



# LeMSIC

Lebanese Medical Students'  
International Committee  
اللجنة الدولية لطببة الطب في لبنان

# LeMSIC Policy Document

## Antimicrobial Resistance

Proposed by: the National Public Health Officer and the Vice-President for External Affairs 2020-21

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## Policy Statement

### Introduction

Antimicrobial Resistance is a major threat for Lebanon's healthcare system. The increasing prevalence of resistant microorganisms might lead to a post-antibiotic era, where infections will predominate and health services delivery (including surgeries) will be impaired. AMR will also exert a heavy toll on the country's already-suffering economy.

### LeMSIC Position

LeMSIC believes that the ongoing increase in Antimicrobial Resistance is a threat to the future of healthcare in Lebanon as well as an impediment to the country's sustainable development. LeMSIC stresses the importance of fighting the acceleration of AMR, therefore reducing mortality and morbidity. LeMSIC firmly advocates for the coordination of multidisciplinary efforts through the lens of the One Health Approach to fight AMR, with a focus on the Youth being major players and beneficiaries in national AMR strategies.

### Calls to Action

#### The Government to:

1. Implement the National Action Plan issued by MoPH in 2019
2. Invest in AMR Control and Prevention through
  - a. Implement strict regulations on the distribution, dispensing, prescription, buying, and usage of antimicrobial agents
  - b. Monitor the supply chain of antimicrobials
  - c. Coordinate with pharmacies on controlling the usage of antimicrobials and spreading awareness on the danger of antimicrobial misuse
  - d. Coordinate with farmers to reduce the usage of antimicrobials in livestock and agriculture, as well as encouraging alternatives to antimicrobial use
  - e. Empowering and training veterinarians to fight the overuse of antimicrobials in agriculture
  - f. Improve surveillance of Anti-microbial use in agriculture
3. Coordinating with hospitals on the control and surveillance of nosocomial AMR.
  - a. Develop and implement national stewardship programs and provide training to healthcare professionals
  - b. Implement strict sanitation guidelines
  - c. Develop up-to-date, computerized AMR surveillance systems for hospitals and encourage reporting
4. Increase AMR education and awareness
  - a. Include AMR education in high school curricula
  - b. Collaborate with universities on including AMR control and surveillance training in the healthcare majors' curricula



The World Health Organization - Lebanon Office to

1. Coordinate with the FAO and OIE to fight AMR via the One Health Approach
2. Support the Lebanese government to implement the 2019 National Action Plan for AMR
3. Support implementing the Global Antimicrobial Resistance and Use Surveillance System (GLASS) in Lebanon
4. Empower the Lebanese youth to fight the spread of AMR

Medical Students to

1. Advocate to MoPH and the WHO on the importance of controlling AMR in Lebanon while focusing on Meaningful Youth Participation
2. Spread awareness to the Lebanese population, on campus, in their cities and villages, on social media, television, newspapers, and through every means available to them
3. Advocate for the inclusion of antimicrobial stewardship and AMR control in the medical curriculum

The Lebanese Order of Pharmacists and the Pharmaceutical Sector in Lebanon to

1. Encourage and empower Lebanese pharmacists to implement proper antimicrobial stewardship
2. To collaborate with MoPH on issuing new guidelines on antimicrobial dispensal and usage
3. To work with MoPH and the WHO on developing an AMR surveillance system for Lebanon
4. To encourage patient education on the danger of self-prescription
5. To provide healthcare workers with guidance on antimicrobial stewardship

Lebanese Veterinarians to

1. Work closely with farmers on reducing the usage of antibiotics
2. Encourage and promote vaccination for animals



## Position Paper

### Background

According to the World Health Organization (WHO), Antimicrobial Resistance is when bacteria, viruses, or fungi stop responding to antimicrobials, hence rendering the medicines ineffective and the infections more difficult to treat. [1]

In 2015, the World Health Assembly urged member countries to issue their National Action Plans (NAPs) on Antimicrobial Resistance World Health Organization, 2015). Lebanon's National Action Plan was drafted in 2019 by the Ministry of Public Health, through the National AMR committee. The NAP included five "axes": AMR Awareness, Surveillance, Infection Prevention and Control, Regulating Antibiotics use, and Budget Planning and Fund Attraction [2].

In 2018, MoPH issued Resolution No. 1570, prohibiting all antibiotics from being sold without prescription, and providing a list of antibiotics for which pharmacists have to keep the prescription.

Antimicrobial Resistance can spread by multiple ways. Antimicrobials' overuse, misuse, and self-prescription accelerate the microorganism's ability to change over time and become resistant to medication [3]. Misuse of antibiotics includes using antibiotics where they are not indicated (for example in a viral infection like the common cold or flu), using the wrong antibiotic, the wrong dose, and the wrong duration [4].

Self-prescription is rampant in Lebanon: one study in Beirut found that 42% of the participants were buying antibiotics without a prescription [5].

Misinformation is a main driver of antimicrobial misuse and self-prescription. In a 2017 study on Lebanese parent's knowledge on the use of antibiotics in upper respiratory tract infections, 33.9% of the respondents thought that antibiotics were useful against the common cold, and 20% considered that the dose can be reduced when the child gets better [6].

One Major culprit of antimicrobial resistance is the agricultural sector. A joint report by the European Centre for Disease Prevention and Control/European Food Safety Authority/European Medicines Agency (ECDC/EFSA/EMA) stated that antibiotic consumption in animals (152 mg/kg) was higher than in humans (124 mg/kg) [7]. The heavy consumption of antibiotics for preventing infections in livestock leads to the development of antimicrobial-resistant strains, eventually entering the food chain and affecting humans. In a nationwide study on poultry farms in Lebanon, 65% of strains isolated from poultry were found to bear genes conferring resistance to  $\beta$ -lactam antibiotics, such as penicillins [1].

## Discussion

### Lebanon's National Action Plan

In 2015, the resolution 68-7 of the World Health Assembly adopted the World Health Organization's Global Action Plan on Antimicrobial Resistance [1]. The Global Action Plan urged member countries to adopt their own National Action Plans on AMR. Consequently, the Lebanese Ministry of Public Health, through the National AMR committee, drafted the National Action Plan on AMR in March 2019. The NAP encouraged coordination of interdisciplinary efforts among physicians, pharmacists, dentists, healthcare workers, veterinarians, farmers, ecologists, and media specialists. Additionally, the NAP adopted by MoPH also envisioned collaborations between MoPH, the Ministry of Agriculture, and the WHO. Furthermore, the plan involved including AMR in the high school curriculum as well as in higher education. The National Action Plan was focused on five axes: AMR Awareness, Surveillance, Infection Prevention and Control, Regulating Antibiotics use, and Budget Planning and Fund Attraction [2].

### The role of healthcare workers

With rampant over-prescription, self-prescription, and the temptation to yield to patient pressure to prescribe antibiotics, the role of healthcare workers is central in safe prescribing, dispensing, and disposing of antibiotics.

Physicians ought to follow up-to-date information about identifying infections, to follow healthy antimicrobial stewardship practices, and to collaborate with Medical Laboratory Scientists in identifying the infectious agent as well as in assessing its susceptibility and resistance to different types of antibiotics. Nurses have an essential role in Antimicrobial Stewardship, Infection Prevention and Control, in addition to Patient Education and awareness [9]. Pharmacists are needed to develop and enforce guidelines on antimicrobial use, as well as in ensuring the proper preparation, storage, and disposal of antimicrobials [10].

Finally, the role of veterinary medicine is of utmost importance. Veterinarians are key in limiting antimicrobial use in livestock and agriculture, through scientifically-guided assessment of the need for antimicrobial use, applying best hygiene and antimicrobial stewardship measures, and educating clients on ways to minimize the use of antibiotics, such as vaccinating animals [11] [12].

### One Health

"One Health" is a public health program approach initiated by the WHO that aims to implement policies, means and legislations to improve antimicrobial stewardship programs. This approach should include interventions and monitoring of antimicrobial utilization and mechanisms for continued improvement of prescribing and utilization, and as well for the preservation of antimicrobial effectiveness for both humans and animals [13]. Among the different sectors and interests involved under the antimicrobial stewardship programs, one of the main sectors targeted is animal health and welfare. This sector is important as it contributes the most to the development of antimicrobial resistance. Through direct contact with animals or through consuming

the meat produced by farming animals, humans are prone to get infected by the antimicrobial resistance bacteria found in animals.

The use of antibiotics in the farming and meat industry is intended to increase the quality of food produced by increasing the mass and preventing bacterial infections. However, the use of antibiotics is given excessively, inappropriately and without any surveillance. In case of infection detected in a small portion of a group of animals, antibiotics are administered through feed or water for the entire group and at higher doses in order to prevent the spread of the infection, a term called metaphylaxis or mass administration at a group level [14]. As a result, the threat of developing further antibiotic resistance increases at alarming levels and gives way for bacteria to resist antibiotics and spread infections that are difficult to treat among farming animals.

In Lebanon, where the demand for meat is high in the general population, the overuse of antibiotics in the farming and meat industry to satisfy the requirements and need for meat has led to the development of antimicrobial resistance [15]. Although more epidemiological evidence is required, recent studies have suggested the development of antimicrobial resistance. A 2020 study suggests that 76% of minced beef samples in Lebanon taken in the study exceeded the microbiological criterion based on E. coli counts, despite the use of antibiotic therapies, which suggests the development of resistance across microbes and poses a threat of further infections [16]. The emergence and proliferation of multidrug resistant bacteria has been linked to the improper use of antibiotics in agricultural practices. In 2019, the ministry of public health in Lebanon has developed a national action plan for combating AMR [2]. The use of antibiotics in humans and animals should be structured and managed by policies and stewardship programs. Thus, the WHO has called for a global action plan that should be adopted in each country to ensure the controlled use of antibiotics as part of the One Health program, and accordingly each country would adopt a national action plan that matches its strengths and opportunities. In Lebanon, the national action plan against AMR consists of objectives distributed across 5 axes: awareness, surveillance, infection prevention and control, antibiotic use, and finally budget planning. For control on antibiotic use, specifically in agriculture, the plan included a ban on the importation and use of some agricultural machinery as well as surveillance on importation of regularly used antibiotics to the country. As much as this plan had strengths in awareness and surveillance mostly in lab training, the weaknesses prevailed as there was absence of long term technical and financial investment for implantation, collective planning as well as monitoring and budget plans

In veterinary medicine, the use of antibiotics significantly differs from that of food producing animals, as it is limited to clinical infections and individual animal basis administration. Thus, mass administration of antibiotics is non-existent in companion animals, and the threat of development of antimicrobial resistance from companion animals is very low compared to that in food producing animals [14].

Finally, Antimicrobial Resistance spreads environmentally through multiple pathways, including meta phylaxis manufacturing sites, municipal waste streams, untreated wastewater from households and hospitals, animal husbandry, wastewater treatment plants, sewage sludge and aquafarming. [17]

## AMR and economy

In light of the burden of the healthcare costs related to AMR, estimated between 300 billion and 1 trillion USD, the World Bank warned that the spread of AMR threatens to cause a global economic crisis by 2050, causing as much damage as the 2008 economic crisis. Low-income countries will be the most affected, accumulating losses exceeding 5% of their GDP. A global spread of AMR will also push around 28.3 million additional people, the majority of which live in low-income countries, into extreme poverty. Hence this will impair reaching SDG 1 (No Poverty), particularly target by 2030. AMR will also have a negative impact on world trade and global livestock production.

In Lebanon, AMR has caused an increase in hospital stays from 2.2. To 2.69 days, and an increase in additional hospital charges by 889 to 1807 \$ per patient [18].

## AMR during and after the pandemic

The emergence of COVID-19 has taken a drastic toll on the public health of individuals especially through inducing secondary bacterial infections with bacteria such as *Streptococcus pneumoniae* and *Haemophilus Influenza* that lead to complications and sometimes death. In addition, the COVID-19 severe inflammatory reaction and secondary bacterial infection symptoms have been difficult to differentiate. As a result, the use of broad-spectrum antibiotic therapy has been relied on to treat COVID-19 patients in case of possibility of developing bacterial infections. With worsening public health conditions and absence of vaccines, health care workers couldn't find a way to abide by antimicrobial stewardship policies which involve reducing antibiotic use [19]. The excessive use of antibiotics during the pandemic poses a threat on the future of combating antimicrobial resistance as it raises the possibility of developing new resistant bacterial strains. Along with the unclear and mysterious mechanisms through which the virus acts on the body, the development of secondary infections, and the misunderstanding of bacterial and viral infections, panic buying and excessive use of antibiotics has been reported in COVID19 infected people at an early stage in the pandemic, especially those that do not show symptoms of secondary bacterial infection. In Lebanon, the absence of proper surveillance and the ability to buy antibiotics without a doctor's prescription has highly contributed as well to the excessive use of antibiotics. This use can sometimes be considered not just ineffective, but also drives the spread of resistance against some of the most clinically important antibiotics [20].

With the development of vaccines one year after the beginning of the pandemic, the incidence of diseases arising from secondary bacterial infections is reduced, and thus the necessity of prescribing antibiotics is reduced. Several studies have proved the reduction of antibiotic prescriptions by up to 60% (2021). Thus, the development of vaccines is necessary for the protection against bacterial infections and in combating antimicrobial resistance. What remains is the call for further prospective monitoring of coinfections, new protocols for prevention, early detection and treatment of infectious complications to be followed and added to antimicrobial stewardship programs in the near future to help fight AMR, especially after the COVID-19 pandemic [21]. For example, calls for the re-evaluation of empirical prescription of antibiotics, i.e., prescribing antibiotics according to experience and not according to the specific situation of the patient, have been released as a way to minimize the excessive use



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of antibiotics. Further calls to abide by antimicrobial stewardship policies and minimize the unintended consequences of inadequate antimicrobial use have been made as well. Such approaches are necessary to be followed in pandemics as a way to minimize risks in all possible means.



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