A CONCISE ANTIMICROBIAL RESISTANCE LEARNING FRAMEWORK FOR CHILDREN AND YOUNG PEOPLE

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GUIDE TO USING THIS RESOURCE

Throughout this resource we will refer to anti-microbial resistance as 'AMR'.

About this learning framework and who it is for

AMR is a growing concern for everyone. Solutions to face this emerging challenge will require ideas and actions from a wide range of people and significant changes in the way we use antimicrobial medicine to treat infections. Working with children and young people is essential to ensure that people will be able to treat and manage infections and consequently save lives in the future. A good understanding of AMR, its causes, effects and current strategies for mitigation is essential to enable people to engage meaningfully with the challenge and contribute to solutions. This learning framework is a resource for educators, health and research professionals to enable them to develop young peoples' understanding of:

The science behind AMR	**The individual, community and global health risks AMR presents**	**The positive actions they can take to mitigate against AMR**

This concise framework identifies key learning outcomes appropriate to different age groups that are applicable across a diverse range of settings and learning environments. It can be used as a tool for structuring curricula and learning activities. It is aimed at teachers, educators, research scientists and informal learning providers. Reference to associated curricula material for each age group, details on how to apply the framework, a glossary and links to other resources is outlined in the full version of the AMR Learning Framework.

Young AMR leaders and activists

Youth project members in Vietnam held a quiz for local children on the topic of bacteria and antibiotics

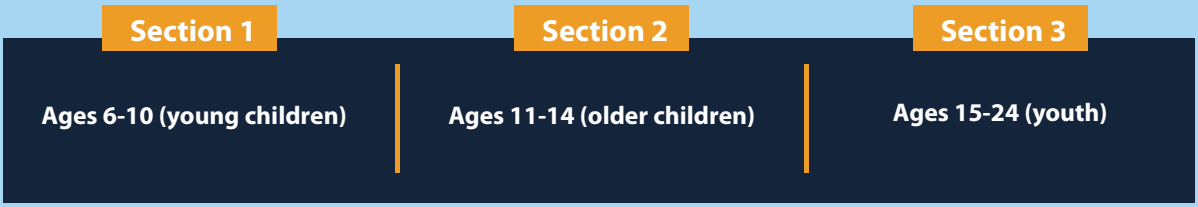
What is antimicrobial resistance and why it is an issue

Our collective overuse of antimicrobial drugs including antibiotics, antivirals and antifungal medicines, is causing one of the most urgent global health problems facing humanity in the 21st century. This overuse of antimicrobials in humans, animals and plants is accelerating the development and spread of drug-resistant infections. Infections become drug-resistant when the microbes that cause them, for example, bacteria, viruses and fungi, adapt and change over time, developing the ability to resist the drugs designed to kill them. One of the most common types of drug resistance is antibiotic resistance.

Drug resistant microbes challenge our ability to treat common infections which can result in longer illnesses, disability and death. Globally, at least 700,000 people currently die every year because of drug-resistant infections. Without action now, this is projected to rise to 10 million annual deaths by 2050. According to the WHO: "without effective antimicrobials for prevention and treatment of infections, medical procedures such as organ transplantation, cancer chemotherapy, diabetes management and major surgery (for example, caesarean sections or hip replacements) become very high-risk."

How the framework is structured

The learning outcomes are organised by age groups, following the UNICEF age categories (which are used for statistical and policy purposes):



Following the age-specific sections, we provide information about further resources to support learning activities and a glossary of terms. Each set of outcomes is then categorised as either cause and description of illness, or prevention and treatment of illness as below. This distinction outlines a logical progression from learning about the diseases to learning how to treat and prevent them.

How to use the learning framework

This framework has been developed to be widely applicable for use in formal and informal learning settings. New AMR-specific learning objectives have been developed for three age ranges: 6-10; 11-14; and 15-24. Levels of conceptual ability for each age group have been derived through an analysis of school curricula across four countries: Kenya, Nepal, Thailand and Vietnam. The learning framework is a linear progression of learning objectives from one age group to the next, with the objectives for the younger age groups providing a foundation for subsequent age groups.

The age-matched linear nature of this framework enables:

- Teachers and curriculum planners to integrate AMR learning objectives into existing science and biology curricula, or AMR extracurricular clubs
- Teachers and informal educators/researchers to be flexible in moving between age groups where required. For example, in an informal learning session with 15-year-olds who have never attended secondary school, learning objectives from the 11-14 age group may be appropriate, ascending to the higher age group as the facilitator feels possible.
- Age-appropriate learning objectives to be selected to suit age-specific audiences in informal learning settings.

1 Learning outcomes for ages 6 -10

AMR specific outcomes

1.1 Explain that people can get better from some illnesses/ infections (such as colds, flu, Chickenpox in children) without any treatment/medication.

1.2 Explain that some bugs/germs which cause illness can be killed by medicines (tablets, creams, medicinal syrup etc).

1.3 Understand that these medicines should only be taken under the guidance of someone with medical training (doctor or clinician or nurse) and/or following instructions on the medicine packet[1].

1.4 Understand that one should complete the 'course' of medicine as advised by the doctor, nurse or clinician or trained health worker, to kill all the germs.

1.5 Explain that a consequence of not following proper instructions (for example, not completing the course as instructed) that medicines may not be able to treat ill-health/infections in the future.

[1]In some countries, medicines are sold without their packaging and instruction leaflet. This practice is unrecommended and the best practice is to buy medicine in its approriate packaging and carefully follow the instructions given.

2 Learning Outcomes for ages 11-14

AMR specific learning outcomes

2.1 Specify that for some non-serious infectious illnesses (whether caused by bacteria or viruses), the body will recover from the illness without the need for medicine such as antibiotics.

2.2 Understand that most infections caused by bacteria can be treated by antibiotics (an example of one that cannot be treated with antibiotic is tetanus).

2.3 Understand that antivirals can be used to treat some viruses and antifungal medicines for fungal infections.

2.4 Understand that antibiotics cannot be used to treat illnesses caused by viruses and fungi.

2.5 Describe the correct/appropriate use of medicine to treat illnesses as follows:

- only take medicine for illnesses when instructed by trained health worker (doctor, nurse, clinician)
- one must complete the medicine as directed by trained health worker.

2.6 Specify that a consequence of not following a health worker's advice/instructions when taking medicines is that the medication may become less effective at treating diseases for everyone.

2.7 Explain that when a person becomes infected with some (but not all) microbes they can build protective immunity against future infection after exposure (for example, Chickenpox).

3 Learning outcomes for ages 15 - 24

AMR specific learning outcomes

3.1 Understand that medicine comprises a range of drugs which includes:

- Painkillers used to reduce pain (for example, paracetamol and Brufen*)
- Antimicrobial drugs which are specific to the type of microbe they treat:
- Antibiotics: specific antibiotics are used to treat specific bacterial diseases and amoebas, and they work through killing (or stopping the growth of) the bacteria or amoeba, for example, penicillin* can be used to treat bacterial ear infections
- Antivirals used to manage and treat viruses because they stop the growth of viruses in the body (for example ARV/ ART use with HIV*)
- Antifungal medicine such as clotrimazole, is used to treat fungal infections like thrush or athletes' foot or ringworm*)
- Antimalarial drugs (for example Coartem*) can be taken to treat malaria and they work by killing the malaria parasite.

3.2 Define 'antimicrobial resistance' as a microbe's ability to survive treatment with a specific medicine. Stress that microbes become resistant to drugs (neither drugs nor people become resistant)

3.3 Define resistant bacteria as bacteria which are not killed by antibiotics, and therefore can lead to infections which are harder to treat.

3.4 Explain the mechanism through which 'antibiotic resistance' develops and spreads:

- Specify that bacteria randomly mutate (or change) when they reproduce and occasionally mutations result in bacteria becoming resistant (being able to survive) to an antibiotic

Learning outcomes for ages 15 - 24

Prevention and treatment of illness cont'

- Specify that when bacteria are exposed to antibiotics, the growth of non-resistant bacteria is stopped, but the resistant bacteria continue to reproduce passing the ability to resist antibiotics to the next generation
- Explain that application of an antibiotic can put selection pressure on bacteria, driving the evolution of resistant bacteria. Selection pressures are external factors which affect an organism's ability to survive in that environment
- Specify that resistant bacteria can be passed on from person to person
- Define 'superbugs' (such as MRSA found commonly in hospitals), as bacteria (or other microbe) which are resistant to several antibiotics, and because of this they are hard to treat.
- Identify the names of some of the more common resistant organisms for each group of microbes, examples of bacteria contributing to the problem of drug resistance in hospitals and in the community include MRSA and *E.coli;* parasites such as plasmodium, which causes malaria, have also evolved drug resistance. Viruses can also evolve drug resistance such as HIV; as can fungi such as Candida *auris*.

3.5 Relate specific human treatment behaviours as favouring the generation of resistant bacteria:

- Understand that the use of antibiotics should always be taken under care and supervision of trained health worker.
- specify that antibiotics don't treat illnesses caused by viruses, but when inappropriately used in this way, bacteria are unnecessarily exposed to antibiotics and this can contribute to resistance
- specify that using antibiotics for non-bacterial infections and non-serious illnesses like colds, unnecessarily exposes bacteria in our body to antibiotics and this can contribute to resistance

Learning outcomes for ages 15 - 24

Prevention and treatment of illness cont'

3.6 Relate some agricultural practices as favouring the generation of resistant bacteria:

- Specify that antibiotics are sometimes used to protect farm animals from infection and to promote growth
- Specify that when, bacteria in animals are exposed to antibiotics, this can contribute to resistant bacteria multiplying, these bacteria can then be ingested by humans
- Specify that animals treating with antibiotics can lead to the development of resistant bacteria, which can in turn contaminate meat and spread to humans if consumed without good hygiene.

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How this learning framework has been developed

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You can find out more about this project here [www.youthagainstamr.com]


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