; Availability of single use devices, such as ventilator tubing, over a 12 month period; Functioning bedpan washer disinfectors over a period of one year.	IPCP and Inspectorate units	<b>AMS practices (audit tool in Appendix C)</b> Culture taking prior to commencement of antibiotics Documented indication for antibiotics Review of antibiotic with culture results Change in antibiotic – stopping/de-escalation/substitution/addition of agents IV to oral switch Duration of therapy	Baseline audits by AMS Committee
		Key informant interviews with major stakeholders to understand: <ul style="list-style-type: none"> <li>Current AMR challenges</li> <li>Current AMR interventions and activities</li> </ul>	

\* NCS – see Appendix E

### 3.3 Review key policies and legal frameworks

This includes reviewing existing provincial legislation such as provincial waste management and environmental legislation; policies on essential medicines lists and formularies; performance management; and scope of work policies to ensure that AMR activities become embedded within the daily activities of all staff.

### 3.4 Prioritise AMR interventions

The baseline data collected above will help the province identify areas of concern where AMR interventions are required. It is important to define a goal for the AMR program. This goal will guide the interventions and allow tracking of improvements in AMS activities. It also becomes a source of accountability for the PAMSC and a motivator for an acceleration of change in behaviours.

In the vast majority of cases this would be to reduce antimicrobial use in facilities in the province. The quantum and period over which this reduction will occur will need to be determined by the PAMSC in consultation with the facilities and other stakeholders.

An initial set of interventions should then be chosen that will improve appropriate use. These two or three interventions should be easy to implement, with minimal changes to normal process and have the biggest impact as the priority interventions in each health establishment. Examples of these interventions include <sup>10-22</sup> with definitions in the Appendix D :

**Table 3 - AMR interventions**

Intervention options	
IPC	AMS
<ol style="list-style-type: none"> <li>1. Hand hygiene compliance</li> <li>2. Improved environmental cleaning practice in public areas and clinical areas</li> <li>3. Isolation room terminal cleaning practices</li> <li>4. Screening of patients at high risk</li> <li>5. Isolation of infected patients</li> <li>6. Decolonisation</li> <li>7. Functioning bedpan washer disinfectant in clinical areas</li> <li>8. Single patient use ventilator tubing in intensive care areas</li> <li>9. Appropriate decontamination and sterilisation reprocessing of medical devices. (WHO: <i>Decontamination and Reprocessing of Medical Devices for Healthcare Facilities, Sept 2016</i>)</li> </ol>	<ol style="list-style-type: none"> <li>1. Formulary restrictions based on AMR and antimicrobial use</li> <li>2. Pre-authorisation</li> <li>3. Multidisciplinary stewardship teams and rounds</li> <li>4. Prospective audits with feedback to prescribers, study, act on the following indicators: <ul style="list-style-type: none"> <li>• Culture taking prior to commencement of antibiotics;</li> <li>• Empiric treatment against STG's</li> <li>• Documented indication for antibiotics;</li> <li>• Review of antibiotic with culture results;</li> <li>• Change in antibiotic – stopping / de-escalation / substitution / addition of agents;</li> <li>• IV to oral switch;</li> <li>• Batching of intravenous antimicrobials;</li> <li>• Duration of therapy monitoring and intervention;</li> <li>• Hang time;</li> <li>• Surgical prophylaxis choice and duration of therapy.</li> </ul> </li> </ol>
	<p><b>Administration of antibiotics</b></p> <ul style="list-style-type: none"> <li>• Correct dose</li> <li>• Correct duration</li> <li>• Correct frequency</li> <li>• Correctly documented</li> </ul>

The basic definitions for each of these interventions are provided in the Appendix D and will be described in detail in the implementation guidelines which are to follow.

These prioritised interventions and actions need to be reflected within the AMR Implementation Plan for the province and will be monitored against the M&E framework in Section VI.

## SECTION IV: GOVERNANCE AT DISTRICT HEALTH MANAGEMENT OFFICE LEVEL

### Roles and responsibilities of District Health Management Office

The District Health Management Office (DHMO) and its associated sub-District management structures are primarily responsible for the coordination and planning of health services in the associated district hospital, community and primary healthcare clinics within that district and sub-district. Much emphasis is being placed on ensuring that health services are delivered in a holistic and integrated fashion, removing silo-based care, which is programme driven, towards the Integrated Chronic Disease Management approach. AMR activities are evidence-based; driven by protocol and standard treatment guidelines; with the nurse and primary care doctors being the main drivers of prescribing and use. Districts are at the forefront of the community and therefore will have an even larger responsibility for public health awareness and education activities, targeting the specific behaviours of concern for AMR in each community.

The DHMO also collaborates and works closely with other governmental sectors such as water and sanitation; environmental services; and waste management services at municipalities and these departments are integral to the One Health approach of AMR especially at this community level and formalised through the Integrated and District Development Plans.

#### 1. Ensuring accountability, leadership and Governance at District Health Department Level

As AMR requires a multidisciplinary approach, it will initially draw on the various clinical and non-clinical areas of expertise within the existing DHMO and sub-District structures to fulfil the roles as defined below. The AMR function has not been placed within a single individual's role to fulfil. Rather the focus is on starting with a core group of individuals within a District AMS Committee (DAMSC) who are supported to provide these activities in the district under the guidance of the existing management structures and committees and through the advocacy role of the AMR Champions.

##### 1.1 AMR Champions in the District

The AMR Champions should be appointed by the District Manager to guide the establishment of AMR management structures, provide secretariat support initially and facilitate implementation of AMR activities within the district and its health facilities. This role should be fulfilled by the Manager of Pharmaceutical Services and the family Physician within the DCST's.

Their role will be as advocates for AMR activities throughout the district: to gather support; generate buy-in, raise awareness and help overcome barriers to implementation of activities to combat AMR. They should be energetic, motivated individuals who are passionate about AMS and who will drive its implementation with enthusiasm and commitment. The DHMO should ensure that these individuals are given the authority and mandate to work freely within the district, the necessary resources, training and budget to undertake the activities needed to implement and drive improvement work going forward.

They will also function to provide a secretariat role if required to the DAMSC by ensuring that the necessary information, documents and reports are disseminated to all members, maintain records of meetings and decisions taken and communicate decisions to all members and other committees with which the DAMSC has close ties such as the District PTC and other management committees of the District Manager's office.

##### 1.2 The District AMS Committee (DAMSC)

The DAMSC should be constituted out of 5 core individuals/roles:

- i. Family practitioner from the District Clinical Specialist Team;
- ii. Manager Pharmaceutical Services;
- iii. Manager Clinical Support Services, Coordination and Quality Management;
- iv. General practitioner from the community;
- v. Sub District manager.

The role of AMR should fall directly within each one of these individuals' job descriptions which will happen over time. In addition to the following members may from time to time also be involved with the work of the DAMSC:

- i. Health Programme Coordinators – HIV/TB, MCH etc.
- i. Infection control professional;
- ii. Quality assurance;
- iii. NHLS;
- iv. Procurement manager;
- v. Human Resource Development manager;
- vi. Environmental health/Public health managers from other departments such as Water Affairs, Sanitation, Waste Management and Veterinary services.

The DAMSC may also want to request the expertise of the microbiologist from the local NHLS lab, or specialists such as paediatricians or infectious diseases specialists from nearby academic/tertiary or regional hospital as outreach.

The DAMSC will communicate and report to the District Manager and the relevant management structures as per that specific district relevant to AMR as well as the district PTC and the provincial AMR structures (Figure 4).

### 1.3 Responsibility of the District AMS committee

- I. Surveillance of AMR and antimicrobial use in the district – The DAMSC must report to the District Manager, the PAMSC and the MAC-AMR biannually on the following:
  - a. Antibiotic and antifungal consumption using data available from the District Pharmacist as per Appendix A;
  - b. Antibiotic resistance data for the District Hospital– utilising the reports from the NICD (microbiologist or epidemiologist) and private sector labs. Antibiotic resistance profiles must include the bug-drug combinations defined in Appendix B with at least annual review with feedback of important trends to health establishments and districts;
  - c. Outbreaks of notifiable medical conditions;
  - d. Healthcare-associated infections (HAI) – reports from clinics of surgical site infection (SSI).
- II. Provide guidance and awareness education to the clinics and community general practitioners on the importance of appropriate antibiotic use. To support this, the DCST's should include a prescription chart review during their facility visits to monitor the following:
  - a. Compliance with the STG's for infectious conditions – correct drug for condition, dose, and frequency;
  - b. Practically assess whether nurse prescribers are diagnosing bacterial infections appropriately and following the correct protocols for treatment as part of the Integrated Chronic Disease Management approach.
- III. Monitor and track progress towards achievement of implementation activities and targets set against indicators and Quality Improvement Programmes for AMR.
- IV. Provide access to tools to support implementation of AMR activities including antimicrobial prescription charts, EMLs, STGs and national antibiotic prescribing guidelines in all clinics.
- V. Provide input into funding needs and budgets for AMR activities.
- VI. Provide access to in-service training for general practitioners, nurses, pharmacists and allied health care professionals in the district in antibiotic stewardship and related infection prevention control, through workshops at regional training centres (see below).
- VII. Ensure a link to the intersectoral environmental, veterinary and public health and the local municipalities on AMR issues following the One Health approach. This will include providing yearly inputs into the planning and execution of AMR activities as part of the greater District Health Plans and Integrated Health Plans.

## SECTION V: GOVERNANCE AT HEALTH ESTABLISHMENT LEVEL

### The Roles and responsibilities of health establishments

Health establishments are the fundamental drivers of the activities that will impact on AMR. They will need to identify how the proposed management structures will fit into already existing oversight structures, how they can adapt their operational processes to improve management of AMR and how they can strengthen already existing programmes such as IPC and the Expanded Programme on Immunisation (EPI) to support the objectives of reducing the burden of infections and preventing the spread thereof. They also have a fundamental role in educating the patients, caregivers, community, healthcare providers and health workers to change their behaviours to prevent infections, prevent their spread and ensure the appropriate use of antimicrobials.

#### 1. Ensuring accountability, leadership and governance at hospital level

##### 1.1 Hospital Antimicrobial Stewardship Committee (HAMSC)

The role of the HAMSC is to provide oversight and coordination for AMS activities at the institution, including the activities of the Hospital's AMS team(s), and to provide 6-monthly progress reports to the PAMSC.

##### 1.2 Positioning of the HAMSC

The position of the HAMSC within the hospital management structures is at the discretion of the CEO. The HAMSC may either form a stand-alone committee or be incorporated into the agenda of either the hospital's IPC or another clinical committee. If AMS is positioned within an already existing committee, AMS activities defined below must be included in the agenda of that committee as standing items. There must be clearly defined lines of communication and feedback provided between the HAMSC and other relevant hospital committees, heads of nursing, pharmacy, quality improvement, other relevant heads of departments, as well as with the PAMSC.

##### 1.3 Composition

It is critical that the highest-ranking member of each component of the AMS response represents the hospital on the HAMSC. This is to ensure translation of policy into action, and is especially important in choosing the most senior level administrator.

The committee should consist of the following core members:

- a. Chair should be the CEO or highest ranking management representative of the hospital;
- b. Senior physician of the hospital;
- c. Head of Pharmacy Services of the hospital;
- d. Infection Prevention & Control Practitioner of the hospital;
- e. Head of Nursing – or highest ranking nurse manager, under whose brief AMS falls;
- f. Medical Microbiologist - where not available, either the most experienced member of the National Health Laboratory Service that services the hospital, OR a seconded microbiologist from another NHLS or private laboratory.

Additional members who can be included, depending on the size of institution and their access to resources, include:

- a. Other clinicians representing each clinical department of the hospital or as a minimum the key departments consuming the most antibiotics – e.g., ICU, surgery, emergency medicine, gynaecology and/or obstetrics;
- b. Adult Infectious Diseases Specialist (where not available, a prescribing specialist clinician, family practitioner or equivalent with experience in AMS);
- c. Paediatric Infectious Diseases Specialist if the hospital is a specialist paediatric hospital or has joint adult and paediatric services. Where a paediatric Infectious Diseases specialist is not available, a prescribing specialist paediatrician with experience in AMS or similar at the level of family practitioner or equivalent should substitute;
- d. Quality Improvement/Assurance practitioner;
- e. Ward pharmacist or any pharmacist trained in AMS.



## 1.4 Responsibilities of the HAMSC

- I. Surveillance – HAMSC must monitor and report on:
  - a. Antimicrobial usage data from pharmacy – ideally data from each hospital department should be presented in Defined Daily Doses per hundred patient days (DDD/100 patient days) for ward patients and as DDD for emergency unit and outpatients. However, the institutions should look at the data available and work with existing data constraints moving towards the ideal. The list of antibiotics for reporting will depend on the level of that facility in terms of the EML (Appendix A);
  - b. Local antibiotic resistance profile data of microorganisms in each facility collected from the local NHLS laboratory, some facilities refer to regional referral laboratory for processing and reports would be available at regional level. Hospital-wide bug-drug combinations as defined in Appendix B should be reviewed and reported annually to the PAMSC. Resistance profiles should also be fed back to all clinicians in the hospital on a 6 monthly basis and presented as part of the quality committee agenda to the management staff;
  - c. Outbreaks of MDRO in the hospital should be reviewed by the HAMSC, which should work with the hospital's IPC team, the provincial outbreak response team, and NICD (when necessary) to control the outbreak according to the Health Act;
  - d. Hospital-acquired infections – institutions must phase in the monitoring of rates for the number of CLABSI, CA-UTI, and SSI and/or VAP (if surgery and/or ICU services are provided at the hospital). Number of *C. difficile* infections per hospital should also be reported. 12-monthly data should be reported to the PAMSC. The IPCP plays a critical role in providing this information, along with the microbiologist or laboratory staff in the hospital;
  - e. Volume of infection-related laboratory investigations (blood cultures, CRP, PCT, white blood cell count) from NHLS laboratories servicing the hospital;
- II. Follow up with existing IPC structures are that all clinical areas follow standard precautions and appropriate additional (transmission-based) precautions as required to reduce the risk of transfer of contagious and resistant pathogens to patients and staff. Supervise terminal cleaning of isolation facilities after patient discharge;
- III. Coordinate the activities of the hospital's antibiotic stewardship team/s. Identify clinical units in need of support;
- IV. Ensure that regular feedback is given to all prescribers on the status of AMR interventions and surveillance information as part of ongoing feedback and awareness. Consideration should be given to reporting systems for prescribers who consistently do not follow protocols and guidelines and should be dealt with through the HAMSC and the Management of the hospital;
- V. Provide regular in-service training in AMS and IPC for clinicians, nurses, and allied health care professionals, through access to antibiotic stewardship ward rounds, web-based training materials and workshops at regional training centres;
- VI. Coordinate and publicise the hospital's participation in awareness days related to AMS/IPC i.e., World Hand Hygiene day (5th May), Infection Control Week (September), Pharmacy Month (September), and World Antibiotics Awareness Week (November).

## SECTION VI: Monitoring & Evaluation and Reporting for the implementation of the AMR programme

Monitoring and Evaluation (M&E) aims to assess the extent to which the desired strategic objectives of the AMR Strategic Framework have been achieved.

In the Implementation Plan, an indicator for each strategic objective has been set out in addition to short-, medium-, and long-term targets for the strategy period. This includes the overarching impact indicators, which seek to evaluate the impact of the AMR strategy for specific organisms and in specific clinical circumstances.

National M&E indicators have been set out within the Implementation Plan and will be monitored by the MAC-AMR to assess the extent to which the desired objectives of the Strategic Framework have been achieved across the country.

M&E indicators are being defined in terms of operational implementation and governance of the AMR framework within the health establishments. These M&E indicators have been divided into their input, process, output or outcome/impact<sup>15</sup>:

- Input indicators talk to the establishment of the systems of governance at the various levels of the health system;
- Process indicators measure the implementation of standards or care and AMS/ IPC guidelines either within this guideline document or within the NCS;
- Output indicators measure how the activities have changed the resistance patterns of AMR organisms and also influenced the consumption of antimicrobials;
- Outcome/impact indicators attempt to determine whether the program has had any impact on the mortality of mothers and infants in relation to infectious diseases.

**Table 4 - M&E indicators by level of health system**

	Level of reporting Category of indicator	Health establishment - hospital	District	Province	National	Measure unit	Frequency of reporting	Numerator	Denominator
Input	AMS governance structures		% of health establishment with functional * AMS governance structures	% of health establishment with functional * AMS governance structures	% of health establishment with functional * AMS governance structures	% of health establishment	biannual	# of health establishment	Total # of health establishment in district/ province/ country
	IPCP	Appointment of an IPCP – yes or no or in progress	% of health establishment (hospitals)? with one or more IPCP	% of health establishment with one or more IPCP	% of health establishment with one or more IPCP	% of health establishment	annual	# of health establishment with 1 or more IPCP	Total # of health establishment in district/ province/ country
	IPC cleaning supplies	Ratio of formally trained IPCP to acute care beds= 1:250 (WHO: core components)	Ratio of IPCP to acute care beds 1:250	Ratio of 1 IPCP per 4-5 CHCs/ Clinics	National IPC coordinator and department of IPC functional	# availability	annual	# IPCP	# acute care beds in health establishment
Process	EML - antibiotics	Availability of cleaning supplies and equipment as per NCS list	Availability of cleaning supplies and equipment as per non NCS list	Availability of cleaning supplies and equipment as per NCS list	Availability of cleaning supplies and equipment as per NCS list	% availability	quarterly	# of all fixed clinics, that had stock-out of ANY cleaning supplies item for any period	Total # of health establishment in district/ province/ country
	Compliance with AMS NCS standards	Availability of Essential antibiotics as per EML	Availability of Essential antibiotics as per EML in health establishments	Availability of Essential antibiotics as per EML in health establishments	Availability of Essential antibiotics as per EML in health establishments	% availability	quarterly	# of all fixed clinics, that had stock-out of ANY antimicrobial item for any period	Total # of health establishment in district/ province/ country
	Compliance with IPC NCS standards	% compliance with AMS NCS standards on last inspection	% of health establishment compliant (75% score) with AMS NCS standards	% of health establishment compliant with AMS NCS standards	% of health establishment compliant with AMS NCS standards	% of health establishment	annual	Score from AMS measures in NCS	Total possible score for AMS measures in NCS
	Improvement in AMS process measures – based on intervention	% compliance with IPC NCS standards on last inspection	% of health establishment compliant with IPC NCS standards	% of health establishment compliant with IPC NCS standards	% of health establishment compliant with IPC NCS standards	% of health establishment	annual	Score from IPC measures in NCS	Total possible score for IPC measures in NCS
		% compliance to process measures	% compliance to process measures	% compliance to process measures	% compliance to process measures	% of health establishment	quarterly	Number of compliant process measures	Total number of process measures
		% compliance to process measures	% compliance to process measures	% compliance to process measures	% compliance to process measures	% of health establishment	quarterly	Number of compliant process measures	Total number of process measures

Level of reporting Category of indicator	Health establishment - hospital	District	Province	National	Measure unit	Frequency of reporting	Numerator	Denominator
Output	% non susceptible for organisms in Annexure B Plus <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin non susceptible Kleb Pneumonia</li> <li>% carbapenem non susceptible Kleb Pneumonia</li> <li>% MRSA</li> <li>% 3rd Generation cephalosporin non susceptible E Coli</li> <li>% quinolone non susceptible Ecoli</li> </ul>	% non susceptible for organisms in Annexure B Plus <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin non susceptible Kleb Pneumonia</li> <li>% carbapenem non susceptible Kleb Pneumonia</li> <li>% MRSA</li> <li>% 3rd Generation cephalosporin non susceptible E Coli</li> <li>% quinolone non susceptible Ecoli</li> </ul>	% non susceptible for organisms in Annexure B Plus <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin non susceptible Kleb Pneumonia</li> <li>% carbapenem non susceptible Kleb Pneumonia</li> <li>% MRSA</li> <li>% 3rd Generation cephalosporin non susceptible E Coli</li> <li>% quinolone non susceptible Ecoli</li> </ul>	% non susceptible for organisms in Annexure B Plus <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin non susceptible Kleb Pneumonia</li> <li>% carbapenem non susceptible Kleb Pneumonia</li> <li>% MRSA</li> <li>% 3rd Generation cephalosporin non susceptible E Coli</li> <li>% quinolone non susceptible Ecoli</li> </ul>	% non susceptible organisms	Annual	# of organism non susceptible	Total number of cases of organisms cultured
AMR animal health	% AMR in key organisms blood cultures only <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin resistant E Coli , Salmonella spp, shigella spp.</li> <li>% quinolone resistance amongst Ecoli, Salmonella spp, shigella spp.</li> </ul>	% AMR in key organisms blood cultures only <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin resistant E Coli , Salmonella spp, shigella spp.</li> <li>% quinolone resistance amongst Ecoli, Salmonella spp, shigella spp.</li> </ul>	% AMR in key organisms blood cultures only <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin resistant E Coli , Salmonella spp, shigella spp.</li> <li>% quinolone resistance amongst Ecoli, Salmonella spp, shigella spp.</li> </ul>	% AMR in key organisms blood cultures only <ul style="list-style-type: none"> <li>% 3rd Generation cephalosporin resistant E Coli , Salmonella spp, shigella spp.</li> <li>% quinolone resistance amongst Ecoli, Salmonella spp, shigella spp.</li> </ul>	% non susceptible organisms	Annual	# of organism non susceptible	Total number of cases of organisms cultured
Antimicrobial Consumption – human and animal	Ratio broad to narrow spectrum antibiotics: J01CA + J01CR and narrow spectrum J01CE + J01CF	Ratio broad to narrow spectrum antibiotics J01CA + J01CR and narrow spectrum J01CE + J01CF	Ratio broad to narrow spectrum antibiotics J01CA + J01CR and narrow spectrum J01CE + J01CF	Ratio broad to narrow spectrum antibiotics J01CA + J01CR and narrow spectrum J01CE + J01CF	Ratio	annual	J01 CA	J01 CE- CR
	Ratio of IV to Oral for the following: ciprofloxacin; co-amoxiclav; ampicillin/amoxicillin; cloxacillin	NA	NA	NA	Ratio	annual/trend analysis		
	Consumption of all JO1 antibacterials, and specific ATC antibacterials such as carbapenems, vancomycin, 3rd gen cephalosporins, fluorquinolones, macrolides in DDD's per 100 bed days	Consumption of all JO1 antibacterials, and specific ATC antibacterials such as carbapenems, vancomycin, 3rd gen cephalosporins, fluorquinolones, macrolides in DDD's per 1000 inhabitants for clinics And In DDD's per 100 bed days for district hospitals	Consumption of all JO1 antibacterials, and specific ATC antibacterials such as carbapenems, vancomycin, 3rd gen cephalosporins, fluorquinolones, macrolides in DDD's per 1000 inhabitants	Consumption of all JO1 antibacterials, and specific ATC antibacterials such as carbapenems, vancomycin, 3rd gen cephalosporins, fluorquinolones, macrolides in DDD's per 1000 inhabitants	Consumption of all JO1 antibacterials, and specific ATC antibacterials such as carbapenems, vancomycin, 3rd gen cephalosporins, fluorquinolones, macrolides in DDD's per 1000 inhabitants	annual/trend analysis	Consumption in DDD's for each antimicrobial	Inhabitants in province x 1000 or patient days for hospital x 100

\*functional means the structure is set up, has a TOR and meets as per the frequency in the TOR

# process measures to be determined as part of the implementation process within provinces

## Appendix A – Antibiotic consumption reporting

### • Reporting of antibiotics consumption

Data from all central, secondary level, and high throughput district level hospitals should be presented in defined daily doses (DDD) per hundred patient days (DDD/100 patient days). The consumption data should be informed by the ABC analysis per antibiotic class and should be stratified by oral and intravenous antibiotics. The ABC analysis is informed by the Anatomical Therapeutic Chemical classification system.

### • Antibiotics

Consumption data for the following antibiotics are to be collected and reported on:

- i. Intravenous antibiotics used in high volumes – amikacin, amoxicillin-clavulanate, ampicillin, azithromycin, ceftriaxone, clindamycin, cloxacillin, ciprofloxacin, gentamicin, metronidazole and penicillin;
- ii. Oral antibiotics used in high volumes - amoxicillin-clavulanate, amoxicillin, azithromycin, ciprofloxacin, clindamycin, flucloxacillin, and metronidazole;
- iii. Antibiotics used for MDRO – carbapenems (ertapenem, imipenem, meropenem), colistin, piperacillin-tazobactam; and vancomycin
- iv. Glycopeptides (vancomycin and teicoplanin), linezolid, daptomycin and ceftaroline
- v. It is also important to have a total measure including both oral and intravenous antibiotic consumption to monitor overall hospital trends;
- vi. Antifungals – intravenous: amphotericin B and caspofungin; oral: fluconazole.

### • Tools for monitoring antibiotic consumption data

#### Anatomical Therapeutic Chemical Classification

The Anatomical Therapeutic Chemical (ATC) classification system is a tool to investigate medicine utilization in order to improve the quality of medicine use. It allows for comparison of medicine consumption at all levels of health care, as well as internationally.

The ATC classification divides medicines into different groups based on the body organ or system on which they act and their chemical, pharmacological, and therapeutic properties (WHO Collaborating Centre for Drug Statistics Methodology 2009, available online at [http://www.whocc.no/atc\\_ddd\\_index](http://www.whocc.no/atc_ddd_index)).

#### Daily Defined Doses

A DDD is the assumed average maintenance dose per day for a medicine used for its main indication. This system allows comparison between products with different dosing regimens. It is important to use the same denominator when comparing data: for example, if DDDs per 1000 inhabitants are calculated with the provincial census as the denominator for year-on-year comparison, provincial census data from each year should be used.

Definitions<sup>2</sup>:

- DDDs per 1000 inhabitants: a rough estimate of the proportion of the population treated daily with a particular medicine.
    - Example: 10 DDDs per 1000 inhabitants per day indicates that 1% of the population on average might receive a certain medicine daily.
    - For the expression of antibiotic consumption at a provincial or district level, census population estimates could be used as the denominator.
  - DDDs per 100 patient days/bed-days: applied when medication use by inpatients is considered; this should be adjusted for occupancy rate of the institution.
    - Example: 70 DDDs per 100 patient days of a medicine provides an estimate of the therapeutic intensity and suggests that 70% of the inpatients might receive a DDD of the medicine every day.
    - Calculating patient days (or bed days): the discharge day for the patient is not counted so as to prevent inflation of the denominator by partial days (i.e. admission will be seen as a full day).
  - DDDs per inhabitant per year: an estimate of the average number of days for which each inhabitant is treated annually.
    - Example: an estimate of 5 DDDs per inhabitant per year indicates that the utilisation is equivalent to the treatment of every inhabitant with a 5-day course during a certain year.
- How to Calculate Antimicrobial Daily Defined Doses (DDD) and DDDs per 1000 Patient Days

2 Introduction to drug utilisation research: Chapter 6: Drug utilisation metrics and their applications. World Health Organisation. Available from <http://apps.who.int/medicinedoc/en/d/Js487e.html>

## Reporting requirements:

An Excel document with the following components are necessary (see Example 1, columns A to K):

1. Date range under analysis
2. Description of antibiotic
3. Anatomic and Therapeutic Classification (ATC) to the 5th level
4. Strength of antimicrobial (including value and unit)
  - a. Convert all strength values into milligrams
5. Pack size (including value and unit)
6. Dosage form of antimicrobial
7. DDD for each antimicrobial
  - a. Search DDD for each antibiotic on [http://www.whooc.no/atc\\_ddd\\_index/](http://www.whooc.no/atc_ddd_index/)
  - b. Convert all DDDs into milligram
8. Quantity issued
9. Patient days for facility/ward being analysed over the data range under analysis

EXAMPLE 1: Year XX															
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Description	ATC	Strength	Strength unit	pack size	Unit	Admin route	DDD	DDD UNIT	DDD value mg	DDD unit mg	Patient days (for period under analysis)	Quantity issued	DDD per pack	DDD issued	DDD/1000 patient days
CLINDAMYCIN 150 mg capsule, 20 capsules	J01FF	150	mg	20	Capsule	Oral	1.2	g	1200	mg	352	50	2.5	125	355
AMOXYCILLIN 250 mg and CLAVULANIC ACID 62,5 mg/5 ml suspension, 100 ml bottle	J01CR	250	mg/ 5ml	100	ml	Oral	1	g	1000	mg	428	20	5	100	234

## Calculating the DDDs:

### Calculating DDD per pack:

1. For solid dosage forms, write the following statement in column N:
  - a.  $=(\text{Strength value} \times \text{pack size}) / \text{DDD Value (mg)}$
2. For liquid dosage forms (strength is xxx mg/y ml. The strength value is per y ml and needs to be divided by y to show the number of units issued), write the following statement in column N:
  - a.  $=((\text{Strength value} \times \text{pack size(ml)}) / y) / \text{DDD Value (mg)}$

### Calculating DDD issued:

1. Write the following statement in column O:
  - a.  $=(\text{DDD per pack} \times \text{Quantity issued})$

### Calculating DDD per 1000 patient days:

1. Write the following statement in column P:
  - a.  $=(\text{DDD issued} / \text{Patient days (for period under analysis)}) \times 1000$

**Example of a DDD calculation:**

Using the data from Example 1, Year XX (above):

Date range: Year XX

Component	Example 1: capsule	Example 2: suspension
Description of antimicrobial	CLINDAMYCIN 150 mg capsule, 20 capsules	AMOXYCILLIN 250 mg and CLAVULANIC ACID 62,5 mg/5 ml suspension, 100 ml bottle
ATC (5th level)	J01FF	J01CR
Strength of antimicrobial	150mg	250mg/5ml
Pack size	20 Capsules	100ml
Dosage form	Oral	Oral
DDD: <input type="checkbox"/> From <a href="http://www.whooc.no/atc_ddd_index/">www.whooc.no/atc_ddd_index/</a> <input type="checkbox"/> Convert to milligrams	<input type="checkbox"/> 1.2g <input type="checkbox"/> 1200mg	<input type="checkbox"/> 1g <input type="checkbox"/> 1000mg
Quantity issued	50 packets	20 bottles
Patient days for Year XX	352	428
<b>Calculations:</b>		
1. DDD per pack	$= (150\text{mg} \times 20 \text{ Capsules}) / (1200\text{mg})$ $= 2.5$	$= ((250\text{mg} \times 100\text{ml}) / 5\text{ml}) / (1000\text{mg})$ $= 5$
2. DDD issued	$= (2.5 \times 50 \text{ packs})$ $= 125$	$= (5 \times 20 \text{ bottles})$ $= 100$
3. DDD/1000 patient days	$= (125 / 352 \text{ patient days}) \times 1000$ $= 355$	$= (100 / 428 \text{ patient days}) \times 1000$ $= 234$

## Appendix B - Priority specimens & pathogens for surveillance of AMR

### National Surveillance on AMR

Objective of the surveillance on AMR is to report on antimicrobial susceptibility testing results and trends in resistance to antibiotics for selected pathogens on invasive diseases at all levels of the health care system.

#### Surveillance methods

The surveillance programme will focus on the ESKAPE pathogens (**Enterococcus faecium/faecalis, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and Escherichia coli** species) and **Candida** within blood cultures only as they are the leading causes of nosocomial infections throughout the world.

This surveillance has already been established at Group for Enteric, Respiratory and Meningeal Surveillance in South Africa (GERMS SA) since beginning of 2000s and is designed as laboratory based surveillance at national level for some organisms and at sentinel sites for others (mainly the academic hospitals). Surveillance reports on additional pathogens such as *Candida* spp, *S. pneumoniae* can be retrieved from GERMS Annual Report published at NICD website ([www.nicd.ac.za](http://www.nicd.ac.za)).

#### Case definitions

Initially surveillance reports will only include blood isolates based on organisms/antibiotics requests as per Table 8 for the ESKAPE organisms.

Case definition for blood isolate is a single blood culture isolate within 21 days.

**Figure 8 - Organisms and antibiotics requirements for AMR surveillance reporting**

Organisms	Antibacterial class	Antibacterial agents
<i>Escherichia coli</i>	Sulfonamides and trimethoprim Fluoroquinolones Third-generation cephalosporins  Fourth-generation cephalosporins Carbapenems  Polymyxins Penicillins Penicillins/inhibitors  Aminoglycosides	Co-trimoxazole Ciprofloxacin or levofloxacin Ceftriaxone or cefotaxime and ceftazidime Cefepime Imipenem, meropenem, ertapenem or Doripenem Colistin Ampicillin Amoxicillin/clavulanate Piperacillin/tazobactam Gentamicin and amikacin
<i>Staphylococcus aureus</i>	Penicillinase-stable beta-lactams	Cefoxitin (cloxacillin/oxacillin)
<i>Klebsiella pneumoniae</i>	Sulfonamides and trimethoprim Fluoroquinolones Third-generation cephalosporins  Fourth-generation cephalosporins Carbapenems  Polymyxins Penicillins/inhibitors  Aminoglycosides	Co-trimoxazole Ciprofloxacin or levofloxacin Ceftriaxone or cefotaxime and ceftazidime Cefepime Imipenem, meropenem, ertapenem or Doripenem Colistin Amoxicillin/clavulanate Piperacillin/tazobactam Gentamicin and amikacin
<i>Acinetobacter baumannii</i>	Tetracyclines Aminoglycosides Carbapenems  Polymyxins	Tigecycline or minocycline Gentamicin and amikacin Imipenem, meropenem, or doripenem Colistin
<i>Pseudomonas aeruginosa</i>	Penicillins/inhibitors Cephalosporins 3 <sup>rd</sup> and 4 <sup>th</sup> Carbapenems  Polymyxins	Piperacillin/tazobactam Ceftazidime and cefepime Imipenem, meropenem, or doripenem Colistin
<i>Enterococci-both faecalis and faecium</i>	Penicillins Glycopeptides Oxazolidinones Lipopeptides	Ampicillin Vancomycin/Teicoplanin Linezolid Daptomycin
<i>Candida</i>	Azoles  Echinocandin	Fluconazole Voriconazole Anidulafungin Miconazole Caspofungin

Data will be available on the NICD web site. Analysis and evaluation of reports is performed by NICD pathologists and epidemiologists.



In order to make informed decisions about antibiotic choices for empiric treatment protocols, and in order to monitor antibiotic resistance trends, it is important to be able to review antibiotic resistance rates for certain organisms / organism groups periodically. This appendix aims to describe the format such reports will take, as well as some of the limitations of the reporting, and the parameters that are used to generate the reports. This appendix is aimed primarily at clinicians and hospital managers who may be receiving and reviewing these reports. It is strongly recommended that these reports be analysed in conjunction with a microbiologist familiar with the laboratory where the testing had taken place.

## General principles

- Results will be expressed as % non susceptible.
- Only the first isolate of a given species per patient is included.
- If there are less than 30 isolates of a given species, the results will not be presented unless there are compelling reasons to do so. Any such data must be interpreted very carefully.
- Data should be presented at least annually. However, more frequent analyses may be necessary in certain situations. If more frequent analysis is performed, note must be taken of the recommendation that results should not be presented if <30 of a particular species are present.
- If possible, susceptibility testing data derived using different testing methodologies should not be combined. However, this is technically challenging from an IT perspective, as the method used to generate the result in the laboratory is not necessarily captured on the laboratory information system (LIS). The NHLS is working towards standardised testing methodology, which should resolve this issue. However, it is important to discuss the report with your local microbiology laboratory to determine if this may be an issue
- The antibiotics reported are those that are routinely tested and reported on all isolates, and that are appropriate for the species. This means that if some antibiotics are only tested on a selection of isolates (eg colistin which is only tested on multi-resistant *Pseudomonas aeruginosa*; or nitrofurantoin which is only tested on urinary tract isolates), these will not be included in the routine report, although it may be included in a special report.

A general example of the format would be:

Organism	Number	% Non Susceptible, 2016, XXX Hospital						
		AMIK	GENT	CIP	CTX	CTZ	IMP	SXT
<i>E. coli</i>	367	45	23	89	65	65	100	45
<i>K. pneumoniae</i>	234	78	65	67	38	38	99	59
<i>E. aerogenes</i>	123	88	79	78	45	48	100	48
<i>E. cloacae</i>	108	91	83	80	35	39	100	23
<i>Proteus spp</i>	201	100	89	95	88	88	100	51

A common query about these reports relates to why some agents are NOT reported for certain organisms. There are three main reasons for this:

1. The organism (or organism group) is intrinsically resistant, and the agent is not tested as it is of no clinical value. Examples would include vancomycin for Enterobacteriaceae; clindamycin for enterococci, cephalosporins for enterococci, macrolides for Enterobacteriaceae, ertapenem for *Pseudomonas* and *Acinetobacter* etc.
2. Susceptibility can be deduced from results of other agents. The commonest example is beta-lactam antibiotics and *S. aureus*. If *S. aureus* is susceptible to oxacillin, it is regarded as susceptible to most other beta lactams (except the penicillins); and conversely, *S. aureus* resistant to oxacillin (ie MRSA) is regarded as resistant to all currently available beta lactams. Hence only oxacillin (or cloxacillin) susceptibility is reported.
3. Susceptibility testing is not routinely performed since no standardised methodology or interpretive criteria exist. Common examples of this would be certain topical agents (such as flomazine, chlorhexidine; as well as ciprofloxacin or aminoglycosides against streptococci from eye swabs); certain non-fermentative Gram negative bacilli (eg *Stenotrophomonas*, *Burkholderia*).

## Limitations

The data does NOT provide an indication of infection rates, and should not be used as such. The only exception would be susceptibility data from blood cultures, where the data will (by definition) refer to clinically significant isolates; and the Blood stream infection (BSI) rates themselves may have clinical value (although BSI rates will be influenced by BC collection practices, among other things)

Due to the limitations of the Laboratory Information System it does not differentiate between hospital and community acquired infection rates.

Antibiotic Susceptibility Testing (AST) data can contribute to national, provincial and district guidelines, however the ability to use the data to drive empiric regimens at facility level may be limited. This can be avoided to a degree by analysing data from specific units (rather than the hospital as a whole); however this comes at the cost of reducing the number of isolates in the data.

The quality of routine data depends on appropriate specimen collection and use of diagnostic tests to guide treatment decisions. Standardization at national level for active participation of clinicians in microbiological diagnostics should be encouraging.

## Appendix C: Audit tool for AMS practices

Data element	Patient 1	Patient 2	Patient 3	Patient 4
Culture taken before antibiotic therapy started				
Documented indication for antibiotic				
Empiric therapy started as per guidelines				
Prompt effective antibiotic treatment				
Review of antibiotic with culture results occurred at day 3				
Review of antibiotic with culture results occurred at day 5				
Changes where documented – indicate what changes were made (stopping/de-escalation/substitution/addition of agents, change to oral)				
<b>TOTALS</b>				

Audit tool can be used in multiple wards for multiple number of patients

Scoring = Yes = 1, No = 0, unclear = NC

A constant sample should be performed per week. For example 20 files per week in order to calculate the rate per week.

## Appendix D – IPC and AMS intervention definitions

### AMS interventions

1. Formulary restrictions based on AMR and antimicrobial use  
The act of limiting the use of a list of medications (formulary) to specific practitioners. A closed formulary may limit drugs to specific physicians, patient care areas, or disease states via formulary restrictions.
2. Pre-authorisation is a type of formulary restriction whereby certain antimicrobials require authorisation by an infectious diseases specialist; medical microbiologist or designated senior physician prior to them being dispensed by the pharmacy or started
3. Stewardship teams and rounds involve a multidisciplinary team with expertise in antimicrobial use that perform prospective audits with direct intervention and feedback to the prescriber. This involves evaluating the appropriateness of prescriptions for antimicrobial agents, contacting the prescriber if the order is inappropriate, and recommending alternative therapy. Feedback to prescribers may be oral or written. The core of the team is usually a prescriber and pharmacist.
4. Sending of specimens for culture prior to commencement of antibiotics
5. Empiric treatment against the standard treatment guidelines - is antimicrobial therapy begun on the basis of clinical observations in anticipation/absence of evidence or further information on the causative organism and its antimicrobial susceptibility profile.
6. Documenting indication for antimicrobials - requires that the need for antimicrobial therapy is documented in the patient's notes
7. Change in antibiotic:
  - a. Stopping – discontinuation of the antibiotic
  - b. De-escalation – conversion from empiric broad spectrum to targeted narrow spectrum antimicrobial
  - c. Substitution – change in antimicrobial based on the culture and sensitivity result
  - d. Addition of agents
8. De-escalation of route - Iv to oral switch describes the practice of converting from intravenous to an effective oral formulation of antimicrobial
9. Batching of intravenous antimicrobials is where the antimicrobials are given together at a uniform time to ensure these medicines are administered to the patient at the correct frequency
10. Duration of therapy - review on day 3 of the need for antibiotic based on the culture results and day 5 of the need to discontinue the antimicrobial
11. Hang time is the time from prescription (be it by hand or as part of electronic prescribing) of an intravenous medication (in this case an antimicrobial), to the time of infusion of said medicine.
12. Surgical prophylaxis: This refers to the provision of an antibiotic prior to surgery to reduce the incidence of post-operative infection at the surgical site. Efficacy of surgical prophylaxis is affected by the choice of agent and timing of administration.

## **IPC interventions**

1. Hand hygiene compliance against the standards for cleaning of public areas and clinical areas as per the National Core Standards
2. Improved cleaning practice: This refers to cleaning practices in the health care facility as a whole, including public areas, clinical areas, theatre, pharmacy, etc. Cleaning practices include environmental cleaning, handling/processing of linen, sterilisation or disinfection of equipment, cleaning of blood and body fluid spills. These practices can be assessed against the National Core Standards
3. Isolation room cleaning practices: This would refer to all cleaning practices taking place in isolation rooms, and can also be assessed against the national core standards.
4. Screening of patients at high risk for antibiotic resistant bacteria: This can be interpreted quite broadly, but in the context of AMR will usually refer to screening of patients at high risk for specific bacteria/resistance profiles, such as MRSA and CRE. Screening practices will vary from institution to institution, and are informed by local epidemiology.
5. Isolation of infected patients: Patients with pathogens that are transmitted by specific mechanisms are isolated using one of three transmission based precautions – airborne, droplet and contact. Airborne precautions are used for patients with TB, measles and varicella. Droplet precautions are used for patients infected with organisms that are spread by large respiratory droplets, such as N. meningitidis, diphtheria, influenza, adenovirus, and pertussis. Contact precautions are used for patients infected with organisms spread by direct or indirect contact – including MDRO and Clostridium difficile.
6. Decolonisation: This is the process of active eradication of an organism that is colonising a patient or healthcare worker. For practical purposes, the only organism for which this is commonly performed is MRSA.
7. Isolation room cleaning practices against the standards for cleaning of public areas and clinical areas as per the National Core Standards (use of recommended disinfectants)
8. Isolation of infected patients against the standards for cleaning of public areas and clinical areas as per the National Core Standards
9. Functioning bedpan washer disinfectors on clinical ward areas
10. Appropriate decontamination and reprocessing of medical devices; no reuse of single use medical devices

## Appendix E – IPC and AMR National Core Standards

**R22.(1) The health establishment must minimize the risk of transmission of health care associated infections.**

**22.(2) (a)(i) The health establishment must ensure that health care personnel use standard precautions.**

2.4.2.1.1 There are comprehensive procedures covering standard precautions which includes the following:

2.4.2.1.1.1 Effective hand hygiene practices which includes the use of alcohol hand rub as per WHO recommendations and appropriate use of hand washing with appropriate Antimicrobial/antiseptic soap; and appropriate alcohol based hand rub (as applicable)

2.4.2.1.3 The IPC practitioner and unit managers or link nurses audit compliance with standards precautions on a monthly basis.

**22.(2) (a)(ii) The health establishment must ensure that health care personnel practice effective hand hygiene.**

2.4.2.3.1 A hand washing drive or campaign is held at least annually.

2.4.2.3.2 The IPC practitioner checks hand hygiene technique is followed by auditing all units on a monthly basis.

2.4.2.3.3 Quality Improvement initiatives to improve hand hygiene are implemented.

**R25.(1) The health establishment must ensure that the clinical service areas are kept hygienic and clean.**

### Criteria and measures

**25.(2)(ii) The health establishment must ensure that cleaning agents and equipment approved by the relevant authority is available for cleaning personnel.**

2.4.5.2.1 There is a list of approved disinfectants for use in environmental decontamination approved by the IPC forum for use in the facility and should include as a minimum:

2.4.5.2.1.1 Chlorine compounds – sodium hypochlorite

2.4.5.2.1.2 Gluteraldehyde 2% formulations

2.4.5.2.1.3 Alcohol cleaning agent

2.4.5.2.1.4 Wet polimer

2.4.5.2.1.5 Plain liquid soap or detergent such as dishwashing liquid or handy Andy

## **Clinical leadership and clinical risk**

**R16.(1)The health establishment must establish and maintain systems, structures and programmes to mitigate clinical risk and promote clinical leadership in order to safeguard the quality and safety of health care services.**

**(ii) Monitor and oversee interventions to improve the use of antimicrobials as part of an antimicrobial stewardship programme;**

1.1.1.1.1 The Antimicrobial Stewardship Committee is functional with terms of reference. The TOR's include:

1.1.1.1.1.1 The multidisciplinary membership

1.1.1.1.1.2 Roles and responsibilities and

1.1.1.1.1.3 Frequency of meetings

1.1.1.1.1.4 Purpose of the committee

1.1.1.1.1.5 Meetings occur as per frequency in terms of reference or pharmacist

2.3.1.6.11 Standardised protocols are in place for microbiological investigations of infectious disease including specimen submission before initiating empirical therapy

2.3.1.6.13 The health establishment conducts audits of antimicrobial use at least 6 monthly to monitor trends in prescribing

2.3.1.6.14 The audits have identified the commonest errors in antimicrobial prescribing and these are communicated to prescribing clinicians

2.3.1.6.15 The Antimicrobial Stewardship Committee provides updated annual antibiotic resistance and antimicrobial use data to all prescribing practitioners in the health establishment

2.3.1.6.17 The Clinical Management Group provides access to expert advice on antimicrobial therapy promptly and at point of care when necessary.

2.3.1.6.18 Audits on antimicrobial therapy show that there is an improvement in rational antimicrobial prescribing including hang time, de-escalation to narrow spectrum and oral route according to culture results

2.3.1.6.19 The annual in-service education and training plan includes training for all health care professionals on antimicrobial stewardship

2.3.1.6.2 There is a lead prescribing clinician with the responsibility of driving the antimicrobial stewardship programme in the health establishment or District

2.3.1.6.20 The Clinical Management Group ensures that records are kept which provide evidence of health care professionals being trained in antimicrobial stewardship through in-service training or continuing professional development

2.3.1.6.21 There is educational material available for prescribers and other healthcare professionals on antimicrobial use and prevention of resistance.

2.3.1.6.23 Annual audit of antimicrobial use both in terms of volume and cost occurs in the health establishment

2.3.1.6.3 The Antimicrobial Stewardship Committee has:

2.3.1.6.3.1 Documented goals towards antimicrobial stewardship

2.3.1.6.3.2 A plan of action to ensure the efficient functioning of the Antimicrobial Stewardship Programme

2.3.1.6.7 Evidence- based local guidelines for the diagnosis, prophylaxis and treatment of common infections have been drawn up by the health establishment based on national guidance or adopted from national essential drugs list and standard treatment (for tertiary hospitals only)

2.3.1.6.9 Appropriate antimicrobial protocols are in place for high risk patients/procedures for treating healthcare associated infections

## Reference list

1. National Department of Health, The Antimicrobial Resistance National Strategic Framework, 2014-2024; August 2014
2. FAO/OIE/WHO. Sharing responsibility and coordinating global activities to address health risks at the animal-human-ecosystem interfaces; a tripartite Concept Note, April 2010
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## **National Department of Health**

Switchboard: 012 395 8000

Physical address: Civitas Building  
Cnr Thabo Sehume and Struben Streets  
Pretoria

Postal Address: Private Bag X828  
Pretoria  
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