



AfricaCDC
Centres for Disease Control
and Prevention

REGIONAL CURRICULUM GUIDE FOR THE INTEGRATION OF ANTIMICROBIAL RESISTANCE AND INFECTION PREVENTION AND CONTROL IN PRE-SERVICE EDUCATION





FOREWORD

Antimicrobial resistance (AMR) is a growing global health threat that undermines the effectiveness of life-saving medicines and endangers human, animal, and environmental health. The increasing burden of drug-resistant infections calls for urgent and coordinated action, particularly in strengthening the knowledge and capacity and influencing behaviour change and practices of professionals working across the human, animal and environment sectors. Infection prevention and control (IPC) is equally critical in mitigating the spread of resistant pathogens and ensuring safe healthcare delivery.

The World Health Organization (WHO) Global Action Plan on AMR was adopted in 2015, calling for a multisectoral, One Health approach to combat AMR. One of its five strategic objectives emphasizes the importance of improving awareness and understanding of AMR through education and training. In line with this the Africa Union Framework Subsequently countries developed their National Action Plans on AMR aligned to this Global Action Plan.

Aligned with this global priority, this Regional Guide for the Integration of Antimicrobial Resistance and Infection Prevention and Control in Pre-Service Education serves as a critical tool in building a well-prepared health workforce. By embedding AMR and infection prevention and control (IPC) principles into pre-service education, this guide ensures that future health professionals—across human, animal, and environmental health sectors—are equipped with the necessary knowledge, skills, and attitudes to tackle AMR effectively.

This guide provides a structured and adaptable framework for integrating AMR and IPC into curricula for medical, veterinary, pharmacy, nursing, and other allied health professions. By fostering a workforce that understands antimicrobial stewardship, rational antimicrobial use, and robust IPC measures, we can strengthen health systems and contribute to the sustainable containment of AMR.

The development of this guide is the result of collaborative efforts among regional stakeholders, experts, and institutions committed to strengthening AMR and IPC education. We extend our sincere gratitude to all contributors for their dedication to this critical initiative.

It is our hope that this guide will inspire harmonized, evidence-based, and action-oriented learning that empowers the next generation of health professionals to be champions in the fight against AMR and advocates for robust infection prevention measures. As we move forward, we urge governments, academic institutions, regulatory bodies, and professional associations to adopt and implement this guide in their training programs.

Together, we can build a resilient health workforce and safeguard the future of antimicrobial effectiveness for generations to come.

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ACKNOWLEDGEMENTS

The development of this Curriculum Guide for AMR and IPC Integration in Pre-Service Education was made possible through the collaboration, dedication, and expertise of numerous individuals and organizations. The East Central and Southern African Health Community extends its deepest gratitude to all who contributed their time, knowledge, and insights to this important initiative.

We would also like to recognize the support of national health and education ministries and professional associations who emphasized the need for AMR and IPC training at the pre-service level. Their commitment to improving healthcare education has been crucial in developing this guide with a focus on real-world application and sustainability.

We would like to thank the members of the multi sectoral Communities of Practice on Antimicrobial Resistance and Infection Prevention and Control, whose expertise in antimicrobial resistance (AMR), infection prevention and control (IPC), education, and public health were invaluable in crafting a comprehensive, context specific and impactful guide. The contributions from the CoP in shaping the learning objectives, instructional strategies, and assessment methods have greatly enriched this resource were invaluable.

Our sincere gratitude to the global health organizations that provided guidance and essential resources, including the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), and Food and Agriculture Organization (FAO). Their research and toolkits on AMR and IPC served as vital foundations in designing curriculum content aligned with international standards.

Lastly, we are grateful to the World Bank through the AFE Health Emergency Preparedness, Response and Resilience MPA (P180127) Project, for the funding to take forward this work. Their support reinforces the global commitment to equipping future healthcare and veterinary professionals with the tools needed to fight AMR and protect public health.

Sincere appreciation to everyone involved in making this curriculum guide a reality. Your contributions will have a lasting impact on education, practice, and global health.





ABBREVIATIONS

AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
AST	Antimicrobial Susceptibility Testing
BCC	Behavior Change Communication
CDDEP	Center of Disease Dynamics, Economics & Policy
ECSA-HC	East, Central and Southern Africa Health Community
FAO	Food and Agriculture Organization
GAP	Global Action Plan
GLASS-AMU	Global Antimicrobial Resistance and Use Surveillance System
HAI	Healthcare Associated Infections
HOD	Head of Department
IPC	Infection Prevention and Control
IPM	Integrated Pest Management
LMICs	Low and Middle Income Countries
MDR	Multi Drug Resistant
NAP	National Action Plan
OH	One Health
PPE	Personal Protective Equipment
R&D	Research and Development
TRACCS	Tracking Antimicrobial Resistance Surveillance
WAAW	World Antimicrobial Awareness Week
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WOAH	World Organization for Animal Health





EXECUTIVE SUMMARY

The Curriculum Guide for AMR and IPC Integration in Pre-Service Education provides a comprehensive framework for integrating Antimicrobial Resistance (AMR) and Infection Prevention and Control (IPC) principles into the foundational training of healthcare, veterinary, and environmental science students. Recognizing AMR as an urgent global health crisis, this guide aligns with the World Health Organization's (WHO) Global Action Plan on AMR and adopts a One Health approach to address AMR across human, animal, and environmental health domains. The One Health Approach further recognizes that gender dynamics can significantly influence health outcomes, including management of AMR and IPC practices.

The Curriculum Guide for AMR/IPC Integration in Pre-Service Education is designed to equip students with the foundational knowledge, skills, and attitudes necessary to address Antimicrobial Resistance (AMR) and Infection Prevention and Control (IPC) whilst also understanding how gender roles affect healthcare access, education and decision-making. Advocating for embedding AMR and IPC principles into pre-service training, ensuring that graduates enter the workforce prepared to combat the rising rates of resistant infections and improve patient and animal health outcomes.

This guide adopts a One Health approach to AMR and IPC education, emphasizing the interconnected roles of human, animal, and environmental health whilst considering the impact of gender dynamics across the three sectors with an aim of fostering an interdisciplinary mindset among students, preparing them to collaborate across sectors and address AMR in a holistic manner.

Curriculum Structure and Key Components

The guide outlines a structured curriculum, that can be adopted based on context diversities, that includes both theoretical and practical components to ensure a comprehensive understanding of AMR and IPC. Key components include:





1. Foundational Knowledge: Core principles of AMR, IPC, and One Health, focusing on the biological, environmental, social factors and their gendered effects that contribute to AMR.
2. Practical Skills Development: Hands-on training in IPC practices, antimicrobial stewardship (AMS), and case-based learning for real-world application of AMR principles.
3. Interdisciplinary and Collaborative Learning: Modules designed to encourage cross-disciplinary collaboration, preparing students for teamwork in complex healthcare environments.
4. Evaluation and Assessment: Tools and metrics to assess student competencies in AMR and IPC, ensuring they meet global standards for responsible antimicrobial use and infection prevention.

Implementation Guidelines

The guide offers step-by-step instructions for implementing an integrated curriculum, adaptation to different educational and resource contexts. It also provides guidance on training faculty, assessing institutional readiness, and utilizing partnerships with health organizations for program support.

Expected Outcomes

The integration of AMR and IPC into pre-service education is anticipated to produce a workforce that is not only technically skilled but also motivated to advocate for responsible antimicrobial use and robust infection prevention practices. Ultimately, this curriculum guide supports the development of sustainable, system-wide AMR solutions that will have a lasting impact on public health and infection control at both national and global levels.



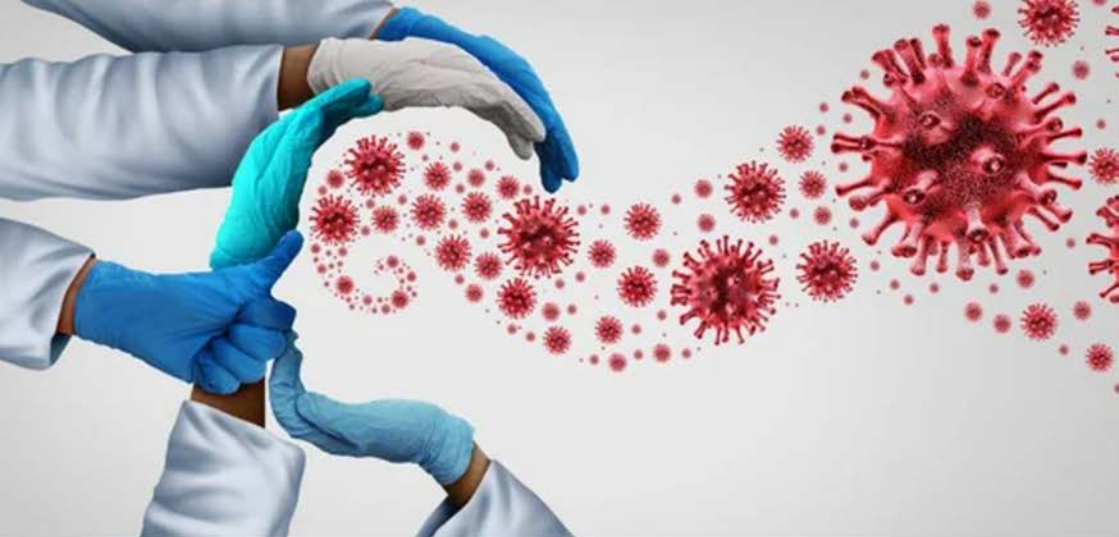


TABLE OF CONTENTS

FOREWORD	I
ACKNOWLEDGEMENT	II
ABBREVIATIONS	III
EXECUTIVE SUMMARY	IV
INTRODUCTION / BACKGROUND	01
PHASE 1: TRAINING OF TRAINERS AND EDUCATIONAL LEADERS	05
PHASE 2: IDENTIFYING KEY COMPETENCIES AND CONTENT IN AMR/IPC	09
PHASE 3: INTEGRATION OF AMR/ IPC INTO PRESERVICE HEALTH PROFESSIONALS EDUCATION	53
PHASE 4 IMPLEMENTATION OF INTEGRATED CURRICULUM	57
MONITORING & EVALUATION	58
ANNEX	59
REFERENCES	62



BACKGROUND

According to the Monitoring global progress on addressing antimicrobial resistance TRACSS report 2021, 75.6% of responding countries reported to offer at least some level of training on AMR for human health professionals, of which only 9.6% countries have systematically incorporated AMR into training curricula for these professionals. A concerted push needs to be made globally to incorporate AMR formally and systematically into the training curricula for all relevant human health cadres. The country reports from the 2023 self-assessment indicated that IPC, AMR and AMS are not mainstreamed into professional education and training for STP, Kenya and Ethiopia. The countries further indicated that there is a need to support the institutionalization of these three areas as a measure for long term and sustained education and awareness.

The integration of Infection Prevention and Control (IPC) and Antimicrobial Resistance (AMR) into pre-service curricula for healthcare and veterinary students is a crucial step toward addressing the global health crisis posed by AMR. This integration aims to equip future healthcare professionals with the knowledge, skills, and attitudes necessary to prevent infections, promote responsible antimicrobial use, and understand the complex, multifaceted nature of AMR.

AMR, driven by factors like overuse and misuse of antibiotics in both human and animal health, poses a severe threat to global health, food security, and economic development. The World Health Organization (WHO) and other global bodies recognize AMR as one of the top public health challenges, emphasizing the importance of educating healthcare professionals early on. Despite these recommendations, many healthcare curricula do not yet provide adequate training in AMR and IPC, leading to a knowledge gap in new practitioners entering the workforce.

The Training Needs Assessment conducted across 34 institutions in East, Central, and Southern Africa revealed significant gaps in pre-service education for Antimicrobial Resistance (AMR), Infection Prevention and Control (IPC), and Antimicrobial Stewardship (AMS). A total of 830 human health students, 89 animal health students, and 308 faculty members participated in the assessment. While 87% of students had heard of AMR, only 53% were familiar with IPC, and just 42% had been exposed to AMS in their training. Practical training was notably lacking—only 29% of students reported having participated in real-world AMR/IPC case studies, and fewer than 35% felt confident applying IPC measures. Among faculty, 68% expressed moderate to low confidence in teaching AMR/IPC content, citing outdated resources, inadequate training, and absence of national or institutional guidance.

Institutionally, only 41% of training institutions had integrated AMR or IPC into their core curriculum, and just 15% had formal mechanisms to track students' competencies in these areas. Despite these limitations, 91% of faculty indicated a willingness to update their teaching materials, and 85% of institutions showed readiness to adopt harmonized and competency-based training modules. The findings underscore the urgent need to develop updated, standardized curricula and to enhance faculty development. There is also strong support for policy reforms to empower institutions, invest in digital platforms for knowledge sharing, and build interprofessional One Health learning environments. Strengthening pre-service education through these interventions is essential to preparing a health workforce capable of addressing AMR threats in a resilient and sustainable manner.

Rationale

Integrating IPC and AMR into pre-service curricula ensures that future practitioners in medicine, nursing, pharmacy, veterinary medicine, and allied health fields are not only aware of the risks and drivers of AMR but also skilled in prevention practices and stewardship. The guide aims to equip future public health professionals with the knowledge, skills, and attitudes necessary to prevent infections and promote responsible





antimicrobial use from the beginning of their careers. This pro-active approach to early integration of AMR and IPC concepts into pre-service curriculum enables graduates to contribute effectively to national and global efforts in combating AMR. By establishing these competencies in pre-service education, institutions can help bridge critical gaps in AMR and IPC knowledge, particularly in low-resource settings where the impact of AMR is most profound.

This guide embodies the One Health approach, which recognizes the interconnectedness of human, animal, and environmental health, offers a holistic framework to address AMR by promoting cross-disciplinary collaboration and education (CDC, 2022). AMR is driven by a combination of factors across these domains, including the misuse of antimicrobials in human medicine, animal agriculture, and environmental contamination (WHO, 2015). Therefore, preparing healthcare, veterinary, and environmental science students with a foundation in AMR and IPC is critical to creating a workforce capable of addressing AMR on multiple fronts.

1. **Early Awareness, Professional Readiness and Behaviour Change:** Embedding AMR and IPC training into pre-service education ensures that future healthcare and veterinary professionals understand the importance of responsible antimicrobial use and effective infection prevention from the start of their careers. Studies indicate that early exposure to AMR concepts significantly improves practitioners' stewardship behaviors and reduces misuse of antimicrobials (Pulcini & Gyssens, 2013). By teaching IPC and AMR principles in an integrated manner, students are better prepared to implement these practices consistently in their professional settings.
2. **Promoting Interdisciplinary Collaboration:** AMR's complex nature requires collaboration across sectors. Training pre-service students within a One Health framework fosters an interdisciplinary mindset, allowing them to appreciate the roles of human, animal, and environmental health in the AMR crisis. This early foundation encourages future collaboration among professionals, addressing AMR at all levels and creating a coordinated effort against this public health threat (Dyar et al., 2018).
3. **Improving Infection Prevention Control and Biosecurity Practices:** Robust IPC practices in both human and animal healthcare are essential to curbing the spread of resistant infections. By educating students in IPC protocols, hygiene practices, and biosecurity measures, institutions can instill preventive habits that reduce infection transmission. Effective IPC has been shown to significantly decrease AMR rates in healthcare facilities and agricultural settings (Tacconelli et al., 2018). Teaching these measures as part of pre-service education equips graduates with the skills necessary to implement IPC as a routine aspect of care.
4. **Addressing the Growing Demand for AMR-Competent Workforce:** The United Nations Quadrupartite have called for increased training in AMR across all disciplines, emphasizing the urgent need for an AMR-competent workforce capable of implementing stewardship and IPC measures effectively (WHO, 2015). Integrating these topics into pre-service education aligns with these global recommendations and fills a critical gap, particularly in regions where AMR is rising rapidly.





5. Sustaining Long-term Change through Education: Addressing AMR is not a short-term endeavor; it requires sustained change in practice and policy. Pre-service education provides a foundational platform for instilling the values, attitudes, and practices of responsible antimicrobial use and infection prevention early in professional training. Graduates trained with a One Health perspective are more likely to uphold these practices throughout their careers.

THE APPROACH TO CURRICULUM DEVELOPMENT

Curriculum development is a systematic process of designing, implementing, and evaluating educational programmes to meet the needs of learners and society. Different approaches guide how curricula are structured, delivered, and assessed. Below are the key approaches to curriculum development:

1. Needs Assessment and Stakeholder Engagement
2. One Health Curriculum Framework Design
3. Content Development and Resource Compilation
4. Pilot Testing and Feedback Collection Across Sectors
5. Finalization and Dissemination
6. Monitoring, Evaluation, and Continuous Improvement from a One Health Perspective

THE PROCESS





Each phase in the development of this curriculum implementation guide is structured to promote a One Health-focused approach, equipping future professionals with the interdisciplinary knowledge and collaborative skills necessary to tackle AMR and IPC comprehensively. This phased approach not only enhances sector-specific competencies but also encourages a culture of cross-sectoral collaboration essential for safeguarding health at the human-animal-environment interface.

Objectives of Curriculum Guide

This curriculum guide should support educational institution to

1. Apply change management strategies in integration AMR and IPC into preservice curricula
2. Identify stakeholders for successful integration
3. Identify appropriate AMR and IPC content for the various cadres and levels of training
4. Identify effective pedagogical approaches to facilitate acquisition of competencies in AMR and IPC
5. Identify resources required for the implementation of new curriculum

PHASES OF IMPLEMENTATION OF THE CURRICULUM GUIDE

As future public health professionals play a key role in combating AMR and implementing effective IPC and biosecurity practices, embedding these topics in pre-service training is essential. To ensure that AMR and IPC education is both comprehensive and practical, a curriculum implementation guide is required.

Integrating a One Health perspective- which recognizes the interconnectedness of these health sectors- into pre-service training ensures that future healthcare, veterinary, and environmental professionals understand the broader implications of AMR and IPC and are equipped to collaborate effectively.

To achieve this, a curriculum implementation guide is necessary to embed One Health principles within AMR and IPC education for students in health-related fields. The implementation will involve 3 planned phases, each designed to build upon the previous one, incorporating leadership, stakeholder input, best practices, and contextual considerations at every step. The phases aim to ensure that the guide is relevant, adaptable, and aligned with local and global AMR and IPC pre-service education standards. This guide will provide a structured, evidence-based approach for educators and institutions, ensuring that students gain the knowledge, skills, and attitudes necessary to address AMR and IPC challenges effectively while fostering an interdisciplinary understanding of antimicrobial resistance and infection control practices.



PHASE 1: TRAINING OF TRAINERS AND EDUCATIONAL LEADERS

Integration of AMR and IPC into a preservice curriculum should begin with full support and agreement from the senior management of the training institutions, relevant regulatory agencies and technical leads of the various academic departments.

In Phase 1 of developing the **curriculum guide for pre-service training in AMR (Antimicrobial Resistance) and IPC (Infection Prevention and Control)**, the focus is on preparing **trainers and educational leaders** who will deliver and champion the curriculum in their respective institutions. This phase is foundational and lays the groundwork for successful and sustainable implementation as it ensures that educators are not only well-versed in the technical content of AMR and IPC but also equipped with the skills and pedagogical strategies necessary to effectively teach these topics to students. This phase helps establish a strong foundation that will enhance the overall impact of the curriculum on future healthcare professionals.

Objectives of Phase 1

The primary objectives of this phase are to:

Sensitize the stakeholders to create ownership of the process and implementation of IPC/AMR curriculum integration

Build Expertise in AMR and IPC Content: Ensure that trainers and educational leaders have an understanding of AMR and IPC, including current trends, the One Health approach, and evidence-based strategies;

Promote Interdisciplinary Understanding: Encourage a holistic, One Health perspective that integrates human, animal, and environmental health considerations into AMR and IPC training;

Establish Champions for AMR and IPC Education: Cultivate a network of knowledgeable trainers who are committed to promoting AMR and IPC practices within their institutions and broader professional communities.



Expected Outcomes of Phase 1

By the end of Phase 1, trainers and educational leaders are expected to:

- Have an understanding of AMR and IPC and the ability to convey this knowledge effectively.
- Be skilled in using interactive and student-centered teaching methods suited for AMR and IPC topics.
- Be committed to advocating for AMR and IPC best practices within their institutions and professional networks.
- Form part of a community of practice that fosters continuous learning, collaboration, and innovation in AMR and IPC education.
- Identify institutional champions who will spearhead integration of AMR and IPC into preservice education

Stakeholders and their roles

1. University leadership and tertiary colleges
 - Development of the curriculum
 - Implementation
 - Mobilize and allocate resources
 - Managing and leading change
 - Promoting multidisciplinary collaboration
 - Monitoring and evaluation
2. Relevant educational regulatory bodies
 - Review relevant policies and regulations to integrate IPC and AMR where applicable
 - Approval and accreditation of the curriculum



Table 1: Modules for sensitizing training of trainers and educational leaders on AMR and IPC

1.1	AMR and IPC in the context of Emerging and Reemerging infectious diseases	Ability to recognise AMR and IPC interventions against emerging and reemerging diseases	• Understand the importance of AMR and IPC in controlling emerging and reemerging infectious diseases • Understanding gender and equity dimensions in controlling emerging and reemerging infectious diseases	• Emerging and Re-emerging infectious diseases • Importance of effective implementation of AMR, IPC and Biosecurity interventions in prevention of infectious diseases • Gender and equity considerations in prevention and control of infectious diseases
1.2	Integrating AMR and IPC into Preservice Education	• Ability to appreciate gaps in the existing pre-service education • Ability to lead integration process Ability identify and foresee challenges and possible solutions	1. To understand the integration of AMR processes in preservice education 2. To understand the risk management process	• Benefits of AMR and IPC integration on healthcare safety, quality and service delivery • Findings from the training needs assessment • AMR curriculum integration process • Facilitating the process of Integrating AMR and IPC content into existing curriculum



1.3 AMR as a Global Health Challenge

- By the end of this sub-module the participants should recognize AMR as a public health problem that requires concerted effort from relevant stakeholders
- Ability to stay abreast with a current global trend in the context of IPC/AMR
- Explain the global trends of AMR
- To recognise AMR as a public health concern
- To create awareness on the current global trends on AMR
- To illustrate the benefit of AMR interventions
- Global trends of AMR
- Morbidity/ Mortality associated with AMR
- Drivers and Impact of AMR
- Global and regional coordinated efforts to combat AMR
- Safety and quality in service delivery

1.4 Managing and Leading Change

Ability to effectively manage and lead attitude change in the context of AMR/IPC

1. To enhance leadership skills
 2. To design and implement change strategies
 3. To monitor and evaluate the change initiatives
- To promote inter-disciplinary collaboration
- Change management principles
 - Leading change
 - Policy framework in the context of AMR/IPC
 - Monitoring and evaluation frameworks
 - Overview of One Health approach on IPC/AMR

1.5 What Next?

Assign Institutional Champions to drive change and implementation



PHASE 2: IDENTIFYING KEY COMPETENCIES AND CONTENT IN AMR AND IPC

In this phase, we aim to identify the essential AMR and IPC competencies and curriculum content to be incorporated into pre-service education across the human health, animal health, agriculture, and environmental sectors. This phase will focus on collaboration with academic leaders, subject matter experts, government representatives, and various stakeholders from public health, clinical, agricultural, and environmental backgrounds to define the knowledge, skills, and attitudes required to address AMR effectively.

By engaging a diverse array of experts and stakeholders, this phase will ensure that the identified competencies and curriculum content promote a One Health approach, fostering collaboration across sectors to combat AMR. These competencies will align with current global standards and national health policies, preparing graduates to play an active role in AMR prevention and management within their professional contexts. Through a holistic and well-rounded curriculum, we aim to empower the next generation of professionals to address AMR challenges and contribute to a sustainable future.

Objectives of Phase 2

1. To define and outline AMR, IPC, biosecurity and biosafety competencies appropriate for each cadre and level of training.
2. To select content relevant to each cadre and level of training.



Table 2: Stakeholders and their roles

1	University academic departmental heads	Provide insight into curriculum structure, ensure alignment with academic standards, and support integration of AMR content within existing programs.
2	Lecturers and educators from tertiary institutions	Facilitate curriculum design and identify appropriate learning objectives and methods for teaching AMR and IPC topics relevant to students' career paths.
3	One Health Experts	Promote an interdisciplinary approach to AMR by linking human, animal, and environmental health and ensuring that competencies reflect a holistic One Health perspective.
4	AMR and IPC subject matter specialists	Offer technical expertise on AMR mechanisms, prevention, and control measures, and help identify competencies that address core AMR and IPC concepts
5	Government ministries (e.g., Health, Agriculture, Environment)	Provide policy guidance, align curriculum with national AMR strategies, and ensure training prepares graduates to meet regulatory requirements.
6	Professional regulatory bodies (e.g., medical, veterinary, environmental, pharmaceutical)	Ensure curriculum content meets professional standards and competencies required for licensing and certification in relevant health professions.
7	Environmental scientists	Contribute knowledge on environmental factors influencing AMR, including waste management, pollution control, and the role of ecosystems in AMR transmission.





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| 8 | Veterinarians and animal health specialists | Address AMR in animal health, including antibiotic use in livestock, and help establish competencies in veterinary practices that reduce AMR spread. |
| 9 | Zoologists and wildlife experts | Provide insights on AMR in wildlife populations and the role of biodiversity and wildlife management in AMR transmission dynamics. |
| 10 | Agricultural officers | Contribute expertise on the use of antimicrobials in agriculture, pesticide regulation, and farming practices that minimize AMR risk. |
| 11 | Food safety experts | Ensure competencies include safe food handling, contamination control, and surveillance to prevent AMR in the food supply chain. |
| 12 | Infectious disease specialists | Offer clinical perspectives on AMR management, diagnosis, and treatment, and help develop competencies for AMR surveillance and patient care. |
| 13 | Microbiologists | Provide foundational knowledge on the microbiology of AMR, laboratory techniques, and diagnostics critical to AMR detection and control. |
| 14 | Epidemiologists | Guide competencies on AMR surveillance, data analysis, and outbreak investigation, essential for tracking AMR patterns. |
| 15 | IPC specialists | Define competencies for infection control practices, personal protective equipment (PPE) use, and effective IPC strategies across settings. |
| 16 | Pharmacists & Clinical pharmacists | Emphasize rational antimicrobial use, stewardship principles, and drug management to minimize AMR in healthcare settings. |
| 17 | Public health specialists | Support the integration of AMR into public health education, prevention, and policy frameworks, with a focus on community-level AMR awareness. |
| 18 | Health promoters and community health workers | Contribute to competencies on AMR education, awareness campaigns, and behavior change communication to reduce AMR in communities. |





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| 19 | Pharmaceutical industry representatives | Provide insights into drug development, antimicrobial stewardship initiatives, and the pharmaceutical sector's role in combating AMR. |
| 20 | International organizations and donor agencies (e.g., WHO, FAO, OIE) | Ensure alignment with global AMR standards and provide resources and support for curriculum development efforts. |

Modules

The following modules aim to provide a comprehensive foundation for addressing AMR through standardized education and training. To facilitate the standardization of the competencies and content across the region, the modules provided here have been adapted from the WHO Competency Framework for Health Workers' Education and Training on Antimicrobial Resistance, 2018. In addition, these modules are aligned with the World Organisation for Animal Health (WOAH) Guidelines for Veterinary Education Core Curriculum, 2013, ensuring a cohesive and interdisciplinary approach to AMR education across human health, animal health, agriculture, and the environment.



Table 3 : All learners (Human health, Animal health, Agriculture and Environment)

1	Introduction to AMR, IPC, biosecurity & biosafety	• Demonstrate foundational knowledge of AMR, its drivers, and the impact of AMR on animal and human health • Understand the roles of IPC, biosecurity, and biosafety in AMR mitigation • Recognize and apply strategies for AMR prevention, focusing on interdisciplinary approaches	• To introduce the concept of AMR • To highlight the importance of AMR prevention and the roles of IPC, biosecurity, and biosafety in combating AMR • To identify and explore key strategies for AMR mitigation and control	• Key concepts in AMR - Epidemiology of AMR, mechanisms of AMR, burden of AMR, drivers of AMR • Mitigation strategies for AMR - IPC, AMS, diagnostic stewardship, surveillance, awareness and advocacy, biosecurity & biosafety • Gender and equity - Gender considerations in AMR and IPC, biosecurity & biosafety interventions
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| 2 | One Health approach to AMR, IPC, biosecurity & biosafety | Applies a One Health approach to develop and implement strategies that prevent AMR and enhance IPC across various sectors | <ul style="list-style-type: none"> • To introduce the One Health concept and its relevance to IPC, biosecurity, biosafety, and AMR • To examine how the interconnectedness of humans, animals, agriculture and the environment contributes to the spread of infections and AMR • To identify effective AMR mitigation strategies across human health, animal health, agriculture and environmental sectors | <ul style="list-style-type: none"> • Introduction to the One Health concept • AMR prevention strategies across human, animal, and environmental sectors • IPC measures tailored to various settings, including healthcare, agricultural, and community contexts • Biosecurity and biosafety measures • Link between humans, animals and the environment in relation to the spread of infections |
| 3 | Awareness and advocacy on AMR, IPC, biosecurity & biosafety | <ul style="list-style-type: none"> • Promotes awareness and advocate for AMR, IPC, biosecurity, and biosafety prevention strategies among policymakers, opinion leaders, health professionals, and community members | <ul style="list-style-type: none"> • To introduce concepts of awareness creation, behaviour change communication (BCC), and advocacy as they relate to AMR, IPC, biosecurity, and biosafety | <ul style="list-style-type: none"> • Introduction to awareness creation and advocacy • Policy frameworks on AMR, IPC, biosecurity & biosafety • Behaviour change communication |



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- Develops and delivers effective public health messages and behaviour change communication (BCC) to drive awareness and advocate for AMR prevention
 - To equip learners with skills to promote awareness among professional colleagues and within the community
 - To develop targeted public health messages for use in BCC and awareness campaigns
 - To understand policy frameworks and how to leverage them in AMR and IPC advocacy efforts
 - Multidisciplinary collaboration
 - Public health messaging
 - Resource mobilization for awareness and advocacy


Table 4: Human health Sciences

Module 1: Foundations that build awareness of antimicrobial resistance

1	All healthcare workers	Knowledge: 1. Understand the development and main causes of AMR. 2. Understand the basic principles of infection prevention and control, i.e. hand hygiene to prevent transmission of infections. 3. Understand the impact of resistance on choice of antimicrobial therapy for treating infections. 4. Understand the morbidity, mortality and economic threat of AMR to human health. 5. Know the importance of optimizing use of antimicrobials in the human and animal sectors to prevent development of resistance.	1. To explain the fundamental causes of AMR, including its drivers across human, animal, and environmental health sectors. 2. To describe core IPC measures, including hand hygiene, and their role in limiting infection spread and AMR. 3. To discuss the clinical and economic impacts of AMR, with a focus on the burden of resistant infections on morbidity and mortality.	Introduction to AMR • Definitions of AMR, antimicrobial agents, and relevant terminology. • Mechanisms of resistance development in microbes (e.g., genetic mutations, selective pressure from overuse/misuse). • Drivers of AMR in healthcare, veterinary, and community settings, including misuse in both human and animal sectors. Infection prevention and control • Core IPC measures to prevent AMR spread, focusing on hand hygiene, sanitation, sterilization, and disinfection protocols. • Role of IPC in reducing healthcare-associated infections (HAIs) and supporting AMR containment. • Overview of global and local IPC policies, guidelines, and best practices for healthcare workers • Impact of AMR • Clinical consequences of AMR: limitations on treatment options, increased risk of morbidity and mortality, longer hospital stays, and higher healthcare costs. • Economic burden of AMR on healthcare systems, including resource allocation for treatment and containment measures.
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Skills:

1. Ability to interpret and communicate the use of appropriate policy guidelines on AMR.

Attitudes:

1. Promote awareness of AMR and appropriate antimicrobial use amongst all health care workers, patient communities and the general public.
2. Act to protect the effectiveness of antimicrobials as an ethical imperative and a public good.

4. To emphasize the ethical responsibilities and benefits of optimizing antimicrobial use in healthcare, both for treating infections and for AMR prevention.
5. To foster skills in interpreting policy guidelines on AMR and communicating them effectively to diverse audiences.

- Case studies or data on AMR prevalence and impact in different healthcare settings and communities.

Optimizing antimicrobial use

- Principles of responsible antimicrobial prescribing, including dosage, duration, and correct administration.
- Overview of antimicrobial stewardship (AMS) programs, including their goals, components, and the role of healthcare workers in stewardship.
- Importance of the One Health approach to coordinate antimicrobial use across human and animal health sectors.

Policy interpretation and communication skills

- Key policy documents and guidelines on AMR (e.g., WHO's Global Action Plan on AMR, national AMR action plans).
- Strategies for communicating AMR policies and guidelines to healthcare teams, patients, and the public.
- Methods for developing effective public health messages on AMR prevention and the rational use of antimicrobials.

Ethical and public health responsibilities

- The role of healthcare workers in promoting AMR awareness and educating patients on antimicrobial use.
- Ethical considerations in preserving antimicrobial efficacy for future generations.
- Advocacy and awareness-raising strategies to inform and engage the public in AMR prevention.





1.1 Prescribers

Knowledge:

- Understand the importance of antimicrobial choice, dosage, interval, duration, preparation and administration of antimicrobials.
- Know the principles of microbiology in identifying pathogens from clinical samples.
- Know the basic diagnostic role of the microbiology laboratory.
- Understand local AMR epidemiology, resistance and susceptibility patterns and use of guidelines.
- Patient counselling etiquettes, discussion techniques and psychology for patient communication.

1. To understand the essential aspects of antimicrobial prescribing, including choice, dosage, and duration for optimal treatment.
2. To interpret microbiological findings accurately for appropriate empiric or culture-based treatment.
3. To develop skills in patient communication, emphasizing the rationale for antimicrobial use and managing expectations around antibiotic prescriptions.

Principles of antimicrobial prescribing

- Criteria for selecting antimicrobials: drug choice, correct dosage, dosing intervals, preparation, and administration for effective treatment.
- Considerations for specific patient populations, such as immunocompromised individuals and those with specific comorbidities.
- Regulatory guidelines for prescribing, dispensing, and administering antimicrobial agents.

Microbiology and diagnostic principles

- Fundamentals of microbiology for identifying common pathogens and their susceptibility patterns.
- Basic understanding of laboratory diagnostics, including sample collection, pathogen identification, and interpretation of lab results.
- The role of AMR surveillance and local epidemiology in informing treatment decisions.



- Understand the principles of empiric, syndromic or culture-based treatment options in relation to the selection of antimicrobials.

Skills:

- Appropriate use of antimicrobials to treat and/or prevent common infections and syndromes.
- Ability to communicate with patients on the appropriate use of antibiotics.
- Ability to collect microbiology samples.

Attitudes:

- Promote a standard for the appropriate use of antimicrobials and manage patient expectations and demands especially when the use of antimicrobials is not indicated.

4. To emphasize the ethical responsibilities and benefits of optimizing antimicrobial use in healthcare, both for treating infections and for AMR prevention.

5. To foster skills in interpreting policy guidelines on AMR and communicating them effectively to diverse audiences.

Local AMR epidemiology and use of guidelines

- Overview of local and regional AMR patterns, including prevalent resistant pathogens and their susceptibility profiles.
- Application of treatment guidelines and the importance of adhering to empiric, syndromic, or culture-based protocols.
- Importance of the AWaRE classification of antibiotics and critical antibiotics for stewardship.

Patient communication techniques

- Best practices for counseling patients on the rational use of antimicrobials.
- Techniques for managing patient expectations and addressing demands for unnecessary antibiotics.
- Educational strategies for promoting awareness of AMR and the importance of adherence to prescribed treatment.

Empiric, syndromic, and culture-based treatment options

- Principles of empiric therapy based on common clinical presentations.
- Syndromic management protocols for primary care, especially in low-resource settings.
- Importance of culture-based treatment where feasible, with a focus on patient safety and treatment efficacy.

Attitudes and ethical considerations in AMR

- Ethical implications of antimicrobial misuse and the prescriber's role in stewardship.

- According to settings and where appropriate, encourage adherence to antimicrobial formulary/ protocol restrictions.
- Understand basic principles of behaviour change in the context of prescribing antimicrobials and model good prescribing behaviour to colleagues.

- Strategies for promoting judicious antimicrobial use as a public health responsibility.
- Frameworks for building patient trust in healthcare decisions and promoting AMR awareness.

Behaviour change and prescribing practice

- Basic principles of behaviour change, patient education, and modelling responsible prescribing.
- Encouraging behaviour change in patients and colleagues to promote appropriate antimicrobial use and set positive examples for the healthcare team.

1.2 Nurses

Knowledge:

- Understand the role of bedside nursing in antimicrobial stewardship programmes.

Skills:

- Assess the source of infection and identify appropriate measures.

1. To understand the essential aspects of antimicrobial prescription, including choice, dosage, and duration for optimal treatment.

Role of nursing in antimicrobial stewardship

- Overview of nurses' role in AMS as frontline healthcare providers.
- Strategies for supporting AMS programs at the bedside, including observing and reporting adverse drug reactions and monitoring antimicrobial effectiveness.

Infection source assessment and control measures

- Techniques for identifying infection sources and distinguishing between bacterial, viral, and other infections.
- Standard and enhanced infection control measures to prevent AMR transmission in healthcare settings, including hand hygiene and environmental sanitation

- Obtain allergy history, perform medication reconciliation, and record this in the medical record.

Attitudes:

- Contribute to a patient centred focus in the clinical team, and monitor and communicate daily patient progress.
- Contribute to public health literacy and general advocacy on the importance of infection prevention.

2. To interpret microbiological findings accurately for appropriate empiric or culture-based treatment.

3. To develop skills in patient communication, emphasizing the rationale for antimicrobial use and managing expectations around antibiotic prescriptions.

Medication reconciliation and allergy documentation

- Importance of gathering comprehensive allergy histories, especially concerning prior antimicrobial reactions.
- Steps in medication reconciliation to ensure safe and appropriate antimicrobial administration.
- Best practices for accurate and thorough documentation of medications, allergies, and any changes in treatment plans.

Patient-centred care and AMR awareness

- Methods for engaging with patients to communicate the importance of adherence to prescribed antimicrobials.
- Promoting understanding of AMR and educating patients on avoiding unnecessary antibiotic use.
- Collaborating with the healthcare team to review and discuss patient progress, focusing on treatment efficacy and potential modifications.

Public health advocacy and literacy on AMR and IPC

- Principles of public health advocacy in AMR and IPC, including community outreach and educational initiatives.
- Tools and resources for nurses to effectively educate patients and families about infection prevention.
- Encouraging responsible antimicrobial use and promoting hygiene practices that reduce AMR risk.



1.3 Pharmacists / Pharmacy technicians

Knowledge:

- Understand the significance of antimicrobial choice, dosage, duration and preparation in the treatment of infections.

Skills:

- Advise patients and prescribers on the appropriate use of antimicrobials.
- Practise safe disposal of unused antimicrobial medicines.

Attitudes:

- Advocate for patient safety and compliance in the prescription and use of antimicrobials in compliance with formulary protocols.
- Critically assess information and pharmaceutical products as part of good procurement practices.

1. To understand the impact of appropriate antimicrobial selection and dosing on patient outcomes and AMR prevention.
2. To communicate effectively with patients and prescribers on safe and effective antimicrobial use.
3. To promote safe disposal practices for unused antimicrobials and minimize environmental contamination.

Fundamental principles of antimicrobial pharmacotherapy

- Selection criteria, dosing strategies, duration of treatment, and preparation of antimicrobials.
- Aligning therapy choices with clinical needs and reducing AMR risk.

Patient counseling techniques on antimicrobial use

- Techniques for educating patients, explaining prescription details, and promoting adherence.
- Communicating side effects, duration of use, and the importance of completing the prescribed course.

Safe disposal practices for antimicrobials

- Procedures for disposing of expired or unused antimicrobials safely, environmental implications.
- Reducing environmental impact and ensuring antimicrobials are disposed of per regulatory guidelines.

Advocacy for patient safety and adherence to protocols

- Topics: Ensuring compliance with established protocols and ethical practices.
- Focus: Pharmacists' roles in safeguarding public health by following formulary and AMR prevention guidelines.

Evaluation and procurement of antimicrobial products

- Critical assessment of pharmaceutical information and product sourcing.
- Making evidence-based decisions in antimicrobial procurement to support stewardship programs.





1.4 Laboratory scientists/technicians

Knowledge:

- Understand the diagnostic role of the microbiology laboratory in detecting infections, resistance patterns, guiding patient management and informing AMR control strategies.

Skills:

- Collect and report data on antimicrobial product quality and sensitivity to national drug registration bodies.
- Advise prescribers on correct microbiological testing procedures.
- Ability to carry out bacterial isolation, identification, susceptibility testing and reporting.

1. To understand the role of the microbiology laboratory in the diagnosis and management of AMR.
2. To develop skills in conducting and interpreting diagnostic tests for AMR surveillance.
3. To promote adherence to laboratory and public health standards in AMR monitoring and control.

Role of the microbiology laboratory in AMR

- Diagnostic functions, resistance detection, patient management guidance, and AMR surveillance.
- Identifying infections, resistance trends, and integrating findings into patient care and public health strategies.

Data collection and reporting for AMR surveillance

- Data collection on antimicrobial quality and sensitivity, feedback to drug registration bodies.
- Contributing to national AMR surveillance by accurately recording and communicating resistance data.

Microbiological testing

procedures and best practices

- Proper sample collection, bacterial isolation techniques, identification methods, and susceptibility testing.
- Ensuring reliable laboratory processes that lead to accurate results and adherence to recommended guidelines.

Facility-specific and cumulative susceptibility reporting

- Creating facility-specific and cumulative resistance profiles, reporting protocols.
- Informing prescribers and public health authorities with relevant data for targeted AMR strategies.



- Provide facility-specific cumulative susceptibility reports for common bacterial pathogens against antibiotics that are recommended in the local or national guidelines.
 - Generate profiles of AMR for identified antimicrobial microorganisms for public health decision-making.
- Attitudes:
- 1. Advocate for and comply with laboratory and public health guidelines regarding antimicrobial susceptibility testing
1. To understand the impact of appropriate antimicrobial selection and dosing on patient outcomes and AMR prevention.
 2. To communicate effectively with patients and prescribers on safe and effective antimicrobial use.
 3. To promote safe disposal practices for unused antimicrobials and minimize environmental contamination.
- Developing AMR profiles and contribution to public health decisions
- Profiling antimicrobial resistance patterns, public health applications.
 - Generating AMR profiles that support informed decision-making and interventions.
- Advocacy for compliance with laboratory and public health standards
- Laboratory best practices, compliance with public health standards, and ethical responsibilities in AMR.
 - Emphasizing adherence to AMR containment guidelines and advocating for consistent lab practices.



1.5 Public health officers/ health services managers

Knowledge:

- Understand the use of quality improvement frameworks to address gaps in AMR education.
- Understand the potential for cost savings and health gains associated with effective infection control and appropriate antimicrobial use.
- Understand the roles and responsibilities of different stakeholders in antimicrobial stewardship teams. Members of the team could include, but are not limited to, the roles of physicians, pharmacists, infection preventionists, microbiologists, nurses and hospital administrators or others.

1. To understand quality improvement frameworks for addressing AMR education gaps in healthcare settings
2. To analyze the economic impact of infection control and appropriate antimicrobial use, including cost savings and health outcomes
3. To identify and coordinate roles and responsibilities within antimicrobial stewardship teams across health systems

Quality improvement frameworks for AMR education

- Overview of quality improvement models (e.g., Plan-Do-Study-Act, Six Sigma) and their applications in AMR education.
- Using frameworks to assess educational gaps, develop targeted interventions, and measure improvements in AMR knowledge and practices within healthcare teams.

Economic impact of effective infection control and antimicrobial use

- Cost-benefit analysis of IPC and AMS programs, health outcomes of effective AMR strategies, budget planning, and resource allocation.
- Economic and health impacts of infection control and AMS interventions, including how these can lead to cost savings for healthcare facilities and improve public health outcomes.



Skills:

- Ability to determine and implement best approaches to antimicrobial stewardship interventions on the basis of context.
- Ability to carry out resource allocation to implement and sustain antimicrobial stewardship programmes.
- Develop policy advocacy and enforcement to manage AMR programmes.

1. To understand the impact of appropriate antimicrobial selection and dosing on patient outcomes and AMR prevention.
2. To communicate effectively with patients and prescribers on safe and effective antimicrobial use.
3. To promote safe disposal practices for unused antimicrobials and minimize environmental contamination.

Roles and responsibilities within AMS teams

- Interdisciplinary roles in AMS (e.g., physicians, pharmacists, microbiologists, IPC specialists, hospital administrators), collaborative approaches to AMS, and coordination of AMS activities.
- Defining and organizing AMS teams, with emphasis on collaboration and communication to achieve sustainable AMR management.

Contextualizing AMS interventions for effective implementation

- Identifying best practices for AMS interventions based on healthcare setting, understanding barriers and facilitators to AMS implementation, and adapting interventions to local needs.
- Tailoring AMS strategies to different contexts, considering factors such as healthcare facility resources, patient demographics, and local AMR trends.

Attitudes:

- Promote AMR awareness at health system, hospital and community levels.
- Establish and enforce compliance with antimicrobial formulary/ protocol restrictions at local and national levels according to country policies.
- Together with civil society, advocate for the responsible development of new antimicrobials and ensure the correct promotion of existing ones.

1. To understand the role of the microbiology laboratory in the diagnosis and management of AMR.
2. To develop skills in conducting and interpreting diagnostic tests for AMR surveillance.
3. To promote adherence to laboratory and public health standards in AMR monitoring and control.

Resource allocation and policy development for AMS programs

- Budgeting and funding strategies for AMS, prioritizing AMS resources, policy development for AMR prevention, and advocacy for regulatory support.
- Supporting AMS initiatives through effective resource allocation, development of local/national AMR policies, and advocacy for AMS program sustainability.

Advocacy and compliance promotion in AMR prevention

- Strategies to promote AMR awareness at healthcare and community levels, compliance with antimicrobial formulary and protocols, advocacy for responsible antimicrobial development, and public engagement.
- Engaging civil society and healthcare professionals to promote responsible antimicrobial use, advocate for development of new antimicrobials, and ensure adherence to protocols at various health system levels.

Collaboration with civil society and the importance of public awareness

- Building partnerships with civil society, promoting AMR awareness campaigns, and encouraging community involvement in AMR prevention.
- Establishing a proactive role in AMR advocacy, working with communities to raise awareness, and promoting responsible use of antimicrobials as part of a broader public health approach.



Module 2: Infection prevention and control

2 All healthcare workers

Knowledge:

- Understands the infection chain especially the four components required for transmission of an infection: (organism, source, route of transmission and susceptible host).
- Understand the role of hand hygiene to prevent transmission of pathogens.
- Understand the principles of prevention of HAIs, including surgical site infections, catheter-associated bloodstream and urinary tract infections.

1. To understand the infection transmission chain and how it informs IPC practices
2. To implement effective hand hygiene practices and understand its role in preventing infection spread
3. To recognize the importance of HAI prevention and control strategies
4. To advocate and practice infection control and prevention methods at both community and facility levels
5. To understand the role of the microbiology lab in identifying infectious organisms and guiding treatment

The chain of infection and transmission pathways

- Overview of infection chain components (organism, source, route of transmission, susceptible host), conditions for transmission, and how IPC measures break this chain.
- Emphasis on identifying points in the chain where interventions can prevent infections and applying targeted IPC protocols.

Hand hygiene best practices

- WHO "5 Moments for Hand Hygiene," proper handwashing and hand sanitizing techniques, reducing the risk of pathogen spread.
- Skill-building in recognizing critical moments for hand hygiene and using appropriate techniques with soap, water, or alcohol-based solutions.

Preventing HAIs

- Types of HAIs (surgical site infections, catheter-associated bloodstream, and urinary tract infections), IPC protocols for preventing HAIs.
- Strategies for reducing HAIs, including catheter care, surgical site protocols, and monitoring infection control practices.



- Importance of strategies to prevent infection at community and health facility levels, e.g. water, sanitation and hygiene (WASH), waste management and immunization.
- Introduction to infectious diseases and role of the laboratory in identification of microbes and susceptibility

Skills:

Practise hand hygiene at the right moment and with appropriate technique, according to WHO

recommendations. Contribute to the design and implementation of procedures for crisis management in infection control: alert management, patient identification, recall of potentially contaminated equipment and supplies, reporting and exchange with relevant health care professionals.

1. To understand the role of the microbiology laboratory in the diagnosis and management of AMR.
2. To develop skills in conducting and interpreting diagnostic tests for AMR surveillance.
3. To promote adherence to laboratory and public health standards in AMR monitoring and control.

Infection prevention strategies at community and facility levels

- Water, sanitation, and hygiene (WASH), waste management practices, immunization programs (e.g., pneumococcus, rotavirus, Haemophilus influenzae type b).
- Focus: Understanding the role of WASH in infection prevention, strategies for managing healthcare waste, promoting vaccination, and IPC practices that benefit community health.

Introduction to infectious diseases and microbiology laboratory role

- Overview of infectious diseases common in healthcare settings, basic microbiology in pathogen identification, laboratory testing, and antimicrobial susceptibility interpretation.
- Developing familiarity with the laboratory's diagnostic role in infection management and how test results inform IPC and treatment decisions.

Implementing and practicing universal and transmission-based precautions

- Standard precautions (e.g., PPE, safe injection practices), transmission-based precautions (contact, droplet, airborne precautions).
- Hands-on training in the use of personal protective equipment (PPE), handling of infectious materials, and implementing additional precautions for specific pathogens.

- Importance of strategies to prevent infection at community and health facility levels, e.g. water, sanitation and hygiene (WASH), waste management and immunization.
- Introduction to infectious diseases and role of the laboratory in identification of microbes and susceptibility

Skills:

Practise hand hygiene at the right moment and with appropriate technique, according to WHO recommendations. Contribute to the design and implementation of procedures for crisis management in infection control: alert management, patient identification, recall of potentially contaminated equipment and supplies, reporting and exchange with relevant health care professionals.

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- Hands-on training in the use of personal protective equipment (PPE), handling of infectious materials, and implementing additional precautions for specific pathogens.

- Implement and practise universal precautions and transmission based precautions in healthcare.

Attitudes:

- Advocate and demonstrate action and accountability for the implementation of IPC and hygiene and sanitation best practices in health care facilities and community settings respectively.
- Advocate for WASH and for scaling up vaccines against common infections caused by microorganisms such as pneumococcus, rotavirus and Haemophilus influenzae type b.
- Understand how and when to contact the infection control professional for their facility or area.
- Promote proper health care waste management.
- Promote injection safety awareness and techniques

1. To understand the role of the microbiology laboratory in the diagnosis and management of AMR.

2. To develop skills in conducting and interpreting diagnostic tests for AMR surveillance.

3. To promote adherence to laboratory and public health standards in AMR monitoring and control.

Advocacy for IPC and hygiene standards in healthcare settings

- Importance of IPC protocols, promoting injection safety, engaging healthcare workers and patients in IPC practices, reporting breaches in IPC.
- Cultivating a culture of accountability and advocacy for IPC measures, educating colleagues and patients on the significance of IPC, and promoting safe practices like injection safety.

Crisis management in infection control

- Crisis response planning, management of infection control alerts, tracking and reporting infections, recalling contaminated items, and coordination among healthcare teams.
- Preparing healthcare workers to respond swiftly and effectively to infection control crises, ensuring patient safety, and minimizing infection spread during outbreaks.



2.1 Prescribers

Knowledge:

- Understand that prescribing antimicrobials to patients colonized with multidrug resistant (MDR) pathogens (e.g. MDR gram negative pathogens in urine or GIT), will not eradicate the pathogens and should therefore not be used as a preventive measure to stop transmission of the resistant pathogens to others.

Skills:

- Apply methods and strategies to prevent and control HAIs, including surgical site infections, catheter-associated bloodstream and urinary tract infections, health care-acquired pneumonia, gastroenteritis.

1. Understanding the limits of prescribing for MDR pathogens
2. Preventing and managing HAIs
3. Planning for cross-contamination prevention

Principles of antimicrobial use in MDR colonization

- Overview of MDR pathogens, common colonization sites, and mechanisms that make certain antimicrobials ineffective against these pathogens.
- Explanation of why antimicrobials should not be prescribed to decolonize patients with MDR pathogens for prevention purposes.
- Case studies on outcomes and challenges related to inappropriate antimicrobial use in MDR pathogen management.

Methods for preventing HAIs

- Infection control strategies for various HAIs, with emphasis on best practices in the management of surgical sites, catheters, and ventilators to prevent bloodstream, urinary tract, and pulmonary infections.
- Techniques for monitoring HAI risk factors and implementing strategies to mitigate these risks, including environmental cleaning, hand hygiene, and use of personal protective equipment.
- Protocols for identifying and managing local factors contributing to HAI risks, such as patient demographics, facility layout, and common microbial strains.



- Identify and manage the specific local factors responsible for increased risk of HAI and AMR according to practice settings.
- Implement a plan that is focused on limiting cross-infection and contamination to reduce HAI and AMR in hospitals and community settings.

Attitudes:

- Promote principles of HAI prevention and control.
- Encourage the decontamination and sterilization of hospital equipment and patient areas.

Developing and implementing an HAI prevention plan

- Components of an infection control plan, including risk assessment, identifying cross-contamination pathways, and targeted interventions to minimize infection spread.
- Training on decontamination, sterilization, and proper equipment handling to prevent HAIs.
- Guidelines for implementing the infection control plan in both inpatient and community settings, with an emphasis on maintaining hygiene practices and promoting AMR awareness among staff and patients.

Promoting HAI prevention and equipment sterilization principles

- Best practices for HAI prevention that prescribers can advocate within healthcare teams, focusing on continuous adherence to IPC protocols.
- Sterilization and decontamination of reusable equipment and high-contact areas to limit HAI and AMR transmission.
- Communication strategies to encourage adherence to HAI prevention practices among all healthcare staff and patients.



2.2 Nurses

Knowledge:

- Understand the role of nursing in IPC.

Skills:

- Monitor patient response and initiate appropriate changes in isolation precautions.
- Provide patients and families with evidence-based, accurate and non-judgmental information on the benefits and importance of immunization for health outcomes.

Attitudes:

- Promote hygiene best practices in health care facilities.
- Promote and monitor compliance with IPC and patient safety measures.

1. Understand the role of nurses in infection prevention and control

2. Monitor and adjust patient isolation and IPC measures based on patient response

3. Educate patients and families on immunization and infection prevention

4. Promote and enforce hygiene and patient safety practices

Introduction to IPC for nurses

- Overview of the role of nurses in IPC.
- Key IPC principles and how they apply to daily nursing practices.
- The impact of nursing actions on patient outcomes in relation to infection prevention.

Monitoring and managing patient isolation precautions

- Guidelines on recognizing infection risks and implementing appropriate isolation precautions (contact, droplet, airborne).
- Procedures for adjusting isolation measures based on patient progress and changing healthcare needs.
- Communication techniques for discussing isolation measures with patients and their families.

Patient and Family Education on Immunization and IPC

- Evidence-based benefits of immunization for common infectious diseases.
- Tools and strategies for providing clear and supportive information to patients and families.
- Addressing common myths and misconceptions about vaccines and infection prevention.

Hygiene best practices in healthcare settings

- Practical hygiene practices in nursing, including hand hygiene and proper use of PPE.





- Strategies for promoting a culture of compliance with hygiene and IPC measures among healthcare workers.
- Methods for monitoring and maintaining hygiene standards across different healthcare environments.

Compliance and accountability in IPC

- The nurse's role in enforcing and supporting IPC compliance within the healthcare team.
- Monitoring tools and checklists for IPC standards.
- Promoting accountability and fostering a culture of patient safety.





2.3 Pharmacists/ Pharmacy technicians

Knowledge:

- Understand the link between antimicrobial stewardship and IPC.
- Understands the difference and the impact of nosocomial infections compared with community-acquired infections.

Skills:

- Ability to follow pharmacy infection control guidelines.
- Use hygienic and safety practices to control cross transmission.
- Clean and disinfect equipment and surfaces.

Attitudes:

- Promote the link between antimicrobial stewardship and IPC.
- Encourage engagement with other health profession

1. Understand the importance of the link between AMS and IPC.

2. Understand the differences between HAIs and community-acquired infections and their impact on infection control

3. 3. Ability to follow pharmacy infection control guidelines

4. Use hygienic and safety practices to control cross-transmission

5. Clean and disinfect equipment and surfaces

6. Encourage engagement with other health professionals to reduce HAIs and AMR

Link Between AMS and IPC

- Overview of AMS) and IPC programs.
- Role of pharmacists and pharmacy technicians in ensuring optimal use of antimicrobials to prevent resistance and control infections.
- Strategies to integrate AMS practices with IPC protocols in both community and hospital settings.

Differences between HAIs and community-acquired infections and their impact on infection control

- Define HAIs vs. community-acquired infections.
- Types of pathogens commonly responsible for HAIs (e.g., *Clostridium difficile*, *Staphylococcus aureus*, and multidrug-resistant (MDR) organisms).
- Understand the increased risk of AMR associated with nosocomial infections and the role of pharmacy professionals in controlling this risk.
- Impact of community-acquired infections on treatment regimens and public health.
- Approaches to differentiate between nosocomial and community-acquired infections in pharmacy practice.
- Impact of infection site (e.g., bloodstream, surgical site, urinary tract) on infection control protocols and antimicrobial therapy choices.





Pharmacy infection control guidelines

- Review of national and international IPC guidelines, including those provided by the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC).
- Pharmacy-specific infection control protocols, including safe medication practices, proper storage and handling of antimicrobials, and infection control during drug dispensing.
- The role of pharmacists and pharmacy technicians in ensuring the safe use and handling of antimicrobials.
- Training on compliance with infection control guidelines in various pharmacy settings (e.g., retail, hospital pharmacy, long-term care facilities).





2.4 Laboratory scientists/technicians

Knowledge:

- Understand the role of the laboratory (i.e. identification of microbes, susceptibility testing, strain typing and timely communication of results) in enabling IPC measures.

Skills:

- Provide accurate and timely laboratory information, using clear protocols, for IPC planning and implementation, including in outbreak settings.
- Contribute to alignment of antimicrobial stewardship, diagnostic stewardship and IPC planning and implementation efforts.
- Practise appropriate IPC measures in the laboratory.

1. To understand the laboratory's role in identifying microbes, performing susceptibility testing, and conducting strain typing to support IPC measures.

2. To grasp the importance of timely and accurate communication of laboratory results for effective IPC implementation.

3. To develop the ability to deliver accurate and prompt laboratory data according to established protocols, particularly in response to outbreaks or IPC planning requirements.

Introduction to the Laboratory's Role in IPC

- Importance of microbial identification and susceptibility testing in guiding IPC strategies.
- Strain typing and its role in identifying infection sources, tracking outbreaks, and aiding containment efforts.
- The need for timely reporting and communication between laboratory staff, IPC teams, and clinical staff.

Data Collection and Reporting Protocols

- Procedures for reporting laboratory findings to IPC teams.
- Documentation standards for outbreak response.
- Adherence to turnaround times for effective clinical decision-making.

Integration with IPC and Antimicrobial Stewardship Programs

- Role of diagnostic stewardship in enhancing appropriate antimicrobial use.
- Aligning laboratory findings with IPC and antimicrobial policies.

IPC Practices in Laboratory Settings

- Safe handling of specimens, use of PPE, and protocols for cleaning and disinfection.
- Procedures for waste management and decontamination.
- Emergency response plans for exposure incidents and biohazard containment.



Attitudes:

- Promote the important role of the laboratory in IPC.

4. To collaborate effectively with antimicrobial stewardship and diagnostic stewardship initiatives to strengthen IPC planning and practices.

5. To practice essential IPC measures in laboratory settings, including disinfection, waste disposal, and personal protective equipment (PPE) use.

6. To advocate for and emphasize the critical role of laboratory support in enabling IPC measures within healthcare and community settings.

Developing Advocacy and Professional Accountability

- Importance of laboratory engagement in public health initiatives against healthcare-associated infections (HAIs).
- Encouraging team collaboration to raise awareness about the role of diagnostics in preventing AMR.
- Professional responsibility in upholding IPC standards, promoting a culture of safety, and contributing to overall patient and public health.

2.5 Public health officers/health services managers

Knowledge:

- Understand the relationships between patient safety, IPC, HAI and AMR.

Skills:

- Support the implementation of multi-modal strategies to achieve behavioural change in IPC practices including necessary resources, monitoring, audit and feedback.
 - Propose appropriate infection control measures for the management of waste, air, water, laundry and food.
 - Develop and update procedures related to decontamination and sterilization guidelines and standards.
1. To understand the relationships between patient safety, IPC, healthcare-associated infections (HAI), and antimicrobial resistance (AMR).
 2. To recognize the broader impact of HAIs and AMR on public health, patient outcomes, and healthcare costs.
 3. To support the implementation of effective IPC behavioural change strategies, utilizing monitoring, audit, feedback, and adequate resource allocation.
 4. To propose and oversee infection control measures for critical areas, including waste management, air and water quality, food handling, and laundry protocols.
 5. To develop and update decontamination and sterilization procedures in alignment with best practice guidelines and standards.

Introduction to IPC in Public Health Management

- Overview of the significance of IPC in protecting patient safety and preventing AMR.
- How HAIs contribute to AMR and affect patient outcomes, length of hospital stay, and healthcare costs.
- The role of public health officers and managers in shaping an effective IPC culture within healthcare organizations and at the community level.

Implementing Multi-Modal IPC Strategies Behavioural change models for IPC

- Techniques to implement IPC behaviour change strategies within healthcare facilities, including resource provision, ongoing monitoring, audits, and feedback loops.
- Training approaches for staff and healthcare teams to reinforce IPC protocols. Resource allocation and monitoring
- Budgeting and resource allocation to sustain IPC programs and monitor progress.
- Establishing metrics for success, such as reduction rates in HAIs and improvements in hand hygiene compliance.

Attitudes:

- Promote the importance of prevention and control of HAI and AMR.
- Highlight the human, economic and wider public health concerns of HAI and AMR. Use data to illustrate the problem and communicate it to decision makers and the affected communities.
- Take an active role in risk reduction during planning of renovations and new constructions in the healthcare organization.

6. To promote the importance of preventing and controlling HAIs and AMR as key components of healthcare safety and quality.
7. To communicate the human and economic implications of HAIs and AMR using data, emphasizing the urgency to decision-makers and community stakeholders.
8. To engage actively in risk assessment and IPC-focused planning during renovations or construction of new healthcare facilities.

Managing Infection Control in Healthcare Environments Waste, Air, Water, Laundry, and Food Safety

- Best practices in managing waste disposal, air and water quality, food preparation, and laundry services to prevent pathogen transmission.
- Procedures for compliance with environmental health and safety standards.

Decontamination and Sterilization Standards

- Key principles of sterilization and decontamination in healthcare facilities.
- Protocols for updating decontamination and sterilization procedures to meet evolving standards.

Data-Driven Communication and Public Health Advocacy Promoting IPC and AMR Awareness

- Using data and case studies to illustrate the severity of HAI and AMR impacts.
- Communicating effectively with healthcare leadership, policymakers, and communities to foster support for IPC initiatives.

Economic and Public Health Implications

- Demonstrating the economic and health costs associated with uncontrolled HAIs and AMR.
- Engaging with community groups and civil society to raise awareness of the importance of AMR prevention and control.



				• Risk Management in Facility Planning and Construction IPC in infrastructure planning • Risk reduction principles during planning phases for healthcare facility renovations or new construction
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7. To communicate the human and economic implications of HAIs and AMR using data, emphasizing the urgency to decision-makers and community stakeholders.
8. To engage actively in risk assessment and IPC-focused planning during renovations or construction of new healthcare facilities.

Managing Infection Control in Healthcare Environments Waste, Air, Water, Laundry, and Food Safety

- Best practices in managing waste disposal, air and water quality, food preparation, and laundry services to prevent pathogen transmission.
- Procedures for compliance with environmental health and safety standards.

Decontamination and Sterilization Standards

- Key principles of sterilization and decontamination in healthcare facilities.
- Protocols for updating decontamination and sterilization procedures to meet evolving standards.

Data-Driven Communication and Public Health Advocacy Promoting IPC and AMR Awareness

- Using data and case studies to illustrate the severity of HAI and AMR impacts.
- Communicating effectively with healthcare leadership, policymakers, and communities to foster support for IPC initiatives.

Economic and Public Health Implications

- Demonstrating the economic and health costs associated with uncontrolled HAIs and AMR.
- Engaging with community groups and civil society to raise awareness of the importance of AMR prevention and control.



Target learners

Animal health students

1	Introduction to AMR in animal health	- Understand the basic concepts of AMR and its relevance in animal health - Recognize the drivers and consequences of AMR in animal health and agriculture - Understand the One Health implications of AMR	- To define and describe AMR, including key terms and concepts - To identify the drivers of AMR specific to animal health - To explain the impact of AMR on public health, animal welfare, and food security	- Definition and basic concepts of AMR - Drivers of AMR in animal agriculture (e.g., misuse, overuse of antibiotics) - Consequences of AMR on animal and human health - One Health framework - link between animal, human, and environmental health
2	Responsible use of antimicrobials in veterinary medicine	- Apply principles for the judicious use of antimicrobials in veterinary settings - Understand regulations and guidelines for antimicrobial use in animals - Assess the risks and benefits of antimicrobial use in animal health	- To describe the guidelines for responsible antimicrobial use in animals - To understand the role of the veterinarian in AMS - To identify regulatory policies and practices governing antimicrobial use in animal health	- Principles of judicious use and AMS - Antimicrobial guidelines (e.g., WOAHA, FAO, and national guidelines) - Roles and responsibilities of veterinarians and farmers in antimicrobial use - Regulatory frameworks and policies





3	Antimicrobial stewardship programs in veterinary settings	• Develop strategies for implementing AMS in animal health • Demonstrate knowledge of AMS components • Monitor and evaluate antimicrobial use within veterinary practices	• To outline the core elements of an AMS program • To design protocols for monitoring and recording antimicrobial use • To evaluate the impact of AMS practices on AMR reduction	• Core components of veterinary AMS • Designing and implementing stewardship protocols • Data collection, monitoring, and evaluation of antimicrobial use • Case studies and examples of successful stewardship programs
4	Infection prevention and biosecurity in animal health	• Apply IPC measures in animal health facilities. • Implement biosecurity measures to prevent the spread of infections • Recognize the importance of IPC in reducing AMR transmission	• To identify infection control practices relevant to animal health • To establish biosecurity protocols for animal health facilities • To explain the role of IPC in preventing the spread of resistant pathogens	• Infection control practices - hygiene, sanitation, and isolation • Biosecurity measures for farms, veterinary clinics, and animal facilities • Linking biosecurity to AMR control • Practical exercises in IPC and biosecurity
5	Diagnostic stewardship in veterinary medicine	• Understand the principles of diagnostic stewardship in animal health • Utilize diagnostic tools to guide appropriate antimicrobial use • Interpret laboratory data to support clinical decision-making	• To explain the importance of diagnostic stewardship in controlling AMR • To demonstrate the use of diagnostic tests to inform treatment • To interpret diagnostic results for effective antimicrobial management	• Principles of diagnostic stewardship • Common diagnostic tests in animal health (e.g., culture, sensitivity tests) • Importance of laboratory testing before antimicrobial use • Case studies on diagnostic-based treatment decisions





6	Surveillance of AMR in animal health	- Recognize the importance of AMR surveillance in veterinary medicine - Understand how to collect and analyze AMR data in animal populations - Implement surveillance practices to monitor trends in AMR	- To explain AMR surveillance systems and their importance in animal health - To identify methods for data collection and analysis in AMR surveillance - To assess AMR trends and implement interventions based on data	- Overview of AMR surveillance systems (e.g., GLASS, WOAAH) - Methods for AMR data collection and sampling - Analysis and interpretation of AMR trends - Case examples of AMR surveillance in animal populations
7	Public health communication and education on AMR	- Communicate effectively about AMR to various stakeholders - Educate animal health professionals and clients on AMR prevention - Understand the role of community engagement in AMR mitigation	- To develop communication skills for AMR education - To design awareness campaigns for AMR in the animal sector - To foster community engagement and understanding of AMR issues	- Principles of health communication and community engagement - Creating AMR awareness materials for farmers, veterinarians, and the public - Community-based AMR education strategies - Case studies on successful AMR awareness campaigns
8	Regulatory and policy frameworks on AMR in animal health	- Understand the role of policies and regulations in AMR control - Apply knowledge of international and national AMR guidelines - Advocate for policy adherence and AMR prevention in animal health	- To outline international and national policies on AMR control - To explain how policies support responsible antimicrobial use in animal health - To identify methods for promoting adherence to AMR-related policies	- Overview of AMR-related policies (e.g., WOAAH, WHO, FAO) - National AMR action plans and regulatory frameworks - Advocating for policy implementation in animal health - Practical examples of policy impact on AMR control





Target learners

Agriculture/plant health students

1	Introduction to AMR in agriculture	• Demonstrate understanding of the causes and mechanisms of AMR in the agricultural environment • Explain the significance of AMR for plant health, environmental sustainability, and food safety	• To understand the basic principles of AMR, including how it develops and spreads in agricultural settings • To recognize the impact of AMR on crop production and broader environmental and food safety concerns	• Definition and overview of AMR. • Mechanisms and pathways of AMR development in agricultural systems. • Consequences of AMR on food production, food security, and the environment. • Case studies on AMR in plant pathogens and its effects on crop yield and quality
2	Sources and drivers of AMR in agriculture	• Identify primary sources of AMR in agricultural environments, including soil, water, and crop treatment methods. • Describe practices that contribute to AMR development and how they can be modified to reduce risk.	• To understand how agricultural practices, including the use of antimicrobials and fertilizers, contribute to AMR. • To evaluate common sources of AMR transmission within plant and soil health contexts.	• Agricultural practices that drive AMR, including use of pesticides, fertilizers, and other chemicals. • Role of contaminated water, soil, and crop inputs as sources of AMR. • Influence of monocropping, intensive farming, and poor waste management on AMR spread.





3	Antimicrobial stewardship in plant health	• Apply principles of AMS in agriculture. • Identify strategies for reducing antimicrobial use in crop protection without compromising plant health.	• To understand AMS practices in plant health. • To evaluate and implement alternatives to antimicrobial use in plant production systems.	• Principles of AMS and its application in agriculture. • Alternatives to antimicrobials, such as integrated pest management (IPM), crop rotation, and biological control. • Policies and guidelines for reducing antimicrobial use in agriculture (e.g., FAO guidelines on AMR)
4	Integrated pest management (IPM) for AMR prevention	• Demonstrate knowledge of IPM principles as they relate to AMR prevention. • Implement IPM techniques to control crop diseases and pests sustainably.	• To understand the role of IPM in reducing reliance on antimicrobials in agriculture. • To practice IPM strategies to prevent disease and pest resistance.	• IPM principles and components (biological, mechanical, cultural, and chemical controls). • Benefits of IPM in mitigating AMR risk in agriculture. • Case studies of successful IPM strategies in controlling resistant pathogens
5	Monitoring and surveillance of AMR in crop health	• Conduct surveillance for AMR in agricultural environments, including sampling, detection, and reporting. • Analyze AMR data for trends in resistance in plant pathogens.	• To understand methods for AMR detection and monitoring in crop health. • To develop skills in data collection and interpretation to inform AMR mitigation strategies.	• Techniques for sampling and testing plant pathogens for resistance. • Surveillance programs and databases for AMR monitoring in agriculture. • Data analysis for identifying and interpreting trends in AMR.





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| <p>6 Regulatory and policy frameworks for AMR in agriculture</p> | <ul style="list-style-type: none"> • Describe national and international policies on AMR in agriculture. • Implement regulatory guidelines in crop protection practices. | <p>7 Educating farmers and agricultural stakeholders on AMR</p> | <ul style="list-style-type: none"> • To understand the role of government policies in managing AMR risks in agriculture. • To apply regulatory guidelines to daily agricultural practices. | <ul style="list-style-type: none"> • Overview of national and international AMR policies (e.g., WHO, FAO, OIE guidelines). • Regulatory frameworks for antimicrobial use in crop production. • Legal and ethical responsibilities in managing AMR in agriculture. |
| | <ul style="list-style-type: none"> • Communicate AMR prevention strategies effectively to farmers and agricultural stakeholders. • Develop training programs on AMR awareness and best practices for crop health. | | <ul style="list-style-type: none"> • To gain skills in educating and engaging farmers on AMR issues and solutions. • To create practical training materials that promote best practices in AMR prevention. | <ul style="list-style-type: none"> • Techniques for farmer education and community engagement on AMR. • Designing AMR training programs for agricultural communities. • Resources and tools for raising AMR awareness and encouraging sustainable practices |





Target learners

Environmental studies students

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| 1 | Introduction to AMR and the environment | <ul style="list-style-type: none"> • Demonstrate foundational knowledge of AMR, its causes, and its environmental impact. • Understand the interconnections between environmental health, human health, and AMR. | <ul style="list-style-type: none"> • Describe how antimicrobials enter the environment through human, animal, and agricultural activities. • Explain the role of environmental factors in the development and spread of AMR. • Identify the impact of environmental AMR on public health and ecosystems. | <ul style="list-style-type: none"> • Overview of AMR: Definition, causes, and global impact • Environmental pathways for AMR (wastewater, soil, surface water) • The "One Health" approach and interconnections with AMR • Case studies on environmental AMR impact on human health |
| 2 | Sources and pathways of environmental contamination with antimicrobials | <ul style="list-style-type: none"> • Identify key sources and pathways of antimicrobials and resistant organisms in the environment. • Evaluate environmental contamination sources with a focus on agricultural, pharmaceutical, and urban wastewater. | <ul style="list-style-type: none"> • Assess the environmental impact of pharmaceutical and personal care products. • Describe the pathways by which antimicrobials enter soil, water, and ecosystems. • Evaluate policies for managing and reducing environmental contamination | <ul style="list-style-type: none"> • Key sources of environmental antimicrobial contamination (agriculture, aquaculture, healthcare facilities) • Environmental fate and transport of antimicrobials • Regulatory frameworks and best practices for waste and contamination management • Environmental monitoring of AMR and AMU (antimicrobial use) |





- 3 Surveillance and monitoring of AMR in the environment
 - Understand and apply the principles of AMR surveillance in environmental settings.
 - Analyze data related to AMR prevalence and trends in environmental samples.
 - Describe methods used for detecting AMR in soil, water, and wildlife.
 - Apply data analysis techniques to interpret environmental AMR trends.
 - Develop recommendations for improved environmental surveillance of AMR
 - Surveillance methods and sampling strategies for AMR in environmental matrices
 - Laboratory techniques for detection of resistant organisms and genes
 - Data interpretation and trend analysis
 - International standards and protocols for AMR environmental monitoring
- 4 Environmental management strategies for AMR mitigation
 - Identify strategies for minimizing the release of antimicrobials into the environment.
 - Propose sustainable environmental management practices to reduce AMR spread.
 - Recommend pollution prevention and waste management strategies to limit AMR spread.
 - Design environmentally sustainable solutions to manage antimicrobial use.
 - Integrate the One Health approach into environmental management plans for AMR mitigation.
 - Pollution control measures (e.g., wastewater treatment, containment of agricultural runoffs)
 - Antimicrobial disposal and recycling
 - Eco-friendly alternatives to antibiotics (e.g., biocontrol, natural antimicrobials)
 - Case studies on integrated AMR environmental management





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| 5 | Policy, advocacy, and public awareness on environmental AMR | <ul style="list-style-type: none">• Demonstrate knowledge of national and global policies addressing environmental AMR.• Engage in effective advocacy and public communication on AMR issues. | <ul style="list-style-type: none">• Describe key national and international policies on AMR and the environment.• Develop advocacy strategies to increase public awareness of environmental AMR.• Communicate effectively about the importance of environmental stewardship in AMR prevention. | <ul style="list-style-type: none">• National and international AMR action plans (e.g., WHO Global Action Plan, FAO guidelines)• Strategies for public awareness campaigns on environmental AMR• Policy development for environmental stewardship in AMR• Communication techniques and tools for environmental advocacy |
| 6 | Research methods in environmental AMR studies | <ul style="list-style-type: none">• Conduct research on AMR in environmental contexts using appropriate methodologies.• Analyze and interpret research findings related to environmental AMR. | <ul style="list-style-type: none">• Identify research methodologies applicable to AMR studies in the environment.• Apply qualitative and quantitative analysis methods to environmental AMR data.• Present research findings to stakeholders effectively. | <ul style="list-style-type: none">• Research design and methodology for environmental AMR studies• Data collection and analysis techniques• Case studies of successful environmental AMR research• Reporting and presenting AMR findings to varied audiences |



PHASE 3: INTEGRATION OF AMR AND IPC INTO PRESERVICE HEALTH PROFESSIONALS EDUCATION

The phase shall commence with identification of subject matter experts, lecturers and key stakeholders responsible for curriculum development, review and implementation. It is recommended that for each curriculum a participant who was involved in identification of key competencies and content is included.

Objectives of Phase 3

1. To determine the most effective approach to integrating AMR/ IPC into the preservice curriculum
2. To integrate the AMR/IPC, Biosecurity & Biosafety into the preservice curricula of various cadres and levels of training
3. To plan for implementation of curriculum following integration of AMR/ IPC

Integrating AMR /IPC into pre-service training curricula is essential to equip future professionals with the knowledge and skills needed to combat growing health challenges. The pre-service education lacks comprehensive and standardized training on these critical topics leading to gaps in knowledge, attitudes, and practices among newly qualified professionals. This lack of foundational training exacerbates the improper use of antimicrobials and inadequate infection prevention and control practices.

Phase 3 will begin with identification of a suitable integration approach followed by utilization of the selected approach to integrate AMR and IPC content into preservice curricula. Curriculum analysis and Training Needs Assessment reports are required prior to commencement of Phase 3 activities. It is recommended that Phase 3 be conducted as a 5-day face-face workshop where possible. Alternatively, a phased online meeting of at least ten 3-hour sessions should suffice. The reports should be provided to the attendees before the meetings.

Integration of content can be done for several curricula concurrently. It is recommended that for each curriculum, a team of 4 to 10 individuals are involved in the integration process depending on institutional requirements and stakeholders. Where integration of several curricula happen at the same time, a single workshop whether physical or virtual should not comprise more than 50 participants or 8 curricula.





The workshop should be led by a health professions educator involved in the training of health professionals and experienced in reviewing and updating curricula assisted by institutional AMR, IPC, One Health approach experts. Standardized powerpoint presentations and reference materials shall be used. They may be modified depending on the context and emerging realities.

Training institutions will be required to provide the official version of the curriculum or the syllabus for this exercise.

The AMR and IPC preservice curriculum integration summary form below shall be populated by each team leader and filed for future reference.

Name of Institution				
Name of Preservice program				
Total hours of integrated content				
Integration approach selected	<i>(Describe the approach that the team has selected)</i>			
Stage of training when various content will be covered and method of assessment	Content	Stage of training	Method of assessment	
Implementation plan	Activity	Start date	End date	Responsible person





3.1	AMR/IPC integration process	• Explain why it is necessary to integrate AMR/ IPC into existing pre-service curriculum • Review AMR/ IPC key competencies and content • Introduce curriculum integration models • Determine the cost of integrating AMR/IPC into the pre-service curriculum • Develop methods to evaluate the integration progress/process	• Participants should select a suitable model for integrating AMR/ IPC, Biosecurity & Biosafety into an existing curriculum	• Why Integrate • Curriculum Integration models • Considerations in the integration of emerging issues into curricula • Review of existing curriculum
3.2	One Health approach	• Identify roles of different sectors in AMR/ IPC, Biosecurity & Biosafety • Identify roles of different cadres in AMR/ IPC	Clearly defined roles of One Health sectors and cadres	Concept of One Health Approach
3.3	Curriculum structure	• Identify the components of the curriculum • Identify the levels of curriculum implementation • -Select appropriate pedagogical approaches for AMR/ IPC, Biosecurity & Biosafety	Understanding of pre-service curriculum	• Components of curriculum • Levels of Curriculum • pedagogical approaches for AMR/IPC, Biosecurity & Biosafety





3.4	Curriculum implementation support	Identify resources for smooth integration and implementation	Resources for implementation identified	- Infrastructure - Practical sites - Supplies and commodities - Teaching materials - Human Resource/Faculty - Time - Reference documents
3.5	AMR/IPC, Biosecurity & Biosafety integration into existing curriculum	To integrate AMR /IPC, Biosecurity & Biosafety into the existing curriculum	Draft curriculum integrated with AMR/ IPC, Biosecurity & Biosafety	- Existing curriculum - the content and competencies



PHASE 4 IMPLEMENTATION OF INTEGRATED CURRICULUM

4.1 Capacity Building for Curriculum Implementers

Training of faculty is necessary for effective curriculum implementation.

All staff involved in curriculum implementation should be sensitised on the changes in the curricula as a result of the integration.

Faculty involved in the training of AMR and IPC should be well versed with the content and recommended pedagogical strategies as well as the assessment methods.

Emphasis should be made on the need to identify the learning outcomes that are relevant for each cadre.

4.2 Access to AMR and IPC learning/ reference materials

Training institutions should provide access to materials that support further learning on AMR and IPC. Opportunities for Continuing Professional Development should be availed for faculty. E-learning platforms are useful for such access.

The Ministry of Agriculture, Environment and Health and Development partners involved in AMR and IPC work may have resources that training institutions can tap into.

4.3 Skills training for AMR and IPC

Acquisition of competency in AMR and IPC may require facilities for practical training for example microbiology laboratories and biomedical waste management systems. Adequate patient load is required for clinical skills. Access to relevant committees and stakeholders involved in AMR and IPC by students may be necessary as well as community engagement opportunities.

4.4 Assessment of AMR and IPC

Provision should be made for both formative and summative assessment in AMR and IPC. Suitable assessment methods should be selected for knowledge, skills and attitudes. Evidence of achievement of learning outcomes should be collected and documented according to institutional policies. Assessment feedback should be utilized to foster students' learning as well as instruction.

4.5 AMR and IPC events, workshops and meetings

Training institutions should encourage their staff and students to participate in AMR and IPC events, workshops and meetings. This can be achieved by including such activities in institutional plans and budgets.



MONITORING AND EVALUATION

Effectiveness of the integration of AMR and IPC into a pre-service curriculum should be assessed through institutional monitoring and evaluation mechanisms.



ANNEXES

Annex 1: Phase 2 Training Program - Identify Key Competencies and Content for AMR and IPC

Day	Time	Session	Responsible person
1	Morning	Registration, Climate setting, Introduction Official opening of the workshop	
	Mid-Morning	Country AMR/ IPC, biosecurity & biosafety strategy	
	Afternoon	Strategies to prevent AMR and promote IPC, biosecurity & biosafety.	
2	Morning	The role of training in preventing AMR and promoting IPC, biosecurity & biosafety. Findings of Training Needs Assessment	
	Mid-Morning	What is a curriculum? What is competency? What is curriculum content?	
	Afternoon	Identification of key competencies and content by cadre	
3	Morning	Plenary session to review identified competencies and content by cadre	
	Mid-Morning	Identification of key competencies and content by level of training by level of training	
	Afternoon	Plenary session to review identified competencies and content by level of training Faculty/ Departmental Action Plan	
4	Morning	Consolidation of key competencies and content by cadre and level of training	
	Mid-Morning	Preparation of Institutional work plans	
	Afternoon	Adoption of work plans Workshop closure	



Annex 2: Phase 3 training program

Day	Time	Session	Responsible person
1	Morning	Registration, Climate setting, introduction Official opening of the workshop	
		Overview of AMR/ IPC, Biosecurity & Biosafety	
	Mid-Morning	Review of key AMR/ IPC, Biosecurity & Biosafety competencies and content	
	Afternoon	Introduction to One Health Approach	
2	Morning	Overview of curriculum structure	
	Mid-Morning	AMR/ IPC, Biosecurity & Biosafety integration process	
	Afternoon	Plenary and experience sharing on integration of emerging issues into the curriculum	
3	Morning	Curriculum integration models Pedagogical approaches	
	Mid-Morning	Group work and plenary - Selection of an effective integration model and pedagogical approach	
	Afternoon	Resources for Curriculum Implementation. Group work and plenary- Identification of resources for curriculum implementation	
4	Morning	Group work- Integrating AMR/ IPC, Biosecurity & Biosafety into existing pre-service curriculum	
	Mid-Morning	Group work- Integrating AMR/ IPC, Biosecurity & Biosafety into existing pre-service curriculum	
	Afternoon	Plenary- Integrating AMR/ IPC into existing pre-service curriculum	
5	Morning	Consolidation of draft curriculum integrated with AMR/ IPC	
	Mid-Morning	Preparation of Institutional/ departmental work plans	
	Afternoon	Adoption of work plans Evaluation of workshop Workshop closure	





Annex 3: Activity tracker

Training/engagement
of Trainers and
Educational Leaders

1. Relevant stakeholders identified
2. Stakeholders sensitized on global burden and consequences of AMR and importance of IPC
3. Stakeholders sensitized on the process of integration of IPC/AMR curriculum
4. Institutional roadmap for integration of IPC/AMR in the existing pre-service curriculum

3 months





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<https://www.who.int/publications/i/item/9789240094123>



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