MINSITRY OF HEALTH AND MEDICAL INDUSTRY OF TURKMENISTAN

STATE SANITARY & EPIDEMIOLOGICAL SERVICE

NATIONAL STRATEGY FOR CONTAINMENT OF ANTIMICROBIAL RESISTANCE IN TURKMENISTAN, 2017-2025

ASHGABAT 2017

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B U Ý R U K

"Türkmenistanda 2017-2025-nji ýyllar döwür ücin mikroblara garşy dermanlara durnuklylygyň döremegine garşy hereketleriň Milli strategiýasyny tassyklamak barada"

"Raýatlaryň Saglygyny goramak hakynda" Türkmenistanyň Kanunyny, "Türkmenistany ykdysady, syýasy we medeni taýdan ösdürmegiň 2020-nji ýyla çenli döwür üçin baş ugry" Milli maksatnamasyny we Türkmenistanyň Prezidentiniň "Saglyk" Döwlet maksatnamasyny durmuşa geçirmek, we saglygy goraýyş edaralarynyň barlaghanalarynda alynyp barylýan işleriniň hilini kämilleşdirmek, saglygy goraýyş edaralaryň işini döwrebap guramak maksady bilen,

T A S S Y K L A Ý A R Y N:

1. "Türkmenistanda 2017-2025-nji ýyllar döwür ücin mikroblara garşy dermanlara durnuklylygyň döremegine garşy hereketleriň Milli strategiýasyny (goşundy №1).
2. "Türkmenistanda 2017-2025-nji ýyllar döwür üçin mikroblara garşy dermanlara durnuklylygyň döremegine garşy hereketleriň Milli strategiýasyny durmuşa geçirmek boýunça çäreleriň Meýilnamasyny" (goşundy №2).
3. "Türkmenistanda 2017-2025-nji ýyllar döwür üçin mikroblara garşy dermanlara durnuklylygyň döremegine garşy hereketleriň Milli strategiýasyny durmuşa geçirmek boýunça çäreleriň ornaşdyrylmagyna monitoringi we baha berişi geçirmegiň Meýilnamasyny" (goşundy №3).

B U Ý U R Ý A R Y N:

1. Türkmenistanyň Saglygy goraýyş we derman senagaty Ministriň orunbasary T. Silliýewe:

1.1.Ýokarda tassyklanan “Mikroblara garşy dermanlara durnuklylygyň döremegine garşy hereketleriň Milli strategiýasyny” gyşarnyksyz ýerine ýetirilmegini üpjün etmeli.

2. Ähli Saglygy goraýyş edaralarynyň başlyklaryna, Döwlet arassaçylyk we keselleriň ýaýramagyna garşy göreşmek gullugynyň Jemgyýetçilik saglygy we iýmit merkeziniň başlygy A. Öwezowa, Aýratyn howply ýokanç keselleriň öňüni alyş merkeziniň başlygy K. Mawlanowa, Derman serişdelerini hasaba alyş we olaryň hiline döwlet gözegçiligi merkeziniň direktory Ö. Owwadowa, Baş dermanhana birleşiginiň direktory B.Meýmanowa, Ýokanç keselleri merkezleri müdirýetiniň Baş müdiri M.Mämmedowa, Halkara okuw-ylmy merkeziniň direktoryň orunbasary A. Seitmedowa, Türkmenistanyň Döwlet Lukmançylyk uniwersitetiniň rektory A. Orazalyýewa:

2.1. Ýurdumyzyň saglygy goraýyş ulgamynda ýokançlaryň derman serişdelerine durnuklylygy babatda saglygy goraýyş edaralaryň barlaghanalarynda alynyp barylýan işleriniň hilini kämilleşdirmegi we işe ornaşdyrylmagyny üpjün etmeli;

2.2. “Türkmenistanda 2017-2025-nji ýyllar döwür üçin mikroblara garşy dermanlara durnuklylygyň döremegine garşy hereketleriň Milli strategiýasyny durmuşa geçirmek boýunça çäreleriň Meýilnamasyny” durmuşa geçirilmeginiň gidişiniň seljermesini ara alyp maslahatlaşmak boýunça her 6 aýdan Milli işçi toparynyň yzygiderli mejlislerini geçirmegi üpjün etmeli.

3. Türkmenistanyň Saglygy goraýyş we derman senagaty ministrliginiň okuw mekdepleri, ylym we işgärler bölüminiň başlygynyň w.w.ýe.ýe B. Annaýewa:

3.1. Şu buýrugy Türkmenistanyň Saglygy goraýyş we derman senagaty ministrliginiň degişli edaralaryň ýolbaşçylarynyň dykgatyna ýetirmeli.

4. Şu buýrugyň ýerine ýetirilişine gözegçiligi Ministriň orunbasary T. Siliýewe tabşyrmaly.

Ministr **N. Amannepesow**

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Abbreviations and Acronyms

NS		National Strategy for Containment of Antimicrobial Resistance in Turkmenistan, 2017-2025
PA		Plan of Action for implementation of the National Strategy for Containment of Antimicrobial Resistance, 2017-2025
AMR		Antimicrobial Resistance
AMA		Antimicrobial agents
AST		Antimicrobial Susceptibility Test
AMC		Antimicrobial Medicines Consumption network
SofAMR		Spread of antimicrobial resistance
MoH&MIT		Ministry of Health and Medical Industry of Turkmenistan
SSES		State Sanitary & Epidemiological Service
SES		Sanitary & Epidemiological Service
TSMU		Turkmen State Medical University
SRC		State Center for Registration and Control of Medical Drugs, Medical Supplies, Equipment and Disinfectants
ICC		Infection Control Committee
HF		Health Facility
CPEDI		Center for Prevention of Especially Dangerous Infections
PHNC		Public Health and Nutrition Center
WHA		World Health Assembly
WHO		World Health Organization
WHO/Europe		WHO Regional Office for Europe
ESAC-Net		European Network on Epidemiological Surveillance for AMR
ECDC		European Center for Disease Prevention and Control
CAESAR		Network on Epidemiological Surveillance for AMR in the countries of Central Asia and Eastern Europe
ESCMID		European Society of Clinical Microbiology and Infectious Diseases
RIVM		National Institute of Public Health and Environment of Netherlands
PHC		Primary Health Care
NEDLT		National Essential Drugs List of Turkmenistan
NDRT		National Drug Register of Turkmenistan
TB Service		Tuberculosis Prevention and Treatment Service
CBD		Capacity Building Department for Health Practitioners
TB		Tuberculosis
MDR TB		Multidrug Resistant Tuberculosis
ES		(State) Epidemiological Surveillance

IPE (PPE)		Individual Protection Equipment (Personal Protective Equipment
CP		Clinical protocols on rational use of antibiotics for treatment of common infections in out-patient and hospital care
SNL		Supranational Laboratory
AMR NWG		National AMR Working Group
EUCAST		European Committee for Antimicrobial Susceptibility Testing
GLASS		Global Antimicrobial Surveillance System
HIC		MoH&MIT Health Information Center
SVS MoA		State Veterinary Service of the Ministry of Agriculture of Turkmenistan
XDR-TB		Extensively drug-resistant Tuberculosis
M&E		Monitoring & Evaluation
TRI (HAI)		Treatment Related Infection (Healthcare-associated infection)
UNICEF		United Nations Children's Fund
FAO		Food and agriculture organization
OIE		World Organization for Animal Health (*Office International des Epizooties*

NATIONAL STRATEGY FOR CONTAINMENT OF ANTIMICROBIAL RESISTANCE IN TURKMENISTAN, 2017-2025

Section 1. INTRODUCTION

Current Situation and Main Challenges

Spread of resistance to antimicrobial agents (AMR)[1] does not know national borders and has reached dimensions, which require immediate actions at the national, regional and global levels.

Antibiotic resistance is a natural biological response to improper use of antimicrobial agents (AMA); increasing number of essential drugs, which become ineffective, contributing to selection, survival and replication of resistant strains of microorganisms. When chosen antimicrobials prove to be ineffective, the second- or third-line drugs need to be used although in the majority of cases these drugs are more expensive, less safe and not always available.

Infections caused by resistant strains are more protracted; more often, they require hospitalization and longer stay in the hospital, and produce worse prognosis for the patients. All of these increase both direct and indirect costs, as well as the risks of development and spread of resistant strains in communities. Antibiotic resistance affects both industrially developed and developing countries and makes an enormous social and economic impact on the societies. In developed countries, it is considered a threat to the national security.

World Health Assembly Resolution (WHA) of 1998 urges country-members: to develop measures promoting prudent and cost efficient use of antibacterials; to prohibit the dispensing of antimicrobials without the prescription of a qualified health care professional; to improve practices to prevent the spread of infection and thereby the spread of resistant pathogens; to strengthen legislation to prevent the manufacture, sale and distribution of counterfeit antimicrobial agents and the sale of antibiotics on the informal market; to take measures to encourage the reduced use of antimicrobials in food-animal production. Countries also urged to encourage the development of sustainable systems to detect antimicrobial-resistant pathogens; monitor volumes and patterns of use of antimicrobial preparations and results of control efforts.

In September 2011, all 53 countries in the WHO European Region approved the European Strategic Action Plan on Antimicrobial Resistance[2]. In May 2015, at the sixty-eighth session of the World Health Assembly, in resolution WHA68.7 a global plan of action for combating antimicrobial resistance (A68 / 20) was approved[3]. The global awareness of the serious threat of the development of AMR continues to grow, and the number of countries actively participating in control of AMR is increasing worldwide. Taking into account the far-reaching consequences of AMR and the urgent need to strengthen the response of many sectors and society as a whole, the fourth health issue discussed at the United Nations General Assembly on September 21, 2016, was devoted to the problem of AMR. The result was a political declaration urging all countries and stakeholders to accelerate and strengthen the response to the development of SCP and to promote the implementation of a global plan of action to combat SCP.

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[1] *Antimicrobial resistance refers to the loss of effectiveness of any anti-infective medicine, including antiviral, antifungal, antibacterial and antiparasitic medicines. Antibiotic resistance refers only to resistance to medicines in bacteria.*

[2] European strategic action plan on antibiotic resistance
http://www.euro.who.int/__data/assets/pdf_file/0008/147734/wd14E_AntibioticResistance_111380.pdf

[3] Global action plan on Antimicrobial resistance
http://apps.who.int/iris/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1

Global WHO Action Plan for Containment of Antimicrobial Resistance refers to this challenge. It promotes an algorithm of interventions for slowing down and decreasing the spread of antimicrobial resistance through:
- decrease of morbidity rate and spread of infections;
- improvement of access to appropriate antimicrobials;
- improvement of use of antimicrobial drugs;
- health systems strengthening, improving these systems' monitoring capacity;
- strengthening of legislative and regulatory base;
- support of development of appropriate new medicines and vaccines.

Based on these considerations the necessity to urge Member-States to undertake immediate actions at the national, regional and local levels to contain antimicrobial resistance , including:

- to develop or strengthen national plans and strategies and international collaboration for the containment of antimicrobial resistance;
- to take urgent action to strengthen infection prevention and control, by means that include application of basic hygiene measures;
- to mobilize human and financial resources in order to implement plans and strategies to strengthen the containment of antimicrobial resistance;
- to strengthen overall pharmaceutical management systems, including regulatory systems and supply chain mechanisms, and, where appropriate, laboratory infrastructure, with a view to ensuring access to and availability of effective antimicrobial agents, taking into account financial and other incentives that might have a negative impact on policies for prescribing and dispensing;
- to monitor the extent of antimicrobial resistance and monitor regularly the use of antibiotics in all relevant sectors, in particular health and agriculture, including animal husbandry, and to share such information so national, regional and global trends can be detected and monitored;
- to improve among all relevant care providers, the public and other sectors and stakeholders awareness of (i) the threat posed by antimicrobial resistance, (ii) the need for responsible use of antibiotics and (iii) the importance of infection prevention and control measures.

In the WHO European Region,[4] development of antibiotic resistance makes treatment of a broad range of common infections, such as sepsis due to bloodstream infections, respiratory and urinary infections, sexually transmitted infections, and food-borne and water-borne infections, more difficult both in in-patient and out-patient settings. In addition to that, multiple drug resistance becomes more and more threatening in relation to common medical interventions and diagnostic procedures which have been considered safe or practically safe up to the recent times. This results in significant health expenditures due to prolonged hospitalizations and increased treatment costs causing both direct and indirect societal expenses.

In some countries, use of antibiotics in veterinary, food animal husbandry and agriculture exceeds the use of antibiotics for human health; this is an additional factor for emergence of resistant microorganisms which can easily spread among humans, animals, foods and environment.

Antimicrobial Resistance in the World and in the WHO European Countries

[4] European Strategic Plan of Action on Antibiotic Resistance. European Regional Committee, 61st session. Baku, Azerbaijan, 12-15 September 2011.

AMR is found in all countries. Patients who are infected with resistant bacteria are at higher risk of treatment faillure and mortal outcomes while using more medical resources than the patients infected with non-resistant strains of the same bacteria.

Resistance of *Klebsiella pneumonia* – a common member of the enterobacteriaceae which causes life-threatening infections – to the "last resort antibiotics" (carbapenems) has spread to all parts of the world. Often, *K. pneumoniae* is the cause of nosocomial infections such as pneumonia, bloodstream infections, infections of newborns and patients in intensive care units. In some countries, due to advanced *K. pneumoniae* resistance, carbapenems are ineffective for treatment for more than half of the patients with this infection.

E. coli resistant to fluoroquinolones – antibiotics commonly used for treatment of urinary infections – is also wide-spread. Today, in many countries in the different geographical regions, fluoroquinolone therapy is non-effective in more than half of the cases.

At least ten counties (Australia, Austria, Canada, France, Japan, Norway, Slovenia, South Africa, Sweden and U.K) registered ineffectiveness of the "last resort" drugs for treatment of gonorrhea (3rd generation of cephalosporins).

WHO has recently updated its recommendations for gonorrhea treatment taking into account emerging resistance. Due to high levels of resistance of gonorrhea to quinolones, now WHO does not recommend to use them for treating this disease. Recommendations for treatment of chlamydial infections and syphilis have also been updated.

Resistance of *Staphlylococcus aureus,* common cause of severe hospital and community infections, to the 1st line drugs has also widely spread. Risk of mortality for a MRSA-infected patient is estimated at 64% higher than that for a patient infected with a non-resistant strain of *Staphylococcus aureus*).

Colistin is the last resort drug for treating life-threatening Enterobacteriaceae infections. Just recently, some countries and regions have reported colistin-resistant cases which make those infections incurable.

WHO estimates that in 2014 there were about 480 000 cases of multidrug resistant tuberculosis (MDR-TB) with resistance to the two most effective tuberculosis drugs. Only one case in each four (123 000 cases) were detected and recorded. MDR TB treatment requires much longer and less effective treatment courses that treatment of regular TB cases. In 2014, only half of the MDR-TB cases were successfully treated. Of the new TB cases in 2014, about 3.3% were multidrug resistant. This figure is higher among those who were treated for tuberculosis in the past: at 20%. Extended drug resistant tuberculosis (XDR-TB) cases which are resistant to at least four main tuberculosis drugs have been detected in 105 countries. Nearly 9.7% of the MDR-TB patients also have extended drug resistance.

In July 2016, cases of *P. falciparum* malaria resistant to the 1st line therapy (artemisinin-combined therapy, ACT) were confirmed in five countries of the Great Mecong subregion (Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Vietnam). Majority of artemisinin-resistant cases are fully cured if ACT includes another effective drug together with artemisinin. However, in the crossborder regions of Cambodia and Thailand *P. falciparum* developed resistance to almost all available antimalarials making treatment very difficult and requiring close monitoring. There is a genuine risk that multidrug resistance can spread to other parts of the subregion. Resistant strains emerging in other countries would be a major public health challenge that would jeopardize important recent gains in the malaria control.

In 2010, about 7% of HIV patients in developing countries who started their antiretroviral therapy (ART) were diagnosed with drug resistance. In the developed countries, this figure was at 10-20%. Lately, some countries reported 15% (or more) of resistance cases among patients who start their first-time treatment and up to 40% among retreatment cases. This problem needs immediate response actions. This growth of resistance also causes significant economic issues as the second and third line drugs are 3 and 18 times more expensive than the first line drugs, respectively. Since September 2015, WHO recommends that all HIV patients should start antiretroviral therapy. Wider use of the ART is expected to escalate the ART resistance problem in all regions of the world. To achieve maximum and long-term effectiveness of the 1st line ART treatment and administer the most effective treatment patterns to the patients, it is important to continue monitoring of the resistance and minimize its further development and spread. WHO develops a new global action plan to fight against HIV drug resistance in 2017-2021, together with the countries, counterparts and stakeholders.

Antivirals are needed to treat epidemic and pandemic influenza. Almost all type A influenza viruses circulating in human beings are resistant to one category of antiviral drugs, M2-channel inhibitors (amantadine and remantadine). However, resistance to neuraminidase inhibitors (oseltamivir) remains low (1-2% of cases). Antiviral susceptibility is continuously monitored through the Global Influenza Surveillance and Response System.

Countries of the European Union have been systematically collecting and sharing data on antibiotic consumption and resistance since the turn of the century through informal networks that were formalized in 2010-11 when they transferred to the European Centre for Disease Prevention and Control (ECDC). WHO European Regional Office (WHO/Europe) urges countries outside the European Union to collect data on the use of antibiotics on a regular basis and send data on prescription, sale and use of antimicrobial drugs to the Antimicrobial Medicines Consumption network (AMC) of WHO/Europe and data on antibiotic resistance to the Net of Epidemiological Surveillance for Antimicrobial Resistance in the countries of Central Asia and Eastern Europe (CAESAR) of WHO/Europe, created jointly with the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) and National Institute of Public Health and Environment of Netherlands (RIVM). Data collected in the AMC and CAESAR networks are compatible to data collected in the European Surveillance of Antimicrobial Consumption network (ESAC-Net) and the European Antimicrobial Resistance Surveillance network (EARS-Net) of the European Union, managed by the ECDC.

Studies made by ECDC showed that resistance of S. aureus to methicillin (methicillin -resistant S. aureus, MRSA) is at 50 percent in some Member States of the WHO European Region and at 25 percent and higher in some other EU countries. The problem of resistance of gram-negative bacteria, such as Escherichia coli and Klebsiella pneumonia, is growing fast in the Southern and Eastern Europe. In the EU countries, 25,000 deaths are estimated annually, while health requires about € 0.9 billion of additional expenses. Data collected by the European Antimicrobial Surveillance Project (ESAC-Net), which is managed by ECDC now, is the evidence of the fact that the use of antibiotics in the eastern and southern countries of Europe is much higher than that in the northern EU countries; this leads to a higher level of drug resistance. Much less is known about antibiotic use and resistance situation in other countries of the WHO European Region; however, some Member States (Russian Federation, Turkey, Croatia) have made certain progress in antibiotic resistance surveillance and reported MRSA prevalence figures which in some countries are above 30 percent.

Despite the increased AMR threat, development, production and introduction of new antibiotics has dramatically dropped. Thus, 16 new antimicrobial agents were introduced in practical medicine for 1983-1987 period, while only seven were introduced between 1987 and 2002. Starting from 1985, antibiotic programmes of the largest pharmaceutical companies in the

United States and Japan have been gradually closed or reduced to 50 percent by 2004. Between 1928 - when Alexander Fleming discovered antibiotics - and 1970-ies, more than dozen antibiotic types were found, then the process of creation of new antibiotics stopped, and in the 21st century, only two new types of antibiotics were created: oxazolidons (2000) and lipopeptides (2003).

Uncontrolled use of antibiotics in hospitals, polyclinics, veterinary services and animal food production has resulted in emergence of new sources of resistant microorganisms. Prudent and reasonable use of antimicrobials is absolutely necessary in treatment of people and animals, as well as in agricultural production. The situation is aggravated by the fact that in many CIS countries antibiotics are still sold, contrary to regulations, without doctors' prescriptions in pharmacies.

The WHA Resolution 58.27 states that containment of antimicrobial resistance is one of the prerequisites for achievement of a number of internationally agreed health-related goals of the UN Millennium Declaration.

With a view of all this, the WHO European Region suggests a range of goals and objectives for a regional strategic plan of actions. These goals and objectives have technical, financial, regulatory, educational and behavioral dimensions which need to be addressed in comprehensive national action plans. At the same time, antimicrobial resistance is a cross-disciplinary issue that needs to be addressed by many national - and sometimes international - partners, stakeholders and experts. Seven strategic objectives were formulated to guide national governments in consideration of complex factors related to and contributing to bacterial resistance. The following objectives were suggested to be included in the regional strategic action plan:

- To strengthen national multisectoral coordination for the containment of antibiotic resistance.
- To strengthen national surveillance of antibiotic resistance.
- To promote national strategies for the rational use of antibiotics and strengthen national surveillance of antibiotic consumption.
- To strengthen infection control and surveillance of antibiotic resistance in health care settings.
- To prevent and control the development and spread of resistance to antibiotics used in veterinary and agriculture;
- To promote innovation and research on new technologies.
- To improve awareness, patient safety and partnership.

Antibiotic resistance is a global problem and only simultaneous efforts to contain antibiotic resistance in each individual country can bring positive results in the entire world.

In the current situation, slowing down of development of antimicrobial resistance is realistic only through holistic evidence-based antimicrobial policies which take into account general biological, medical, socio-economic and educational aspects of the problem.

Antimicrobial resistance is a multi-disciplinary issue, and its tackling requires involvement and contributions from many national, as well as international, stakeholders and counterparts.

In May 2015, the Sixty-eighth World Health Assembly adopted the global action plan on antimicrobial resistance (AMR). One of the five strategic objectives of the action plan is to strengthen the AMR evidence base through enhanced global surveillance and research.

AMR surveillance is the basis for measuring the resistance burden and provision of information needed to support local, national and global strategies. To support this

objective, the Global Antimicrobial Resistance Surveillance System (GLASS) aims to establish a global standardized approach to the collection, analysis and sharing of data in order to provide information for decision making processes, to encourage local, national and regional efforts and to establish evidence database for response measures and communication, information and awareness raising activities. The GLASS mission is to bring together clinical, laboratory and epidemiological data on the pathogens which are of the highest threat to the human health at the global level.

AMR surveillance improves if it is connected with monitoring of antimicrobial use practices. Joint efforts of surveillance networks such as EARS-Net and EASC-Net for EU Member States and the CAESAR and AMC network for non EU Member States of the European Region show that comprehensive monitoring of resistance and consumption may become an important factor for encouraging policy commitments to successful campaigns and resistance containment actions.

Section 2. TURKMENISTAN: CURRENT SITUATION AND MAIN CHALLENGES

2.1. Current Situation

The State Health Programme (2016) is a fundamental document which defines guiding principles and reflects priority areas of the health sector in Turkmenistan. The Work Plan (1999) based on the Presidential Programme (2015-2017) identified its implementation mechanisms (Plan for the realization of the State Health Programme of the President of Turkmenistan. Ministry of Health and Medical Industry. Ashgabat, Turkmenistan, April 1999).

In addition, the AMR legislative and regulative framework includes other documents, such as the Law "On the Medicines in Turkmenistan" (2016), the Law "On the Food Safety and Quality" (2009), Sanitary Code of Turkmenistan (2010), the Law of Turkmenistan "On Protection of health of citizens" (2009), the Law of Turkmenistan "On pharmaceutical activity and drug provision" (2002) and comprehensive joint action plans with the Veterinary Service and other bylaws.

Implementation of activities in this area is one of the priorities within the framework of bilateral cooperation between the Regional WHO Office for Europe and the Ministry of Health and Medical Industry of Turkmenistan (MoH&MIT).

Given the importance of the issue, MoH&MIT initiated establishment of the AMR National Working Group (NWG) in 2014. This is a cross-sectoral working group with the mission to develop national documents and plans for containment of antimicrobial resistance. The NWG is comprised of representatives of the MoH&MIT, State Sanitary and Epidemiological Service (SSES), Turkmen State Medical University (TSMU), Turkmenpharmatsiya, Veterinary Service and other concerned organizations. The NWG membership is planned to be increased in future. National focal points (coordinators) were designated to coordinate the activity of the NWG and technical issues.

A number of workshops were conducted with consultative and technical assistance from WHO international experts, including few training courses on AMR for health managers and specialists of different levels. National trainers were trained to conduct initial training on AMR for health workers at the central/provincial/district levels.

Information Resource Center for Containment of AMR was established within the structure of the Ashgabat city SES office. The Center operates as an organizational and methodological center for discussion, training and familiarization of health workers with the AMR aspects.

In 2014, 2015 and 2016, several WHO expert missions visited the country to assess its AMR situation and provide consultative and technical support followed with advice and recommendations. In addition to that, a training course on laboratory antimicrobial

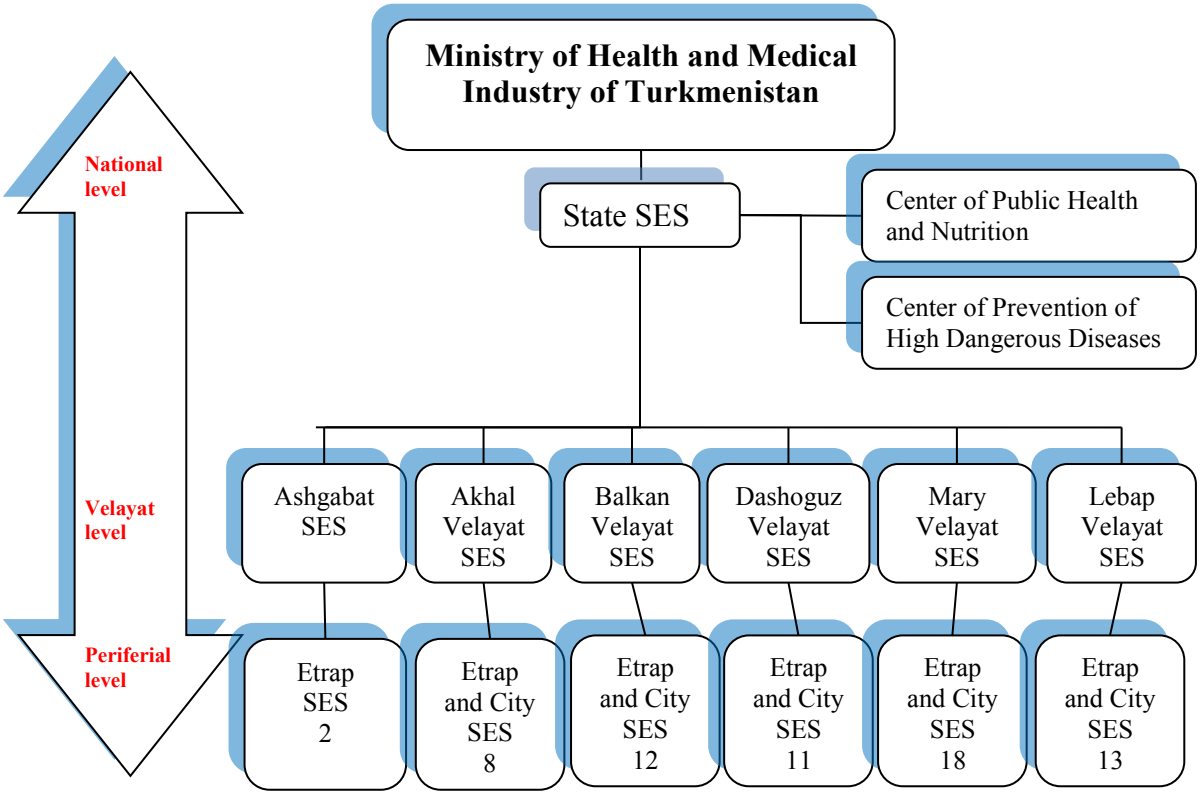
susceptibility testing methods was provided to the laboratory specialists at the central and provincial levels in 2016.

In June 2016, a range of AMR-related recommendations and suggestions were also made by the IHR Joint External Evaluation Mission, which also covered AMR as one of the areas of assessment.

The State Sanitary and Epidemiological Service (SSES) and its most important division of epidemiological surveillance perform their activities in compliance with the laws and by-laws developed and adopted in the country, primarily – with the Sanitary Code of Turkmenistan. Turkmenistan established legislative, economic and administrative framework to ensure public epidemic safety and guarantees of favorable living conditions for the current and future generations.

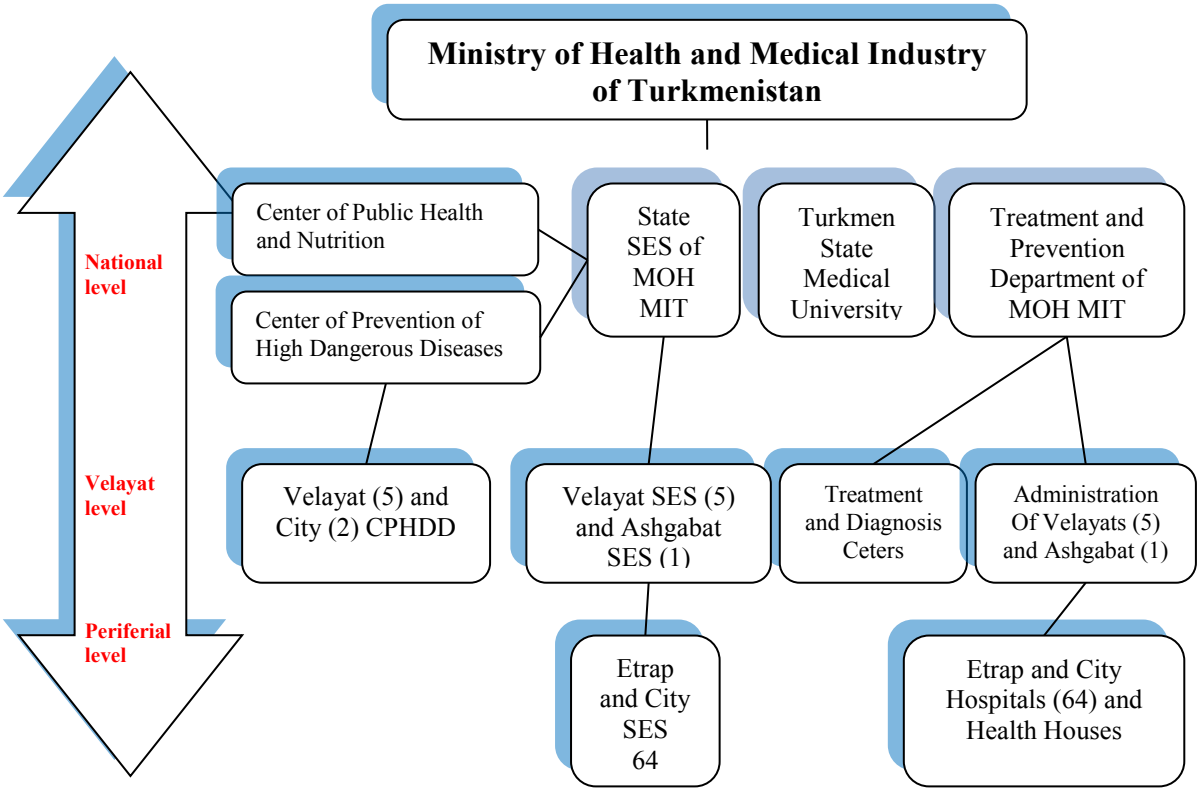
The State Sanitary and Epidemiological Service functions through its central apparatus within the structure of the Ministry of Health and Medical Industry of Turkmenistan (MoH&MIT), Public Health and Nutrition Center (PHNC), Center for Prevention of Extremely Dangerous Infections (CPEDI) and provincial (velayat) and city/district (etrap) sanitary and epidemiological units (SES). (Table 1. Organizational Structure of the MoH&MIT Sanitary and Epidemiological Service)

Table 1. Organizational Structure of the MoH&MIT State Sanitary and Epidemiological Service



Clinical care is provided to population through the health facilities at different levels, including out-patient and inpatient (hospital-based) care in the central and regional healthcare settings. (Table 2. Organizational Structure of the MoH&MIT Healthcare Facilities).

Table 2. Organizational Structure of the MoH&MIT Healthcare Facilities



Healthcare facilities at the secondary and tertiary (regional and peripheral) levels are the main consumers of antimicrobials. They purchase antimicrobials in large quantities, although primary healthcare physicians also prescribe quite a lot of antimicrobials. The reason for this may be the lack of a formal supervision system for prescription, distribution and use of antimicrobials in the health sector pf the country.

The country has an operational infection service network (Department of the Infectious Disease Centers - 1 at the central/national level, 5 infectious disease hospitals at the provincial level and 55 infectious disease hospital departments at district/city level), which employs 207 doctors and 506 nurses.

In the in-patient and out-patient settings, patients are prescribed and administered antimicrobials in compliance with the current standard methodological guidelines and clinical protocols.

In clinical practice, empiric treatment is the current norm, but very few microbiological tests are taken to subsequently guide correction or adjustment of the treatment in case of failure, or to provide data for epidemiological surveillance of the general resistance pattern in the country/area.

The processes of development of evidence-based clinical protocols (CP) and mechanisms of implementation of these protocols into every day healthcare practices need to be institutionalized.

Development and update of clinical protocols and guidelines and their implementation in every day clinical practices are on-going processes, which involve key specialists of the healthcare sector. In future, development and preparation of clinical protocols should be transferred to the research and clinical centers. MoH&MIT would coordinate and implement these clinical protocols. Introduction of clinical protocols into postgraduate curriculum and continuous in-service medical education and training programmes is an essential tool for implementation of the clinical protocols.

Laboratory service is a hierarchal three-tier system and includes 103 microbiology laboratories, which perform microbiological tests as well as tests for resistance of pathogenic agents to antimicrobials. (Table 3. Information about structure of the MoH&MIT microbiology laboratories.)

Laboratories use modern testing methodologies to diagnose antibiotic resistance in bacteria, such as disk diffusion method, broth dilution method, as well as automated antimicrobal susceptibility testing instrume (e.g. Vitec 2) and automated microbial detection system (e.g. BacT\ALERT).

Laboratory testing for antimicrobial susceptibility (AMS) takes from 5 to 6 days, on average. Key microbiological spectrum of in-hospital and community infections includes the following microorganisms: *Streptococcus pneumoniae, Staphylococcus aureus, Enterococcus faecalis, Enterococcus faecium, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, etc.*

MoH&MIT microbiology laboratory service includes: 64 SSES laboratories (1 PHNC laboratory, 6 provincial/ Ashgabat city SES and 57 city/district SES laboratories); 8 CPEDI laboratories which are the part of the SSES involved in microbiological testing for especially dangerous infections; and 29 laboratories in the structure of clinical and diagnostic laboratories of healthcare facilities which perform microbiological tests. At the district level, bacteriological tests are performed mostly by the sanitary-epidemiological service laboratories. Some of the laboratories do not meet the requirements of the modern bacteriological laboratories. Available fragmentary research data on antibiotic resistance and nosocomial infections are insufficient; official reporting systems are not well-structured and lack efficient data verification methods; optimal

external quality control is not provided for all laboratories; molecular typing of outbreak-causing microorganisms is not performed.

Table 3. Information about the structure of the MoH&MIT microbiology laboratories

	Ashgabat	Ahal	Balkan	Dashoguz	Lebap	Mary	Turkmenistan total
SES	1	8	11	11	18	14	63
PHNC	1	-	-	-	-	-	1
CPEDI	1	1	3	1	1	1	8
Health facilities	10	2	2	2	6	9	31
Total	13	11	16	14	25	24	103

The main challenge in susceptibility testing is the lack of standardized protocols for mandatory AMR investigations as well as standardized testing methodologies.

Today, the best-organized drug resistance testing system exists in the framework of the TB Programme of Turkmenistan. A specific characteristic of its diagnostic algorithm is the hierarchy of the laboratory network at different administrative levels. Established network of laboratory diagnostics allows access to modern testing methodologies for patients at different administrative levels. It is a good sign that both internal and external quality control of laboratory tests is in place in Tuberculosis Service laboratories, including existing feedback reporting system.

The study of prevalence of the drug resistant tuberculosis, conducted jointly with the World Health Organization, found resistance to isoniazid in 26.7% of new cases and in 32.4% cases of repeated treatment. Multiple drug resistance (MDR TB) in new cases was at 15.4% and in chronic cases – at 38.2%. To compare, in CAR countries, MDR TB was found in 19% to 23% of new cases and up to 50% and more in repeatedly treated cases. The initiated project research of treatment effectiveness has produced good preliminary results.

In order to study the causes of the resistance a series of operational researches were undertaken which proved that the main causes of resistance development are the lack of controlled treatment, concomitant disorders and diseases, and asocial behaviors.

Pre-service and in-service (undergraduate and postgraduate) education and training of health professionals is conducted by the Turkmen State Medical University (TSMU). In-service/post-graduate training is provided at the doctors' capacity building faculty (CPF), University departments, such as Hospital Therapy, Microbiology, Family Medicine, post-graduate education, etc.

The State Epidemiological Surveillance Service performs a wide range of important interventions. The existing epidemiological surveillance system has been appropriately fulfilling its duties and responsibilities for many years, achieving goals and objectives set up.

It should be noted that the gap list includes technical and technological inadequacy of the epidemiological surveillance system with the modern level and requirements for computerization and communication. Manual processing of huge amounts of data using outdated statistical and graphical methodologies and limited means of communication are the inhibitive factors for the functional operations of the State Epidemiological Surveillance at current stage.

SSES collects a lot of data on infectious diseases and infection-related information. Its work includes identification of infectious agents, causes and conditions for spread of infectious diseases, anti-epidemic interventions, and statistical recording and reporting. Great amounts of information accumulated in SSES need to be regularly analyzed which can be properly made only using appropriate information technologies.

The country has a functional system of epidemiological surveillance for infections emerging in health facilities, that include the entire complex of activities related to making justified prudent decisions on development of measures for fighting and prevention of these infections. SES staffs at all levels include specialists in charge of controlling epidemiological surveillance and compliance in the healthcare facilities.

Special emphasis is made on supply of disposal equipment and sterilization instruments, disinfectants and health workers' individual means of protection.

Hand washing technique, protocols of hand washing have been introduced into the program of health workers' training since dirty hands are the main way for infection transmission. Much attention is given to the individual protection equipment, such as gloves and special uniform.

Supervision of compliance with sanitary and epidemiological requirements in maternity hospitals where new WHO delivery technologies and recommendations are introduced is also in the scope of SES activities.

Infection Control Committees (ICC) are organized in accordance with appropriate orders in all health facilities. ICC coordinates the system of efficient organizational, preventive and antiepidemic measures aimed to prevent emergence and spread of hospital infections, including appropriateness of prescription and use of antimicrobials.

Special focus is made on the architectural and planning decisions at the design stage of the healthcare facilities (layout, efficient space allocation, convenient routes for patient and personnel flows, zoning of territory etc.).

Laboratory and instrumental monitoring exercise, including for microbiological indicators for objects and environment in healthcare facilities, is regularly performed. This monitoring exercise allows revealing derangements with respect to requirements for sanitary and epidemiological regime and undertaking appropriate measures in a timely manner.

Harmonization of the system with international requirements, adoption of modern approaches and optimization of sanitary and hygienic interventions to prevent in-hospital infections in health care facilities will significantly reduce the risk of emerging infections and result in improvement of quality of health services provided to the population.

According to the National Drug (Medicine) Register of Turkmenistan, as of 01.01.2017, 3641 items of pharmaceuticals/medical drugs and medical goods were registered in Turkmenistan in the period between 01/07/2015 and 01/01/2017. Of them, 317 items are antimicrobials (excluding antivirals). Three antimicrobials are produced in Turkmenistan (0.9%).

124 antimicrobials, which are included in the existing list of essential drugs, were registered during this period.

Introduction of a socially targeted system for the rational use of medical drugs is one of the most important areas of the MoH&MIT activities. This process includes formulation and approval of the State List of Essential Drugs. The State List of Essential Drugs includes 357 registered drugs; 41 of them are antimicrobials, antivirals and antifungals. There is also a State List comprising 130 drugs which are provided to the medically insured patients with 90% discount of the regular price, including 41 antibacterials, antifungals and antivirals (substitutes are not counted) and a National Register based on competent and evidence-based professional selection of the most therapeutically efficient and cost-effective and safe medicines; development and dissemination of fair pharmaceutical information; training of health personnel; monitoring of appropriate use of medicines, and measures to prevent and correct medication mistakes.

The State Center for registration of medicines and quality control of medical supplies, medical equipment and disinfectants (SCR) and «Bash Dermanhana Association» are the MoH&MIT main partners in establishing the system of efficient use of medical drugs.

According to the current regulations, the SCR's organizational structure includes:

- Department of Registration of Medicines with its services:

  a) Registration of drugs and pharmaceutical supervision, with the good clinical practice group (GCP) and Secretariat of the Pharmacological Committee

  b) Post-registration changes, additions and expertise of medicine packing

  c) Pharmaceutical expertise with the medicine research groups of the national pharmaceutical industries and adoption of rules of good manufacturing practices (GMP)

- Department of Medicine Quality Control with:

  a) Laboratory for drug quality control

  b) Medicine quality certification service

  c) Post-registration medicine quality supervision service

  d) Pre-registration inspection for compliance with the GMP rules

- Department of Registration and Certification of Medical Supplies, Medical Equipment and Disinfectants
- Logistics Department
- Licensing, Monitoring and Information Department with its services:

  a) Licensing and monitoring of importation of medicines

  b) Marketing and control of prices for medicines

  c) Information about medicines and methodological bureau

This SGR structure allows not only registration (including comparative studies of quality, microbiological and therapeutical effectiveness of the whole range of antibacterials and other agents) but also active involvement of the Center in collection and consolidation of regional and facility requests for medicines, as well as on-going monitoring and comparative analysis of prices for essential drugs in order to reasonably reduce budgetary expenses on treatment of socially important diseases, and implementation of the national programme for containment of antibacterial resistance (in line with the WHO recommendations).

The SCR and «Bash Dermanhana Association» have already started establishing a monitoring system for antibiotic consumption and formulation of national recommendations for rational use of antibiotics and national compliance regulations. However, it is imperative to disseminate relevant recommendations to medical education institutions and other health-related institutions because it may result in decrease of antibiotic prescriptions.

At the Center's initiative, the Ministry of Health of Turkmenistan issued a decree #117 on 12 April 2012 on prohibiting retail sale of all tuberculosis drugs, including rifampicin, in public pharmacies.

Audits of the public pharmacy network also allowed to regulate prescription of fluoroquinolones, especially the ones which are included in the Essential Drugs List and used for tuberculosis treatment (ofloxacin, levofloxacin).

At present, there are 247 licensed pharmacies in Turkmenistan; of those, 68 pharmacies are private, including 4 pharmacy storages, and 179 are government-owned. Licenses for importation, exportation, wholesale and retail sale of drugs are issued by the License Department of the Ministry of Health in accordance with the current legislation. An individual license is required for each private pharmacy; public (government-owned) pharmacies work under the general license and "Turkmen Pharmacy" supervision.

In April 2000, a Health Information Center was established in order to take effective measures to protect and improve public health, spiritual and moral education, change of health behaviors, sanitary and hygienic education of people and promotion of healthy life styles. This was the beginning of creation of a new preventive service in the country. The Health Information Center is involved in health education and communication and awareness raising work both among health professionals and public at large.

The Health Information Center organized the 2009 Health Day events which were dedicated to antimicrobial resistance issues, and since that time, it has placed special emphasis in its activities on prevention of the antimicrobial resistance.

Awareness of patients, as well as of health professionals, is of great importance. Survey on AMR which was conducted in 2014 among the general public, patients and PHC doctors revealed that the majority of the patients received information from the doctors but would also like to receive it from the media and pharmacy workers. The interviews of the primary health care specialists showed that during the past month 70% of them prescribed antibiotics, fluoroquinolones more often than any others.

No studies of self-medication have been yet carried out in Turkmenistan; however, the extent of self-treatment may be assumed to be rather wide because when people get ill they often tend to treat themselves using a broad range of available pharmaceuticals, including antimicrobials.

In January 2016, the Law of Turkmenistan "On Supply of Medicines" came into force. This Law is aimed to improve legal and organizational framework of governmental regulation of relations in the field of drug supply, including antimicrobial-related issues.

The time has come to develop a national policy for the rational use of antibiotics with strict control of their prescription and sale, which requires legislative changes and amendments and an antibiotic consumption monitoring system.

Recognition of the existence of the AMR problem and creation of national efficiently working cross-sectoral groups of specialists is considered a significant step for successful implementation and intervention control of AMR. International interdisciplinary collaboration is also necessary.

Development of the National AMR Strategy and Action Plan will make it possible to discuss the AMR issues and undertake appropriate measures to contain antimicrobial resistance and continue scientific research aimed to fill knowledge gaps.

Situation analysis of antimicrobial resistance in Turkmenistan

An in-depth situation analysis is needed to ensure effectiveness of the planned and implemented AMR interventions. The analysis would help to identify the main areas of implementation of the National Strategy. It is necessary to consider data of the main indicators, such as:

- Prevalence of common infectious diseases (hospital and community infections, infections in children and in adults).
- Identification of ten most common infectious diseases at the PHC/hospital care levels.
- Most frequently prescribed antimicrobials at the PHC/hospital care levels.
- Average duration of antimicrobials intake at the PHC/hospital care levels.
- Availability of MoH&MIT-approved standards (clinical protocols) for treatment of prevalent/common infectious diseases.
- System in place for regular supervision of appropriate drug prescriptions at the PHC/hospital care levels.

- Availability of data on microbiological etiologies responsible for the common infectious diseases and their susceptibilities to commonly prescribed antibiotics Names and quantities of antimicrobials produced and imported into the country.
- Names and quantities of antimicrobials sold through the retail pharmacy network in the country.
- Antimicrobial quality control along the whole production-to-consumption chain.
- Government control of the antimicrobials advertising.
- Public awareness and information for health professionals about infectious diseases and efficient antimicrobial therapy.

Section 3. Goals & Objectives of the National Strategy and Main Areas of Implementation

The National Strategy has been developed based on the WHO Global Strategy on Containment of AMR, strategic goals of the European Strategic Plan of Action oon Antibiotics, including technological, financial and educational aspects of the implementation.

The strategy is focused on people and interventions are supposed to affect groups of people, engaged in the activities related to AMR. These people should be the part of a problem solution: health workers that prescribe medicines, pharmaceutical workers, veterinaries, consumers, policy developers in healthcare and in agriculture and in pharmaceutical industry.

The strategy's goal is targeted to solution of the AMR issues as a whole and not tackling the issue of a certain disease; in particular, the strategy is focused on resistance to antibacterials. Priorities in this area of activity should be harmonized with national realization. Improvement of the use of antimicrobials should be the first step on the way to contain resistance. Increasing of access to these drugs and change in behavior should be in the scope of activities, which definitely requires time.

Main Goal:

Containment of development and spread of antimicrobial resistance, preservation of effectiveness of antimicrobial agents

Objectives:

OBJECTIVES:

1. Establish national AMR surveillance system.
2. Introduce measures to ensure rational use of antimicrobials in public health and veterinary service.
3. Estimate quantities of antimicrobial consumption.
4. Improve quality control system for the use of antimicrobials.
5. Establish a system of medical notification on the development of resistance and a system for promotion of antimicrobials' rational use among health specialists and population.

Section 4. Main Areas of the National Strategy Implementation

Taking into consideration that the WHO Global Strategy for Containment of Antimicrobial Resistance is aimed at patients and population as a whole; doctors and drug distributers; public health professionals and health managers; consumers of antimicrobials in agriculture; scientists and researchers; pharmaceutical industry; international agencies and professional associations;

and taking into account resolutions of the Sixty-seventh session of the World Health Assembly and in line with the provisions of the European Strategic Plan of Action on Antimicrobial Resistance – the Ministry of Health and Medical Industry of Turkmenistan considers it necessary to focus on the following key issues:

1. Prevention and control of infectious diseases.
2. Control of AMR.
3. Control of access to antimicrobials.
4. Rational use of antimicrobials.

Section 5. Activities of Implementation of the National Strategy

Taking into account the seriousness of the problem, the Ministry of Health and Medical Industry initiated creation of an intersectoral working group for development of national documents and plans on containment of current and emerging antimicrobial resistance. The group includes representatives of the Ministry of Health, veterinarian service and academic sector. It is planned to add new members to the group in the future.

Emphasis is made on strengthening interaction between clinical, laboratory and pharmaceutical specialists. A large spectrum of activities is planned within the frameworks of implementation of the above-mentioned areas of activities given that specifics of each area is taken in consideration.

5.1. Prevention and Control of Infectious Diseases

Activities planned to be implemented in this area:

- Strengthen infection control programmes in healthcare facilities and implement modern recommendations and measures to prevent nosocomial infections.
- Strengthen activities and functions of the Infection Control Committees in healthcare facilities, as well as define and enhance the role of a clinical pharmacologist in AMR control.
- Revise/update/develop infection control regulations.
- Organize training courses on infection control and prevention of nosocomial infections.
- Raise awareness of patients about simple measures to prevent and reduce infections in the family or community environment, such as immunization, hand-washing, nutrition, hygiene, etc.
- Increase immunization coverage and other health interventions to prevent diseases and reduce use of antimicrobials.

5.2. Monitoring of Antimicrobial Resistance

Activities planned to be implemented in this area:

- Establish a national epidemiological surveillance system for collection, analysis and reporting of data on emergence and dynamics of resistance of certain pathogens, including reporting of new resistant cases.
- Ensure availability of coordination mechanism enabling efficient surveillance of AMR, including monitoring of antimicrobials use, development of national recommendations on rational use of antimicrobials, and national regulations for compliance.
- Establish a the three-level functional system of interaction of microbiological laboratories on AMR. Create a network of laboratories for the AST.
- Ensure mandatory antimicrobial susceptibility testing in accordance with approved clinical protocols.

- Strengthen capacity of clinical and microbiological laboratories (in hospitals, SES, CPEDI, research laboratories, food laboratories).
- Identify an appropriately equipped laboratory with required functional capacities as a scientific and methodological center – an AMR reference laboratory – to coordinate and provide external quality control of peripheral microbiology laboratories through performing antimicrobial susceptibility testing, developing methodological recommendations, providing consulting and training support, collecting data and creating an AMR laboratory database.
- Develop data collection system, specific instruments/tools and standards, which can be used by the epidemiological surveillance institutions at the national level so that information can be uploaded into regional databases, such as CAESAR.
- Improve laboratory diagnostics in healthcare facilities; develop methodological guidelines in order to standardize collection, storage, transportation and testing of clinical samples.
- Optimize the work of diagnostic microbiological laboratories in the country as a unified structure to survey development and spread of resistance.
- Develop normative legal acts, provisions, regulations, instructions and methodological guidelines on microbiological testing for antimicrobial susceptibility in line with modern requirements.
- Develop and implement single methodology and strict standards at all stages for the detection of antimicrobial susceptibility of bacteria, such as EUCAST methodology.
- Provide all diagnostic laboratories which perform antimicrobial susceptibility tests with reference strains for quality control, as well as all necessary supplies, reagents and modern laboratory equipment.
- Develop and adopt standardized scheme for reporting of bacteriological testing results on AST in order to centralize monitoring activity and create a single database.
- Ensure implementation of the EQA program for the national laboratory network for AST.
- Provide equipment and the same software applications to microbiological laboratories in order to create a database, conduct monitoring, and submit and receive data in a timely manner; unify the entire microbiological laboratory services into a single electronic laboratory network.
- Make choice, with support from WHO, of a Supranational Reference Laboratory that would be engaged in provision of consultative and methodological support and external quality control for National reference Laboratory.
- Organize training courses for appropriate groups of specialists on AMR interventions.

5.3. Monitoring Accessibility of Antimicrobials

- Develop and introduce the Law "On Pharmaceuticals and Pharmaceutical Support of the Population of Turkmenistan", which is planned to regulate retail sale of antimicrobials only if they are prescribed by a physician as well as advertising activity and commercial promotion of antimicrobials.
- Require that producers and pharmacological companies should collect and report data on antimicrobial distribution, including importation, sale and exportation.
- Designate a national coordinator (focal point) responsible for collection and analysis of antimicrobials distribution, including importation, sale and exportation.
- For methodology in antimicrobials surveillance, the WHO AMC network standards will be considered.

- Ensure that only high standards of antimicrobial quality, safety and efficiency should be available in pharmaceutical commercial networks.

5.4. Rational Use of Antimicrobials and Strengthening Surveillance of their Use

5.4.1. Awareness Raising and Safety of Patients and Communities

- Implement national educational initiatives, public behavior change campaigns and various public awareness programmes.
- Regularly communicate information about resistance problems, rational antimicrobial use and harms from self-treatment to population, including through media.
- Conduct various awareness raising events to emphasize the importance of the problem.

5.4.2. Education and Training of Health Professionals

- Increase content and number of academic hours on the rational use of antimicrobials in the educational standards.
- Introduce special course on the rational use of antimicrobials in the pre-service (undergraduate) curriculum.
- Develop specialized training programmes based on the national list of essential drugs and national register of medicines and clinical recommendations on the rational use of antimicrobials for the post-graduate training systems.
- Expand coverage of health workers with educational/training programmes in all spheres of healthcare.

5.4.3. Education and Training of Pharmaceutical Workers

- Increase content and number of academic hours on the rational use of antimicrobials in the educational standards.
- Introduce special course on the rational use of antimicrobials in the pre-service (undergraduate) curriculum.
- Develop specialized training programmes on the rational use of antimicrobials for the post-graduate training systems.
- Expand coverage of pharmaceutical workers and pharmaceutical chemists with educational/training programmes.

5.4.4. Standardization of In-Patient and Out-Patient Treatment

- Update national lists of essential drugs and national register of medicines on a regular basis.
- Develop clinical recommendations (clinical protocols) for the rational use of antimicrobial drugs as treatment standards of common infections in outpatient and in-patient (hospital) practices and promote their official approval.
- Organize training courses for all health practitioners on the use of clinical protocols on the rational use of antimicrobials for treatment of common infectious diseases in outpatient and in-patient practices.
- Disseminate the above regulative documents to all health practitioners and pharmacists.
- Ensure control of appropriateness of antimicrobials prescription, including doses and algorithms of use, in compliance with the approved clinical protocols.

- Establish committees or designate specialists responsible for control of prescriptions and use of antimicrobials in healthcare facilities.

5.4.5. Prevention of Development and Spread of Antibiotic Resistance in Veterinary and Agriculture

- Study AMR prevalence patterns and use of antimicrobials in agricultural and domestic animals.
- Strengthening the normative -regulatory documents for reduce and prohibit, in future, use of antibiotics as growth-promoting factors in veterinary and agriculture.
- Study the possibility for establish a system of access to antibiotics for animals only when prescribed by a veterinarian.
- Establish integrated surveillance systems for antibiotic resistance (in humans, animals and foods) and use of antibiotics in food animals.
- Expand coverage of veterinarians with educational/training programmes.
- Expand coverage with educational activities for specialists of various services and industries related to food safety, for preventing and controlling the spread of AMR through the food chain.
- Encourage compliance with the required hygiene and infection control measures in order to reduce the need for antibiotics.
- Strengthen cross-sectoral and international cooperation in this field.

Section 6. Programme Management and Implementation Mechanism

Organizational and managerial work related to the implementation of the strategy is the responsibility of the national working group (NWG) under the MoH&MIT. Agencies interested in implementation of this activity will be included in the NWG in future, and Interdepartmental coordination committee will be created.

The NWG is authorized to coordinate activities of healthcare facilities aimed at rational use of antimicrobials and AMR prevention.

The NWG duties and responsibilities include:

- Active and efficient implementation of the National AMR Strategy and Plan of Action.
- Coordination of antimicrobial use regulation policy.
- Coordination of monitoring and surveillance of resistance, including the right for projection (forecasting), mapping of AMR spread, and interventions to restrict the use of antimicrobials in order to ensure their effectiveness and prevent emerging resistance.
- Organization of periodic meetings to discuss progress in the Action Plan and Strategy implementation.
- Monitoring and evaluation of the National Strategy and Action Plan implementation, analysis and conclusions to inform decision making for effective Strategy implementation and achievement of its goals and objectives.

The MoH&MIT State Sanitary & Epidemiological Service is authorized to coordinate and monitor implementation of the National AMR Strategy.

Key implementing agencies:

- All structural subdivisions of the Ministry of Health and Medical Industry.

- All health facilities and institutions, irrespective of their forms of ownership or types of activity.
- Turkmen State Medical University and other medical education institutions.
- Diagnostic laboratories.
- Pharmaceutical companies and pharmacies, irrespective of their forms of ownership or types of activity.
- State Veterinary Service.
- Professional associations, societies, non-governmental organizations.

Organizations and institutions are Strategy implementers, irrespective of the forms or types of their activities.

Government administration, ministries, agencies and local self-governance authorities can be involved in joint activities

Financing

- State Budget
- International organizations' and donors' funds.

Research and Practical Applications

Scientific and research works in the field of antimicrobial resistance and practical application of innovative methods for rational use of antimicrobials are planned within the framework of the Strategy implementation.

International Cooperation

Engagement in collaboration with WHO, UNICEF, FAO, OIE and other international organizations and associations in the field of rational use of antimicrobials and containment of antimicrobial resistance. Active participation in joint projects, international meetings, conferences, seminars, experience sharing and exchange of information.

Monitoring and Evaluation

An effective system for monitoring and evaluation (M&E) of implementation of the National Strategy and Action Plan allows stakeholders to compare actual progress with the expected results. The National AMR Working Group has the key role and responsibility for conducting M&E and measuring the implementation results. M&E includes regular monitoring reviews, preparation of annual reports and progress reports in accordance with the National AMR Strategy and Action Plan. Detailed monitoring mechanism should be discussed and approved at the AMR working group meeting.

An important role and ownership of the National AMR Strategy is placed with the MoH&MIT, SSES, SVS MoA and their subordinate institutions and organizations. Equally important for the Strategy implementation is technical assistance and support from the international partners.

Annex 2. Plan of Actions for implementation of the National Strategy for Containment of Antimicrobial Resistance in Turkmenistan, 2017-2025.

Annex 3. Plan of monitoring and evaluation of implementation of the National Strategy for Containment of Antimicrobial Resistance in Turkmenistan, 2017-2025.

Annex 2.

Order of Ministry of Health and
Medical Industry of Turkmenistan
№371, 16 November 2017 года

Plan of Actions for Implementation of the National Strategy for Containment of Antimicrobial Resistance in Turkmenistan, 2017-2025

№	Activity	Timeframes	Implementers	Responsible agencies	Remarks
1.	**Organization and Management**				
1.1	Establish AMR NWG	2015	MoH&MIT SSES	SSES	
1.2	Develop consolidated data collection and analysis system for Action Plan implementation				
1.3	Conduct regular NWG meetings to discuss progress of the Action Plan implementation	Once in 6 months and as needed	MoH&MIT SSES	SSES	
1.4	Actively use resources of the AMR Information Resource Center in Ashgabat city SES	On-going	MoH&MIT SSES	SSES	
1.5	Prepare annual reports on: - AMR surveillance, - use of antimicrobials in health facilities, - resistance indicators, - joint work on AMR and use of antimicrobials in Veterinary Services	Once a year, in January	MoH&MIT SSES Ministry of Agriculture	SSES	
2.	**Control of Antimicrobial Resistance**				
2.1	Create a national AMR surveillance system to collect, analyze and report data on emergence	2017-2025	MoH&MIT	SSES	

	and dynamics of resistance of certain pathogens, including reporting of new resistant cases		SSES		
2.2	Designate sentinel surveillance institutions (hospitals and polyclinics/"houses of health") with servicing laboratories for AMR monitoring and AMS testing	2017 with extension untill 2025	MoH&MIT SSES	SSES PHNC	
2.3	Develop national guidelines on AMR surveillance in the country	2017-2018	MoH&MIT SSES	SSES	
2.4	Develop data collection system and specific tools, including software applications (such as WHO NET) and standards, to be used by the AMR surveillance institutions	2017-2025	MoH&MIT SSES	SSES	
2.5	Designate laboratories which should perform AST (create the national network of AST laboratories)	2017-2018	MoH&MIT SSES	SSES PHNC	
2.6	Develop and adopt a standardized bacteriological reporting system (by microorganisms, resistance rates) in order to centralize monitoring and create an integrated database	2017-2018	MoH&MIT SSES	SSES PHNC	
2.7	Join WHO CAESAR network for AMR data exchange	2017	MoH&MIT SSES	SSES	
2.8	Optimize work and strengthen infrastructural and human resource capacities of microbiological, clinical and food laboratories as an integrated structure to survey AMR emerging and spread	2017-2025	MoH&MIT SSES	SSES PHNC	
2.9	Supply laboratories with media, reagents and methodological guidelines in line with the EUCAST standards (European Committee on Antimicrobial Susceptibility Testing)	2017-2025	MoH&MIT SSES	SSES PHNC	
2.10	Develop guidelines/manuals for microbiological tests for some AMR-related syndromes in line with the EUCAST standards (European Committee on Antimicrobial Susceptibility Testing)	2017-2018	MoH&MIT SSES	SSES PHNC	

2.11	Adoption of modern methods of AMR diagnostics and international standards and recommendations into practices	2017-2018	MoH&MIT SSES	SSES PHNC	
2.12	Develop guidelines, regulations, and methodologies to align and standardize rules for collection, storage, transportation and testing of clinical samples for antimicrobial susceptibility in line with modern international requirements	2017-2025	MoH&MIT SSES	SSES PHNC	
2.13	Designate a national AMR reference laboratory with approved an statute and workplan	2017 1st quarter	MoH&MIT SSES	SSES PHNC	
2.14	Identify, with WHO support, a collaborating center (supranational laboratory) which would provide consultancy, methodological support and external quality control for NRL	2017	MoH&MIT SSES	SSES PHNC	
2.15	Develop and integrate internal and external quality control systems in laboratories performing AMS-testing	2017-2025	MoH&MIT SSES	SSES PHNC	
2.16	Arrange participation of the national AMR reference-laboratory and other national laboratories in the AMR external quality control programmes (such as annual EQAP of CAESAR)	Annually	MoH&MIT SSES	SSES PHNC CPEDI	
2.17	Create a single integrated data base with general access from all microbiological laboratories (combined into a single electronic network and using the same software) for monitoring, timely distribution and receiving data for all microbiological laboratories in the country	2017-2025	MoH&MIT SSES	SSES	
2.18	Conduct training courses on AMR surveillance for various professional groups	2017-2025	MoH&MIT SSES	SSES	
2.19	Provide various professional groups with developed and approved AMR surveillance guidelines and regulations	2017-2025	MoH&MIT SSES	SSES	

3. **Prevention and Control of Infectious Diseases**					
3.1	Strengthen infection control programmes in health facilities through implementation of modern infection control recommendations and interventions and prevent nosocomial (in-hospital) infections	2017-2025	MoH&MIT SSES	SSES	
3.2	Develop national guidelines for infection control and prevention of nosocomial (in-hospital) infections	2017	MoH&MIT SSES	SSES	
3.3	Revise/update/develop infection control standard regulations	2016-2025	MoH&MIT SSES	SSES	
3.4	Ensure that Infection Control Committees (ICC) in all health facilities are strengthened and provided methodological and consultative support	2016-2025	MoH&MIT SSES	SSES	
3.5	Conduct Training-of-Trainer workshops for national trainers who would provide cascade trainings on infection control in health facilities for different specialists	2017-2025	MoH&MIT SSES	SSES	
3.6	Conduct training workshops on infection control and prevention of nosocomial infections for health specialists from health facilities and SES services	2017-2025	MoH&MIT SSES	SSES	
3.7	Consider establishment of epidemiologist positions in the health facility staffing patterns and ensure that they should be trained to work in the health facility settings	2017-2018	MoH&MIT SSES	SSES	
3.9	Conduct regular monitoring of infection control measures in health facilities to make recommendations and inform decision making	2017-2025	MoH&MIT SSES	SSES	
4. Control of access to antimicrobials					
4.1	Implement enforcement measures of the Law of Turkmenistan "On the Supply of Medicines"	2017-2025	MoH&MIT SRC Bash Dermanhana Association	MoH&MIT SRC	
4.1	Develop and implement regulations for sale of antimicrobials	2017-2025	MoH&MIT SRC Bash	MoH&MIT SRC	

			Dermanhana Association		
4.2	Develop protocols for data collection and analysis based on the international standards for antimicrobial use, based on AMC methodology	2017-2018	MoH&MIT SRC Bash Dermanhana Association	MoH&MIT SRC	
4.3	Develop and enforce mandatory antimicrobial reporting by manufacturers, pharmacies and pharmaceutical companies (including data on importation, sale and exportation)	2016-2017	MoH&MIT SRC Bash Dermanhana Association	MoH&MIT SRC	
4.4	Develop and enforce mandatory reporting on antimicrobial use in health facilities	2016-2017	MoH&MIT SRC Bash Dermanhana Association	MoH&MIT SRC	
4.5	Join WHO AMC network for AMC data exchange	2018	MoH&MIT SRC Bash Dermanhana Association	MoH&MIT SRC	
4.6	Designate a national coordinator (focal point) of antimicrobial data collection and analysis (including importation, sale and exportation). Consider WHO AMC Network methodology.	2017 1st quarter	MoH&MIT SRC Bash Dermanhana Association	MoH&MIT SRC	

4.7	Ensure acquisition and sale of antimicrobials which meet standards of quality, safety and effectiveness	2017-2025	MoH&MIT SRC Bash Dermanhana Association	MoH&MIT SRC	
5. Enhancement of Rational Use and Surveillance of Antimicrobials					
5.1. Public Awareness and Safety of Patients					
5.1.1	Implement, including with mass media, national educational and training initiatives, behavior change campaigns and various public information/communication and awareness raising programmes on the extent of the resistance problem, rational use of antimicrobials, and harms caused by self-treatments	2017-2025	MoH&MIT. SSES Health Information Center	MoH&MIT. SSES, Health Information Center, "Health of Turkmenistan" and "Saglyk" magazines	
5.1.2	Conduct a national World Antibiotics Week campaign	Annually, in November	MoH&MIT SSES Health Information Center	Health Information Center	
5.2. Education and Training of Health Workers					
5.2.1	Introduce special course on the rational use of antimicrobials in the pre-service curriculum in secondary and higher education	2017-2025	MoH&MIT TSMU	TSMU	
5.2.2	Develop specialized programmes on the rational use of antimicrobials for in-service (post-graduate) curriculums based on the National List of Essential Drugs, National Register of Medicines and clinical protocols for the rational use of antimicrobials	2017-2025	MoH&MIT TSMU	TSMU	

5.2.3	Expand coverage of health practitioners and nursing staff in outpatient and in-patient care with education and training (package of documents)	2017-2025	MoH&MIT. TSMU	MoH&MIT, TSMU, IESC	
5.3. Education and Training of Pharmaceutical Workers					
5.3.1	Introduce special course on the rational use of antimicrobials in the pre-service curriculum	2017-2025	MoH&MIT TSMU	TSMU	
5.3.2	Develop specialized programmes on the rational use of antimicrobials for in-service (post-graduate) curriculums	2017-2025	MoH&MIT TSMU	TSMU	
5.3.3	Expand coverage of pharmacists with education and training	2017-2025	MoH&MIT TSMU	MoH&MIT TSMU	
5.4. Standardization of Outpatient and In-Patient (Hospital) Care					
5.4.1	Update National List of Essential Drugs and National Register of Medicines on a regular basis	2017-2025	MoH&MIT TSMU SRC	MoH&MIT	
5.4.2	Conduct training courses on development of clinical protocols on the rational use of antimicrobials for treatment of common infectious diseases and antimicrobial-related syndromes in outpatient and in-patient care (otitis, sinusitis, pharyngitis, acute bronchitis, urinary infections and etc), with support from international experts	2017-2018	MoH&MIT TSMU WHO	MoH&MIT	
5.4.3	Develop and approve clinical protocols for rational use of antimicrobials in treatment of common infectious diseases and antimicrobial-related syndromes in outpatient and in-patient care (otitis, sinusitis, pharyngitis, acute bronchitis, urinary infections and etc)	2017-2018	MoH&MIT TSMU WHO	MoH&MIT	
5.4.4	Conduct training workshops for all health practitioners on implementation of clinical protocols for rational use of antimicrobials in treatment of common infectious diseases and antimicrobial-related syndromes in outpatient and in-patient care (otitis, sinusitis, pharyngitis, acute bronchitis, urinary infections and etc)	2017-2025	MoH&MIT TSMU WHO	MoH&MIT	
5.4.5	Provide clinical protocols for rational use of antimicrobials in treatment of common infectious diseases and antimicrobial-related syndromes in outpatient and in-patient care (otitis, sinusitis, pharyngitis, acute bronchitis, urinary infections and etc) to all health practitioners and	2017-2025	MoH&MIT	MoH&MIT	

	pharmacists				
5.4.6	Designate a specialist (group of specialists) responsible for control of prescription and use of antimicrobials in outpatient and inpatient healthcare practices. Develop Terms of Reference describing duties, responsibilities, functions and composition of the group	2017	MoH&MIT	MoH&MIT	
5.4.7	Monitor prescriptions of antimicrobials in healthcare practices, including their numbers and dosages in accordance with the approved clinical protocols	2017-2025	MoH&MIT	MoH&MIT	
6. Prevention of Development and Spread of Antibiotic Resistance in Veterinary and Agriculture					
6.1	Designate an AMR coordinator (focal point) in the veterinary sector	2017 1st quarter	SVS MoA SSES	SVS MoA	
6.2	Conduct study the use of antimicrobials in the veterinary sector	2017-2025	SVS MoA SSES	SVS MoA	
6.3	Conduct trainings on the rational use of antimicrobials for veterinarians	2017-2025	SVS MoA SSES WHO	SVS MoA	
6.4	Strengthening the normative-regulatory documents on excluding the use of antimicrobials for growth in veterinary and agriculture	2017-2025	SVS MoA SSES	SVS MoA	
6.5	Study of possibility of establish a system of access to antimicrobials for the use in the animal health sector only when prescribed by a veterinarian	2017-2025	SVS MoA	SVS MoA	
6.6	Establish integrated surveillance systems for antibiotic resistance (in humans, animals and foods) and use of antibiotics in food animals	2025	SVS MoA SSES	SVS MoA	
6.7	Expand the coverage of educational activities for specialists of various services and industries related to food safety, for preventing and controlling the spread of AMR through the food chain	2018-2025	MoH&MIT SSES SVS MoA, Ministry of Trade and Foreign Economic Relations	MoH&MIT SSES SVS MoA, Ministry of Trade and Foreign Economic Relations	

			and others	and others	
7. Monitoring and Evaluation of Implementation of the Action Plan					
7.1	Ensure monitoring and evaluation of implementation of the Action Plan	2017-2025	MoH&MIT SSES SVS MoA	MoH&MIT SSES SVS MoA	
8. International Collaboration and Cross-Sectoral Cooperation					
8.1	Consider participation in the WHO regional AMR surveillance networks (CAESAR) and AMC network (AMC)	2017	MoH&MIT SSES SVS MoA WHO	SSES	
8.2	Consider participation in the Global Antimicrobial Resistance Surveillance System (GLASS)	2017	MoH&MIT SSES SVS MoA WHO	SSES	
8.3	Collaborate with WHO and other international organizations and associations in the field of rational use of antimicrobials and containment of antimicrobial resistance, and infection control in health facilities	2017-2025	MoH&MIT SSES SVS MoA WHO FAO MEB UNICEF	SSES	
8.4	Participate actively in the joint projects, operational research, international meetings, conferences, workshops and information exchange and experience sharing activities	2017-2025	MoH&MIT SSES SVS MoA WHO FAO MEB UNICEF	SSES	

Annex 2

Plan of Monitoring and Evaluation of Implementation of the National Strategy for Containment of Antimicrobial Resistance in Turkmenistan, 2017-2025

No.	Area / Indicators	Outputs	Outcomes
1	**Organization and Management**		
1.1	Establishment of a National Coordination Group (NCG) comprised of representatives from different sectors	Officially designated NCG with description of its mandate and nominal membership, and involved stakeholder ministries/agencies and individuals	-
1.2	National Strategy for Containment of Antimicrobial Resistance and Action Plan	National Strategy for Containment of Antimicrobial Resistance and Action Plan approved by the Government	-
2	**Control of Antimicrobial Resistance**		
2.1	AMR epidemiological surveillance system	• National guidelines for AMR surveillance developed • AMR data recording and reporting system is in place • Health specialists of different medical professions trained on AMR interventions, including implementation of the national AMR surveillance guidelines at the national/provincial/district levels	National AMR surveillance data are comparable both at the national and at the regional/global levels Number of trained health specialists increases each year
2.2	AMS testing data	• Officially designated AMR reference laboratory carries out coordination and control of the laboratories which perform AMS tests • Single integrated AMS laboratory system is in place at the national/provincial/district level	AMS surveillance data can be used as a management and optimization tool for future AMR measures and interventions

		• Microbiological landscape and antimicrobial resistance to main pathogens data is available at the national/provincial/district levels • Number of laboratories which perform AMS tests in line with the updated requirements (system)	Number of laboratories which perform AMS tests in line with the new requirements increased
3	**Prevention of Infectious Diseases and Infection Control**		
3.1	Infection Control and prevention Programme	• National guidelines for infection prevention and control developed • % of hospitals which implement Infection Control Programme • Health specialists of different medical professions trained on implementation of the national guidelines of infection prevention and control at the national/provincial/district levels	Number of hospitals which implement Infection Control Programme increased Number of trained health specialists increases annually
3.2	Infection surveillance / general reasons for the use of antibiotics	• Top 10 common nosocomial (in-hospital) infections in adults and children (list of infections developed) • Top 10 common outpatient infections in adults and children (list of infections developed) • Top 10 key community-spread syndromes which require prescription of antibiotics to adults and children (list of syndromes developed)	Surveillance data focused on the rational use of antibiotics
3.3	Surveillance of nosocomial (in-hospital) infections (Treatment-related infections – healthcare	• Prevalence of common treatment-related infections in children and adults	TRI reduction trends

	associated infections)		
4	**Control of Access to Antimicrobials**		
4.1	Development of a mandatory data reporting system for antimicrobials' use	• A mandatory reporting system of antimicrobials' use is in place	Information and data of antimicrobial use is available for analysis and decision making Reduction of use of antimicrobials in the country (improvement of the rational use of antibiotics), and thus reduction of inefficient use Reduction of use of broad-spectrum antibiotics Increase of use of narrow-spectrum antibiotics
4.2	Antimicrobials' quality control through the whole production chain (from manufacture to consumption)	• Increased number of spot-checks of antimicrobials' quality control in the market	Reduction trends in the numbers of identified cases of inappropriate quality of antimicrobials
4.3	Names and amounts of antimicrobials domestically produced and imported	• Monitoring data trends	Reduction of use of antimicrobials in the country (improvement of the rational use of antibiotics), and thus reduction of inefficient use Reduction of use of broad-spectrum antibiotics Increase of use of narrow-spectrum antibiotics
4.4	Names and amounts of antimicrobials sold in retail pharmacy network in the country	• Monitoring data trends	Data can be used as a valuable tool of AMR management and optimization, future measures and interventions

			Reduction of use of broad-spectrum antibiotics Increase of use of narrow-spectrum antibiotics
4.5	Development of bylaws (regulations) for sale of antimicrobials only when prescribed	• Sale of antimicrobials in pharmacy network only when prescribed by a physician	Rational use of antimicrobials in the country
4.6	Government control of antimicrobials' commercial promotion/advertisement	• Control of antimicrobials' commercial promotion/advertisement is in place	Data can be used as a valuable tool of AMR management and optimization, future measures and interventions
5	**Control of the right assignment and rational use of Antimicrobials**		
5.1	MoH&MIT-approved clinical protocols for treatment of common infectious diseases are available	• Clinical protocols for treatment of common infectious diseases developed and approved by the MoH&MIT decree; • Gradual increase of the number of health workers trained to use these protocols and their accessibility	Improvement of the AMR legal regulations in line with the international standards and recommendations
5.2	A system for on-going supervision of correct prescriptions of antimicrobials at the PHC and hospital care levels	• Supervision system is in place	Data can be used as a valuable tool of AMR management and optimization, future measures and interventions
5.3	Most frequently prescribed antimicrobials at the PHC and hospital care levels	• Dynamics of data monitored and used for feedback to PHC facilities and hospitals for continuous comparisons and improvements	
5.4	Average duration of antimicrobial treatment at the PHC and hospital care levels	• Alignment of data with the regulative documents – over time trends and results used for continuous comparison and	Capacity building for AMR control and containment

		improvement at different levels of the healthcare system	
5.5	Awareness raising of health workers and general public about infectious diseases and effective antimicrobial treatment	• Awareness raising	
5.6	AMR training programme for health specialists	• AMR training programme for health specialists is in place	
6	**Prevention of Emergence and Spread of Resistance to Antimicrobials Used in Veterinary and Agriculture**		
6.1	Strengthening of normative regulatory base for prohibition to use antibiotics as a growth promotion factor in veterinarian sector	• Legal regulations developed and enforced	Implementation of antimicrobials' restriction measures in veterinary and agriculture
6.2	A system to oversee the use of antibiotics in veterinary and agricultural sectors (including water sector)	• The system is in place at the local level	Raising of awareness on AMR problem
6.3	Expand the coverage of educational activities for specialists of various services and industries related to food safety, for preventing and controlling the spread of AMR through the food chain	• The educational activities on awareness raising were conducted	Strengthening of cross-sectoral/interagency cooperation
6.4	Cross-sectoral (interagency) cooperation	• Joint actions to implement the National AMR Strategy	
7	**Monitoring and Evaluation**		
7.1	Conducting monitoring and evaluation	• M&E results of implementation of the National AMR Strategy	Availability of data to track progress of the National AMR Strategy implementation and to take actions
8	**International Collaboration**		
8.1	International collaboration in AMR field	• International cooperation in AMR laboratory diagnostics	International collaboration and implementation of the WHA resolutions about AMR, IHR and

		• International cooperation in studies of antimicrobials' use • International cooperation in infection prevention and control • International cooperation in AMR containment	other AMR-related international organizations