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National Action Plan to Contain Antimicrobial Resistance (2022-2025)

Since the implementation of the *National Action Plan to Contain Antimicrobial Resistance (2016-2020)*, China has adopted a comprehensive management strategy to contain resistance and has achieved positive results. However, some common antimicrobial resistance problems are still intensifying, and there are gaps in the resistance prevention and control levels among regions and institutions, and the situation is still challenging. In order to accelerate the implementation of the Healthy China Strategy, implement the *Biosecurity Law of the People's Republic of China*, contain antimicrobial resistance, and better protect people's health, this Action Plan is formulated based on a review of previous work.

I. General Requirements

Adhere to the principle of "prevention first, integration of prevention and treatment, and comprehensive measures", focusing on the prominent problems regarding antimicrobial resistance, innovating institutional mechanisms and working models, and effectively containing the resistance of major human and animal pathogenic microorganisms. By 2025, the national governance system for containing antimicrobial resistance should be basically improved, and the health literacy of the population related to antimicrobial resistance prevention and control should be greatly improved. The antimicrobial resistance prevention and control capabilities of human health and animal health professionals should be significantly improved, and the evaluation system for the use of antimicrobials and resistance should be better. The research of antimicrobial resistance prevention and control should be further accelerated, and international exchanges and cooperation should be promoted.

II. Main Indicators

From 2022 to 2025, the following main indicators will be achieved:

(1) The incidence rate of antimicrobial-resistant bacterial infections in health facilities and community-acquired antimicrobial-resistant bacterial infections will continue to decline.

(2) The resistance rate of major human and animal pathogenic microorganisms will continue to decrease, or the growth rate of resistance will decrease.

(3) The awareness rate of urban and rural residents on antimicrobial resistance and the correct rate of knowledge test should reach 80% on infection control as well as the rational use of antimicrobials; good behavioral rate on rational use should reach 60%. Health education on antimicrobial resistance, infection control, and rational use of antimicrobials should cover all primary and secondary school students nationwide.

(4) The training on rational use of antimicrobials should cover all health personnel and practicing veterinarians in large-scale animal farms, and their correct rate on relevant knowledge test should be above 80%.

(5) At least 75% of outpatient and inpatient antimicrobial prescriptions in health facilities at secondary and above levels nationwide should be appropriate.

(6) 100% of antimicrobials sold at drug retailers should be by prescriptions; 80% of the antimicrobials sold for animal use by animal medicine sellers should be by veterinary prescriptions.

(7) The coverage of monitoring network for human and animal antimicrobial use and resistance should continue to increase; the evaluation system for antimicrobial use and resistance should be sounder.

(8) One to three new antimicrobials should be developed and marketed, and five to ten new microbial diagnostic instruments, equipment, and reagents should be developed.

(9) A preliminary clinical antimicrobial drug susceptibility breakpoint standard system suitable for China's context should be established.

III. Main Tasks

(A) Adhere to the principle of “prevention first” and reduce infection rate.

1. Strengthen infection control in health facilities. Promote infection control work and management of antimicrobial use in health facilities in an integrated way; increase investment in infection control, including staffing and technical capacity building for infection control professionals. Supervise and guide health facilities to implement infection control systems, standards, and regulations, research and develop evidence-based measures to prevent and contain important drug-resistant microbial infections; reduce the incidence rate of drug-resistant bacterial infections in health facilities and strengthen the categorized disposal of medical waste at the source of waste production. Strengthen primary infection control education and behavior management of non-health personnel such as cleaning and security personnel within health facilities. (Responsibilities are divided among the National Health Commission, National Administration of Traditional Chinese Medicine, and the Health Bureau of the Logistics Support Department of the Central Military Commission.)

2. Strengthen water, environmental hygiene and personal hygiene. Deepen the Patriotic Health Campaign to promote the formulation of healthy habits among the whole population. Ensure the drinking water safety in households, communities, and healthcare facilities. Improve public health facilities, and promote the “toilet revolution” in rural areas. Promote the comprehensive management of urban and rural environmental hygiene and improve the environmental sanitary conditions in urban and rural areas. Strengthen the hygiene management of breeding sites, slaughterhouses, food production workshops, and other places to prevent animal diseases and ensure food safety.

Implement multiple measures to prevent and reduce community-acquired infections. (Responsibilities are divided among the National Health Commission, Ministry of Agriculture and Rural Affairs, and the National Disease Control and Prevention Administration.)

3. Strengthen the prevention and control of environmental pollution by antimicrobials. Strengthen the standardized treatment of domestic sewage, medical wastewater and solid waste, pharmaceutical companies' production waste, waste from aquaculture and food production. Strictly implement the environmental impact assessment in the planning and construction projects of antimicrobial production premises; strengthen the management and control of antimicrobial drug pollution emissions, and promote the reduction of antimicrobial drug waste. Pilot monitoring of antimicrobials in water environments. Strengthen capacity building in prevention, control, monitoring and regulation of antimicrobial drug environmental pollution. (Responsibilities are divided among the Ministry of Ecology and Environment, National Health Commission, and other authorities.)

4. Strengthen the vaccination against infectious disease. Further strengthen the vaccination against infectious diseases to enhance the resistance of humans and animals to preventable infectious diseases and reduce their incidence and the demand for antimicrobial drug use. (Responsibilities are divided among the National Health Commission, Ministry of Agriculture and Rural Affairs, and the National Diseases Control and Prevention Administration.)

(B) Strengthen public health education and raise awareness of antimicrobial resistance.

1. Enhance communications and educational campaigns for urban and rural residents. In conjunction with the “Public Health Awareness Action" under the *Healthy China Initiative (2019-2030)*, further raise public awareness of antimicrobial resistance issues, and improve knowledge of infection prevention and rational use of antimicrobials. Promote personal health protection, correct the behavior of using antimicrobials without prescriptions, and guide the public to use antimicrobials rationally under the guidance of physicians and pharmacists. (Led by the National Health Commission, and responsibilities are divided between the National Radio and Television Administration, and the Ministry of Agriculture and Rural Affairs.)

2. Widely carry out science education for primary and secondary school students. Conduct science education and publicity activities on rational use of antimicrobials and antimicrobial resistance prevention and control in primary and secondary schools to guide students to establish concepts of infection prevention and rational use of antimicrobials from an early age and develop good hygiene habits and rational medication usage behavior. (Led by the Ministry of Education with the participation of the National Health Commission, and the National Radio and Television Administration.)

3. Regularly hold “Antimicrobial Awareness Week” events. Hold events to increase awareness of antimicrobials in November each year, in sync with the World Health Organization’s “World Antimicrobial Awareness Week” campaign. Promote infection control, rational use of antimicrobials, and knowledge of antimicrobial resistance in various ways such as videos, posters, WeChat public accounts, and interactive knowledge quizzes to effectively raise public awareness of antimicrobial resistance. (Led by the National Health Commission the Ministry of Agriculture and Rural Affairs with the participation of the National Radio and Television Administration.)

(C) Enhance training to improve the prevention and control capacities of the professionals.

1. Strengthen college and university education of talents. Develop and expand the professional workforce in infection control, infectious diseases, pharmacy, microbiology and veterinary medicine based on demand. Support eligible universities and colleges to voluntarily set up antimicrobial resistance-related secondary disciplines or interdisciplinary programs under the relevant first-level disciplines; encourage cross-disciplinary training of professionals who are specialized in multiple fields including biology, medicine, pharmacy, agriculture, environmental science, etc. Strengthen the training of integrated professionals in public health and clinical medicine to promote the integration of therapeutic care and preventive care. Support universities with capacities to offer courses in antimicrobial resistance, infection control, and rational use of antimicrobials in the specialties of clinical medicine, veterinary medicine, pharmacy, and so on or add relevant content into relevant courses. (Led by the Ministry of Education with the participation of the National Health Commission, and Ministry of Agriculture and Rural Affairs.)

2. Strengthen the training of health personnel. Strengthen the routine training of healthcare personnel on the rational use of antimicrobials and resistance prevention and control; encourage relevant professional organizations, academic institutions and associations, etc. to provide high-quality training including flagship training courses. Make full use of online and offline education methods to improve health personnel's theoretical knowledge and practical skills related to antimicrobial resistance prevention and control. Implement the *Administrative Measures on Clinical Use of Antimicrobials* and provide regular training to doctors and pharmacists with evaluation; those who pass the evaluation shall be granted the license of prescription or dispensing qualifications for antimicrobials. (Responsibilities are divided among the National Health Commission and the National Administration of Traditional Chinese Medicine.)

3. Strengthen education for practitioners in husbandry and veterinary industries. Promote the public awareness rally campaign of “rational use of antimicrobials in animals”. Enhance training of animal disease prevention and control and rational use of antimicrobials for veterinarians and husbandry practitioners, and

continuously expand the training coverage. Include good practice in the use of animal antimicrobials into the curriculum for high-quality farmer training projects. (Responsible authority: Ministry of Agriculture and Rural Affairs)

(D) Strengthen industry regulation for rational use of antimicrobials.

1. Improve the quality in clinical use of antimicrobials. National regulations, standards and rules on antimicrobial management should be further implemented in healthcare facilities with the goal of improving the outcome of patients with infectious diseases and improving healthcare quality. Innovative management models should be developed, and information technology, artificial intelligence and other technologies should be fully utilized to enhance regulation capacity and efficiency. Strengthen the development of infectious disease departments in hospitals of secondary level and above levels to standardize the diagnosis and treatment of bacterial and fungal infections. Enhance the construction of clinical microbiology labs to improve the diagnostic capabilities of pathogens through inter-laboratory quality evaluation and promoting rapid tests for drug-resistant bacteria. Clinical pharmacists in the field of infection control should be trained, and key departments such as pediatrics should be staffed with dedicated pharmacists. Technical support and regulation should be strengthened for private hospitals, township hospitals, community health service centers, private clinics and other health facilities to continuously improve the rational use of antimicrobials. (Responsibilities are divided between the National Health Commission and the State Administration of Traditional Chinese Medicine)

2. Strengthen the stewardship and management of veterinary antimicrobials. Promote the development of guidelines and administrative measures for the safe use of veterinary antimicrobials. Strengthen the supervision and management of veterinary hospitals, clinics and breeding farms to further standardize the use of veterinary antimicrobials. Around the implementation of rural revitalization and food safety strategies, promote the green development of the breeding industry, continue to promote the action of reducing the use of antibiotics in animals, and promote the use of safe, efficient, and low-residue veterinary traditional Chinese medicine and other products to replace veterinary antibiotics. Strictly implement the plan to phase out the use of antibiotics as feed additives for growth promotion. Promote the sales and use of veterinary antimicrobials based on veterinary prescriptions. Continue to carry out safety risk assessments and residual monitoring of veterinary antimicrobials to protect food safety and public health safety. (Responsible ministry: Ministry of Agriculture and Rural Affairs)

3. Strictly regulate the sales of antimicrobials. Strictly implement the policy that antimicrobials can only be sold by retail pharmacies per prescriptions, and enhance supervision over drug circulation channels such as retail pharmacies and third-party platforms for drug online sale. The use of automatically generated prescriptions without diagnosis is strictly prohibited. Crack down on the sales of

counterfeit and substandard antimicrobials in the pharmaceutical sector. (Responsibility ministry: National Medical Products Administration)

4. Give full play to the role of medical insurance payment in promoting rational use of drugs. Deepen the medical insurance reform in payment methods; reasonably calculate the costs related to the diagnosis and treatment of infectious diseases. Continuously adjust the medical insurance drug list based on clinical needs and the affordability of medical insurance funds to include antimicrobials with high clinical value and patient benefits as well as good economic evaluation into the coverage of medical insurance following the established procedures. Carry out evidence-based negotiations for medical insurance coverage, national centralized drug procurement and medical insurance payment method reform for antimicrobials, and strengthen policy implementation impact evaluation. (Led by the National Healthcare Security Administration, supported by the National Health Commission)

(E) Improve the monitoring and evaluation system to inform decision-making.

1. Improve the clinical monitoring system of antimicrobials. Strengthen the development of antimicrobial clinical use monitoring network, bacterial resistance monitoring network, fungal disease monitoring network, and healthcare facility infection monitoring network, and expand the monitoring coverage. Improve the monitoring indicators and methods, improve data quality and analysis efficiency, and fully utilize the monitoring networks for supervising and guiding the clinical diagnosis, treatment, and industry management. Strengthen data linkage between monitoring networks and explore to establish a rapid alert mechanism for outbreaks of multidrug-resistant bacteria based on real-time data from monitoring networks. (Responsibilities divided between the National Health Commission and the State Administration of Traditional Chinese Medicine)

2. Establish and improve the monitoring network in animal diagnosis, treatment, and breeding sectors. Promote the establishment of a veterinary antimicrobial use monitoring network and an animal source antimicrobial resistance monitoring network; improve the animal source bacterial resistance monitoring network, and gradually expand the monitoring coverage to breeding farms, veterinary hospitals, clinics, and animal slaughterhouses to obtain data on veterinary antimicrobial use and bacterial resistance data. Actively carry out universal monitoring, active monitoring, and targeted monitoring with focuses on key animal pathogens, zoonotic bacteria and relevant mutualistic bacteria. Strengthen the quality control of monitoring laboratories. (Responsible ministry: the Ministry of Agriculture and Rural Affairs)

3. Realize the integrated use of monitoring data from different sectors. Accelerate the establishment of a collaborative mechanism among human health, animal health and breeding sectors for the rational use of antimicrobials and resistance monitoring; research and establish a scientific and reasonable evaluation indicator

system to inform antimicrobial stewardship in health and breeding sectors. Establish a national reference laboratory for antimicrobial resistance and biological specimen database. Establish a standard system for resistance research and monitoring technique, collect and store drug resistant microbial isolates, and provide standard strains required for clinical care and research. (Responsibilities divided between the National Health Commission and the Ministry of Agriculture and Rural Affairs)

4. Establish and improve the monitoring, evaluation and early warning system for antimicrobial resistance risks. Strengthen biosafety risk monitoring for antimicrobial resistance and improve the capacity of detecting and analyzing antimicrobial resistance biosafety risks. Using the data and information obtained from risk monitoring, regularly organize investigations and assessment of antimicrobial resistance biosafety risks and establish an early warning system. (Responsibilities divided between the National Health Commission and the Ministry of Agriculture and Rural Affairs)

(F) Strengthen the supply of relevant drugs, device and equipment.

1. Accelerate the market launch of urgently needed new drugs, medical device and equipment products. Priority review and approval in line with procedures will be given to innovative drugs, vaccines, medical device and equipment urgently needed for the prevention, diagnosis, and treatment of drug-resistant infections. Strengthen the monitoring and evaluation of adverse events related to antimicrobials. (Responsible ministry: National Medical Products Administration)

2. Promote the development of the antimicrobial resistance prevention and control-related industries. Promote the collaboration between upstream and downstream enterprises and research units in the antimicrobial drug industry chain. Focus on key links in the industrial chain such as raw materials and new pharmaceutical equipment to carry out technical product research and development, and fill in the gaps in the industrial chain. Encourage enterprises to develop and apply green production processes such as continuous synthesis and biological transformation, strengthen production process automation and transformation towards closed processes, improve the comprehensive capacities of wastewater, waste gases and solid waste disposal to promote the green, large-scale, and intensive development of raw materials for antimicrobials. (Responsible ministry: Ministry of Industry and Information Technology)

(G) Strengthen scientific and technological research and development for antimicrobial resistance prevention and control.

1. Promote the research and development as well as the translation and use of innovative antimicrobials, diagnostic tools, vaccines, and antimicrobial substitutes. Establish a collaborative innovation mechanism for multidisciplinary research and development, promote the output, translation and use of core key

technologies and major products for antimicrobial resistance prevention and control. Encourage the research and development of rapid diagnostics and reagents for drug-resistant bacterial infections; support the development of drug concentration monitoring techniques that are inexpensive and easy to roll out. Support the research on the diagnosis, treatment, and prevention and control of drug-resistant bacterial infections, including new treatment regimens, prevention and control strategies for drug-resistant bacterial infections, and the post-market evaluation of antimicrobials. Carry out clinical studies on antimicrobial susceptibility breakpoints and the development of standards. Focus on strengthening the research and development of antimicrobials suitable to be used for special groups such as pregnant and postpartum women, children and the elderly, and further strengthen the research and development of alternatives of antimicrobials such as traditional Chinese medicines. Promote the research and development of antimicrobials for veterinary use and alternatives of veterinary antimicrobials. (Responsibilities divided among the National Health Commission, National Administration of Traditional Chinese Medicine, Ministry of Science and Technology, National Medical Products Administration, and Ministry of Agriculture and Rural Affairs)

2. Support the research on molecular epidemiology, drug resistance mechanisms, and transmission mechanisms of antimicrobial resistance. Timely understand the epidemiological characteristics and trends of antimicrobial resistance in different regions, population groups, healthcare facilities, animals, and the environment; clarify the pathogenicity, resistance, and transmission mechanisms of microorganisms, and provide scientific data for formulating resistance prevention and control strategies and developing new drugs and technologies. (Responsibilities divided among the National Health Commission, Ministry of Science and Technology and Ministry of Agriculture and Rural Affairs)

3. Carry out research on the prevention and control of environmental pollution caused by antimicrobials. Develop analysis technology of antimicrobials in the environment and conduct research of possible ecological impact of residual antimicrobials in the environmental. (Responsibilities divided between the Ministry of Science and Technology and the Ministry of Ecology and Environment)

(H) Widely carry out international exchanges and cooperation.

Actively participate in global health governance; carry out multilevel exchanges and cooperation around the problems and challenges in global antimicrobial resistance; promote the construction of a community of common health for mankind. Strengthen exchanges and cooperation with relevant international organizations and countries around the world. Learn advanced concepts, high-tech, and experience in the field of antimicrobial resistance, actively offer "Chinese solutions" and "Chinese experience" for global antimicrobial resistance prevention and control. Based on work progress and technological advantages, continue to promote bilateral and multilateral cooperation on science and technology with other countries in the formulation of prevention and control

strategies and technical standards, monitoring and evaluation, research and development, technology roll-out, personnel training, and focus discussions. Under the framework of the "Belt and Road Initiative" and the " Silk Road of Health", focus on promoting international cooperation in antimicrobial resistance monitoring and containing the cross-regional and cross-border spread of drug-resistant bacteria. Actively support countries and regions in need to carry out drug resistance prevention and control activities. (Responsibilities divided among the National Health Commission, Ministry of Agriculture and Rural Affairs, and Ministry of Science and Technology)

IV. Support measures

(1) Strengthen organizational leadership. Establish a sound coordination and contact mechanism among relevant departments to strengthen regular information communication, give full play to the role of overall coordination, increase support for related work, and ensure the sustainability of the work. According to this *Action Plan*, identify annual work priorities, and assign specific tasks and measures to be taken to specific departments to fulfill their respective responsibilities so as to join efforts and achieve various objectives on time. Each local administration should develop specific implementation plans and submit them in writing to the National Health Commission by the end of December 2022. (Led by the National Health Commission, supported by relevant sectors according to their respective responsibilities)

(2) Carry out monitoring and evaluation. At the national level, establish the mechanism for monitoring the implementation process and evaluating the results of the *Action Plan*. Focusing on objectives and tasks, improve the evaluation indicator system, clarify the evaluation subjects and contents, carry out annual work evaluation and quality improvement research on specific measures. Publish special reports on the implementation progress of the *Action Plan* in due course based on the monitoring and evaluation findings, actively share experiences and best practices, and solve problems in a timely manner. Each province/autonomous region/municipality should carry out local monitoring and evaluation as required to ensure proper implementation. (Led by the National Health Commission, supported by relevant sectors according to their respective responsibilities)

(3) Give full play to the role of experts. Establish and improve the National Expert Committee for Antimicrobial Resistance Prevention and Control to promote communication and exchange among experts in different fields and sectors, provide advice for strategic research and policy making, provide technical support for the implementation of the *Action Plan*, timely propose recommendations on any adjustment of the *Action Plan*, and promote the improvement of relevant guidelines and technical protocols. Each locality may establish its own local expert committee for antimicrobial resistance prevention and control to enhance technical support. (Led by the National Health Commission, supported by relevant sectors according to their respective responsibilities)

Related Link: "Interpretation of the National Action Plan for Antimicrobial Resistance Prevention and Control (2022-2025)"