

The implementation progress of the National Action Plan to contain antimicrobial resistance in China

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This article looks at the wide-ranging progress made by the Chinese government in implementing its National Action Plan to contain antimicrobial resistance in that country.

The United Nations ad hoc Interagency Coordination Group on Antimicrobial Resistance (IACG) recently issued a report on the global implementation of the Political Declaration of the High-level Meeting of the United Nations General Assembly on Antimicrobial Resistance (2016) with the title: “No Time to Wait: Securing the future from drug-resistant infections”. The title itself urgently calls for positive action to control antimicrobial resistance (AMR) for the future of all humanity. At the same time, five recommendations to improve the status of AMR and handle the urgent issue of its control were proposed: 1) Accelerate progress in countries; 2) Innovate to secure the future; 3) Collaborate for more effective action; 4) Invest for a sustainable response; and 5) Strengthen accountability and global governance (1).

In 2016, based on the concept of One Health, the Chinese government enacted a National Action Plan (NAP) to contain AMR, which includes goals and strategies for 2016–2020, and involves 13 ministries related to healthcare, agriculture, animal feeding, environmental protection, science and technology and finance (2). The Chinese government subsequently established an inter-ministerial coordination group to supervise the implementation of the NAP, and the National Health Commission chairs and moderates the actions of the group (3). Looking back over the past three years, the Chinese strategies and actions in AMR control have been comprehensive and effective, and the achievements are commendable.

In accordance with the NAP, China has made outstanding achievements in the following areas (Table 1):

Governance: China has established a mechanism of inter-ministerial joint meetings on AMR containment to analyse bacterial resistance and antimicrobial consumption data, explore problems, and formulate policies, regulations and measures to control AMR in the coming year (3).

Policies: The government has encouraged research and development of anti-resistant bacterial agents, sped up the registration and approval of novel antibacterial drugs, strengthened the management of antibiotics sales with prescriptions, standardized the rational use of antimicrobial drugs in medical institutions, carried out a special campaign to monitor antibacterial residues in animal products, regulated the usage of antibacterial agents in animal breeding, including prohibiting the usage of important human antibiotics as an animal growth promoter (e.g., colistin) (4), and initiated environmental monitoring for contamination with antibacterial residues.

Action: Antimicrobial consumption, bacterial resistance and hospital-acquired infections surveillance networks have been established and optimized, covering more than 1,000 medical institutions; the national special campaigns of antimicrobial stewardship in hospitals have been continuously carried out for eight years (5); the animal bacterial resistance surveillance network was established in 2008, and the monitoring of resistance in five critical types of bacteria from pigs, poultry and dairy cows were monitored; and the training of professional personnel to improve the capacities for rational use of antibiotics and AMR control are persistently conducted.

Scientific research: Making full use of the country’s existing science and technology system, the government has supported scientific research and technology development related to bacterial resistance control; the Natural Science Foundation of China is responsible for basic research on bacterial resistance the Ministry of Science & Technology has set the National Major Science & Technology Programmes for new drug development that support R&D on new antibiotics, and the National Key R&D Programmes support R&D on AMR control related to agriculture, food safety, and Chinese traditional medicine (6). Six

Table 1: Implementation of the National Action Plan to Contain Antimicrobial Resistance in China from 2016–2018

Strategies proposed in NAP	Implementations	Specific actions or outcomes
To exploit advantages of joint action on prevention and control, and fulfil the sectoral responsibility of AMR containment	<ul style="list-style-type: none"> • Setting up an Inter-ministerial Joint Meeting on AMR Control, consisting of 12 ministries, coordinated by the National Health Commission 	<ul style="list-style-type: none"> • Annual meetings to formulate action plans will be held in the coming year
To increase investment in R&D of antibiotics	<ul style="list-style-type: none"> • The project fund sponsored by the Natural Science Foundation of China was more than CNY 10 million per years for basic research • Projects sponsored by the Ministry of Science & Technology: <ul style="list-style-type: none"> – Key R&D programmes for AMR: animal (CNY 5 million), food (CNY 30 million) and children (CNY 10 million); – Major scientific and technological projects for anti-resistant microbial agents: CNY 156 million. • Local governmental funds (lack of statistics) 	<ul style="list-style-type: none"> • Six innovative antibiotic candidates are in preclinical development stages • Five candidate proteins for bacterial vaccine development are being investigated • A <i>Staphylococcus aureus</i> vaccine started Phase II clinical trial • 17 urgently needed anti-resistant generic antibiotics have been approved
To strengthen the management of security of supply for antibacterial agents	<ul style="list-style-type: none"> • Encouraging the R&D of anti-resistant bacterial agents • Accelerating the registration of novel antimicrobials • Guaranteeing the accessibility of antimicrobial agents to all patients 	<ul style="list-style-type: none"> • “Guidelines for Pharmaceutical Industry Development Planning” have been modified to prioritize the R&D of innovative antibiotics • Guidelines for registration of new antibiotics have been modified
To establish and strengthen antibacterial agent usage and drug resistance control systems	<ul style="list-style-type: none"> • Continuing the national special campaigns on antimicrobial stewardship in healthcare institutions • Strengthening antibiotic sales by prescription in pharmacies • Issuing the National Action Plan to Contain AMR in animals (2017–2020) • Modifying the drug list for animal usage and preventing use of important human antibiotics in animals • Monitoring antibiotic residues in animal food production 	<ul style="list-style-type: none"> • Protocols of the campaigns are updated yearly • The National guidelines for clinical use of antibiotics in 2015 have been modified • Risk assessment of usage of antibiotics for animal growth promotion has been conducted • The use of five antibiotics, including colistin, as growth promoters in animals has been stopped • Over 99% of animal products, such as pork, eggs and milk, are quality-assured regarding content of antibiotics residue contamination
To optimize antibiotic consumption and resistance surveillance system.	<ul style="list-style-type: none"> • Improving the coverage and quality of surveillance of antibiotic consumption, antibacterial resistance and hospital-acquired infections • Establishing and optimizing the bacterial resistance surveillance in animals 	<ul style="list-style-type: none"> • All provinces have established AMR and antibiotic consumption surveillance networks • The national cross-section hospital infection surveillance is conducted in nearly 2,000 hospitals every other year • Resistance of 5 types of bacteria to 16 agents is surveyed in animals
To improve the capacity of professional personnel in bacterial resistance prevention and control	<ul style="list-style-type: none"> • Educating prescribers and healthcare providers • Training of rural veterinarians 	<ul style="list-style-type: none"> • More than 10,000 healthcare providers are being trained every year • 110 rural veterinarians have received education on antibiotic usage and AMR control
To strengthen the prevention and governance of environmental pollution of antibiotics	<ul style="list-style-type: none"> • Developing techniques to monitor environmental antibiotic residues to reduce antibiotics emission 	<ul style="list-style-type: none"> • Environmental protection standards for pharmaceutical companies in siting, construction, sewage disposal, etc., have been set up
To strengthen publicity on AMR and conduct education of antibacterial rational use and resistance	<ul style="list-style-type: none"> • Holding the yearly WHO Antibiotics Awareness Week ceremony 	
To conduct wide international exchange and cooperation	<ul style="list-style-type: none"> • Sino-Swedish collaborative projects to contain AMR • Sino-Britain collaborative projects to contain AMR • Bilateral communication with other countries 	<ul style="list-style-type: none"> • Four projects have been sponsored with CNY 12 million for Sino-Swedish AMR control collaboration • Six projects have been sponsored with 15 million CNY for Sino-Britain new antimicrobial agent research • 10 projects have been sponsored with CNY 60 million for Sino-Britain AMR control

new antibacterial candidate compounds and five vaccines for bacterial infections are in preclinical development stage, and a *Staphylococcus aureus* vaccine is in a Phase II clinical trial.

International collaborations: The Sino-Swedish and Sino-Britain collaborative projects of AMR containment research and development have been carried out (7). Responding to

the call from the World Health Organization (WHO), the annual Antibiotics Awareness Week in November has been implemented (8).

In accordance with the NAP, China has taken active and effective action to achieve results concerning prudent use of antibiotics and AMR containment. China is a country with a large population and is facing a severe situation with regards to AMR. China needs to carry out more extensive and sustainable AMR control action, increase financial investments, raise public awareness, strengthen technical facilities, promote R&D on new drugs and techniques, implement modern animal breeding techniques to reduce antibiotic usage, etc., in order to adopt the recommendations of IACG, to achieve the expected goals of AMR control in 2020, and to lay the foundation for sustainable AMR control strategies. ■

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