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关于印发遏制细菌耐药国家行动计划（2016-2020年）的通知

中华人民共和国国家卫生和计划生育委员会2016-08-25

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各省、自治区、直辖市及新疆生产建设兵团卫生计生委（卫生局）、发展改革委、教育厅（教委、教育局）、科技厅（委、局）、工业和信息化主管部门、财政厅（局）、国土资源厅（局）、环境保护厅（局）、农业（农牧、农村经济、畜牧兽医）厅（委、局）、文化厅（局）、新闻出版广电局、食品药品监督管理局、中医药管理局，解放军各大单位卫生部门：

为积极应对细菌耐药带来的挑战，提高抗菌药物科学管理水平，遏制细菌耐药发展与蔓延，维护人民群众身体健康，促进经济社会协调发展，国家卫生计生委等14部门联合制定了《遏制细菌耐药国家行动计划（2016-2020年）》（以下简称《行动计划》，可从国家卫生计生委医政医管栏目下载）。现印发你们，请结合各地、各部门的工作实际认真组织实施，切实落实各项政策和保障措施，保证《行动计划》目标如期实现。

国家卫生计生委 国家发展改革委

教育部 科技部

工业和信息化部 财政部

国土资源部 环境保护部

农业部 文化部

新闻出版广电总局 食品药品监管总局

国家中医药管理局 中央军委后勤保障部卫生局

2016年8月5日

# 遏制细菌耐药国家行动计划（2016-2020年）

为加强抗菌药物管理，遏制细菌耐药，维护人民群众健康，促进经济社会协调发展，制定本行动计划。

## 一、前言

我国是抗菌药物的生产和使用大国。抗菌药物广泛应用于医疗卫生、农业养殖领域，在治疗感染性疾病挽救患者生命、防治动物疫病提高养殖效益以及保障公共卫生安全中，发挥了重要作用。但是，由于新型抗菌药物研发能力不足、药店无处方销售抗菌药物、医疗和养殖领域不合理应用抗菌药物、制药企业废弃物排放不达标、群众合理用药意识不高等多种因素，细菌耐药问题日益突出。细菌耐药最终影响人类健康，但造成细菌耐药的因素及其后果却超越了卫生领域，给人类社会带来了生物安全威胁加大、环境污染加剧、经济发展制约等不利影响，迫切需要加强多部门多领域协同谋划、共同应对。

## 二、工作目标

从国家层面实施综合治理策略和措施，对抗菌药物的研发、生产、流通、应用、环境保护等各个环节加强监管，加强宣传教育和国际交流合作，应对细菌耐药带来的风险挑战。到2020年：

（一）争取研发上市全新抗菌药物1-2个，新型诊断仪器设备和试剂5-10项。

（二）零售药店凭处方销售抗菌药物的比例基本达到全覆盖。省（区、市）凭兽医处方销售抗菌药物的比例达到50%。

（三）健全医疗机构、动物源抗菌药物应用和细菌耐药监测网络；建设细菌耐药参比实验室和菌种中心；建立医疗、养殖领域的抗菌药物应用和细菌耐药控制评价体系。

（四）全国二级以上医院基本建立抗菌药物临床应用管理机制；医疗机构主要耐药菌增长率得到有效控制。

（五）人兽共用抗菌药物或易产生交叉耐药性的抗菌药物作为动物促生长应用逐步退出；动物源主要耐药菌增长率得到有效控制。

（六）对全国医务人员、养殖一线兽医和养殖业从业人员完成抗菌药物合理应用培训；全面实施中小学抗菌药物合理应用科普教育；开展抗菌药物合理应用宣传周。

## 三、主要措施

（一）发挥联防联控优势，履行部门职责。

发展改革部门促进抗菌药物研发和产业化；科技部门通过相关科技计划（专项、基金等）统筹支持抗菌药物和细菌耐药研究；财政部门安排细菌耐药控制相关经费，加强资金管理和监督；食品药品监管部门加强抗菌药物的审批、生产、流通管理，重点加强零售药店凭处方销售抗菌药物管理；工业和信息化部门完善医药产业政策，促进抗菌药物绿色生产和相关成果的产业化；卫生计生部门负责加强抗菌药物临床应用管理，做好遏制细菌耐药工作的组织协调和督促落实，中医药管理部门、军队卫生部门分别做好中医医疗机构、军队医疗机构的抗菌药物临床应用管理；农业部门加强兽用抗菌药物生产、经营、使用环节监管，减少动物源细菌耐药；国土资源部门加强土壤环境抗菌药物监测能力建设；环境保护部门加强抗菌药物环境污染防治工作，加强抗菌药物环境执法和环境监测能力建设，加快抗菌药物污染物指标评价体系建设；教育部门将抗菌药物合理应用相关知识纳入中小

学健康教育内容并落实；文化部门、新闻出版广电部门通过广播、电视等主要媒体向公众广泛宣传抗菌药物合理应用知识。

## （二）加大抗菌药物相关研发力度。

1. 鼓励开展细菌耐药分子流行病学和耐药机制研究。及时掌握我国不同地区、人群、医疗机构、动物等细菌耐药发展趋势、传播与差别，加大基础研究力度，阐释细菌致病和耐药机制，为制订耐药控制策略与研究开发新药物新技术提供科学数据。

2. 支持新型抗感染药物、仪器设备和疫苗的研发。加强细菌耐药防控科技部署，支持新型抗感染药物研发，特别是具有不同作用机制与分子结构的创新药物研发；支持耐药菌感染快速诊断技术的研发，特别是快速鉴别细菌感染与非细菌感染的技术设备、耐药菌快速检测仪器设备以及基层医疗机构应用微生物检测仪器设备的研发；支持相关疫苗研发。推动动物专用抗菌药物和可替代抗菌药物的动物疾病预防与促生长产品研究与开发。

3. 支持耐药菌感染诊断、治疗与控制研究。包括新的治疗方案、优化剂量、耐药菌感染治疗策略以及临床少用抗菌药物的再评价等，提高临床治疗感染性疾病的能力水平。

4. 开展抗菌药物环境污染控制研究，进行抗菌药物污染治理技术、抗菌药物在水环境和土壤中的去除以及修复技术等研究。

## （三）加强抗菌药物供应保障管理。

1. 完善抗菌药物注册管理制度。按照药品审评审批制度改革要求，严格抗菌药物的上市审批。依据政策对用于耐药菌感染相关创新药物、仪器设备以及疫苗加快审评审批。研究建立抗菌药物环境危害性评估制度，在医药、兽药、肥料注册登记环节，开展药物的环境危害性评估。

2. 加强抗菌药物生产流通管理。加大对生产流通领域抗菌药物的监管力度，严格落实零售药店凭处方销售抗菌药物，禁止抗菌药物网络销售，打击假冒伪劣抗菌药物销售。零售药店须做好处方存留备查工作，对以各种形式规避凭处方销售抗菌药物的行为，加大处罚力度。

3. 推进抗菌药物产业升级。完善医药产业政策，引导企业发展新型抗菌药物，支持抗菌药物新品种产业化。推动抗菌药物生产企业兼并重组，鼓励其采用新技术、新设备进行技术改造，促进抗菌药物绿色生产。

## （四）加强抗菌药物应用和耐药控制体系建设。

1. 规范抗菌药物临床应用管理。严格落实《药品管理法》、《医疗机构管理条例》、《处方管理办法》、《医疗机构药事管理规定》、《抗菌药物临床应用管理办法》、《医院处方点评管理规范（试行）》、《抗菌药物临床应用指导原则》等有关规定。鼓励建立多学科合作机制，由临床科室、感染性疾病、临床微生物、药学、医院感染管理等多学科组成工作团队，提升专业化管理水平。继续开展抗菌药物临床应用、细菌耐药监测工作，适时发布监测报告，提高监测结果利用水平。加强医务人员抗菌药物合理应用能力建设，重点加强基层医务人员知识培训。改善医疗机构基础环境，加强医院感染管理。大力加强医疗机构信息化建设，将抗菌药物管理要求通过信息化手段予以体现，逐步实现科学、高效管理，形成可持续发展的耐药控制机制。

2. 加强兽用抗菌药物监督管理。制订兽用抗菌药物安全使用指导原则和管理办法，及时修订药物饲料添加剂使用规范、禁用药清单。实施兽药分类管理制度，推行凭兽医处方销售使用兽用抗菌药物管理。严格管理抗菌药物原料药的各种销售渠道。实施动物健康

养殖方式，加强养殖场所卫生管理，改善养殖环境、加强饲养管理，维持动物健康状态。加强药物饲料添加剂管理，减少亚治疗浓度的预防性用药，禁止人用重要抗菌药物在养殖业中应用。加大兽用抗菌药物安全风险评估力度，加快淘汰高风险品种。制订人用、兽用抗菌药物分类表，区分人用与兽用抗菌药物种类，并依据药物的重要性、交叉耐药和临床应用品种等情况确定应用级别。

#### （五）完善抗菌药物应用和细菌耐药监测体系。

1. 完善抗菌药物临床应用和细菌耐药监测网络。在依托现有机构基础上，设立全国抗菌药物临床应用和细菌耐药监测中心，负责医疗机构抗菌药物与耐药监测，制订监测标准和监测方案，组织实施监测工作。进一步完善抗菌药物临床应用监测网和细菌耐药监测网，开展普遍监测、主动监测和目标监测工作。监测面覆盖三级、二级医院和基层医疗机构，监测对象涵盖住院和门诊患者，获得全面细菌耐药流行病学数据。

2. 建立健全养殖领域抗菌药物应用和细菌耐药监测网络。在依托现有机构基础上，设立全国兽用抗菌药物应用和动物源细菌耐药监测中心，负责养殖领域抗菌药物与耐药监测，制订监测标准和监测方案，组织实施监测工作。建立完善兽用抗菌药物应用监测网和动物源细菌耐药监测网，开展普遍监测、主动监测和目标监测工作。监测面覆盖不同领域、不同养殖方式、不同品种的养殖场（户）和有代表性的动物源性食品流通市场，获得动物源细菌耐药流行病学数据。

3. 建立医疗与养殖领域抗菌药物合理应用和细菌耐药监测网络的联通机制，实现两个领域的监测结果相互借鉴参考。建立科学、合理的评价指标体系，为医疗与养殖领域加强抗菌药物应用管理提供依据。

4. 建立细菌耐药参比实验室和生物标本库。实验室负责耐药菌的鉴别工作，建立标准耐药研究与监测技术体系，收集保存分离到的各种耐药细菌，提供临床与研究所需标准菌株。

#### （六）提高专业人员细菌耐药防控能力。

1. 加强医药专业学生培养。鼓励有条件的高等医学院校在临床医学专业、药学专业开设合理用药课程。鼓励有条件的高等农林院校在动物医学专业开设动物感染性疾病治疗相关课程。

2. 加强相关专业医务人员培养。大力培养抗菌药物合理应用与耐药控制人才，重点培养感染性疾病、临床药学、临床微生物等专业人才，并保证培养的数量满足医疗机构需求。加强医务人员抗菌药物合理应用与耐药控制继续教育，医务人员每年要完成一定课时的继续教育培训并考核通过。

3. 加强养殖业与兽医从业人员教育。培养壮大兽医队伍，加强兽医和养殖业从业人员抗菌药物合理应用教育培训。通过开展定期或不定期培训，促进相关制度规范的落实，提高兽用抗菌药物合理应用水平。

#### （七）加强抗菌药物环境污染防治。

从规划及规划环评角度严格抗菌制药企业选址，同时新、改、扩建抗菌制药项目必须严格执行环境影响评价制度。加快抗菌药物污染物指标评价体系建设，就抗菌药物环境污染问题有针对性地加强环境执法以及水、土壤、固体废物等抗菌药物监测技术方法和规范等能力建设。开展抗菌药物可能的生态环境影响相关科研工作，研究抗菌药物环境污染的防治措施，推动抗菌药物废弃物减量化。

#### （八）加大公众宣传教育力度。

充分利用广播、电视等传统媒体和互联网、微博、微信等新媒体，广泛宣传抗菌药物合理应用知识，提高公众对细菌耐药危机的认识。将合理应用抗菌药物与社会主义新农村建设和文化、科技、卫生“三下乡”等支农惠农活动相结合，在基层文化活动中增加抗菌药物内容，减少不必要抗菌药物应用。开展中小学抗菌药物合理应用与细菌耐药科普教育与宣传活动，从小树立抗菌药物合理应用观念。医疗机构加强对患者合理应用抗菌药物的教育指导，纠正自我抗菌药物治疗行为。定期开展抗菌药物合理应用宣传周，每年与世界卫生组织同步开展宣传活动。

#### （九）广泛开展国际交流与合作。

积极参与世界卫生组织、世界动物卫生组织、联合国粮食及农业组织等国际组织开展的相关工作，包括防控策略与技术标准制订、抗菌药物应用和细菌耐药监测、人员培训、专题研讨等。与其他国家和地区开展耐药监测协作，控制耐药菌跨地区跨国界传播。与国际社会分享相关耐药监测结果与研究成果，共同制订具有国际危害耐药菌的控制策略。与国际社会开展新型耐药控制技术与产品的研究与开发。积极支持需要帮助的地区开展耐药控制活动。

### 四、保障措施

（一）加大保障力度。根据政府卫生投入政策、经济社会发展水平和细菌耐药趋势，加大对遏制细菌耐药工作的投入，用于建设耐药控制相关设施、设备及人员培训等，并将遏制细菌耐药任务完成情况和绩效考核结果与财政补助挂钩。

（二）发挥专家力量。国家成立遏制细菌耐药咨询专家委员会。咨询专家委员会由医学（基础与临床医学、中医学）、兽医学（兽药）、微生物学、药学、生物制药、卫生管理、环境保护、流通管理、流行病学、生物统计、经济学、教育、传媒、信息化建设等专家组成，对抗菌药物管理与耐药控制工作提供咨询意见和政策建议。各地可以参照成立本地区的遏制细菌耐药咨询专家委员会。

（三）加强督导检查。各地要根据本行动计划要求，将工作目标和任务措施分解到具体部门，落实工作责任。各地有关部门要对地区年度工作情况进行检查，重点是医疗卫生和农业养殖应用抗菌药物、零售药店凭处方销售等情况进行检查，发现问题依法处罚，确保行动计划有效落实。

[http://en.nhfpc.gov.cn/2016-08/26/c\\_70276.htm](http://en.nhfpc.gov.cn/2016-08/26/c_70276.htm)

# National Action Plan to Contain Antimicrobial Resistance (2016-2020)

(en.nhfpc.gov.cn)

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To promote the management of antibacterial agents and containment of bacterial resistance, and to protect the public health and guarantee harmonious economic and social development, the National Action Plan to Contain Antimicrobial Resistance was prepared.

## I. Introduction

China is one of the major countries for the production and use of antibacterial agents. Antibacterial agents are widely used in healthcare and animal husbandry. It plays a significant role in treating infections and saving patient lives, preventing and treating animal diseases, improving farming efficiency, and guaranteeing public health security. However, antimicrobial resistance has become increasingly prominent due to insufficient research and development capacity of new antimicrobials, sales of antimicrobials without prescriptions in pharmacies, irrational use of antibacterial agents in medical and food animal sectors, non-compliant waste emissions of pharmaceutical enterprises, as well as lack of public awareness toward rational use of antimicrobials. Bacterial resistance ultimately affects human health, but the cause of bacterial resistance and consequences are beyond the health sector. Antimicrobial resistance brings increasing biosecurity threats, worsens environmental pollution, constrains economic development and other adverse effects to human society, thus, there is an urgent need to strengthen multi-sectoral and multi-domain collaborative planning to jointly cope with this issue.

## II. The Goals of the National Action Plan

In order to deal with the challenge of antimicrobial resistance, the National Action Plan aims to establish comprehensive management strategies and measures on the national level for the overall implementation of strengthening the supervision of antimicrobial research and development, production, circulation, use and environmental protection, promoting advocacy and education, and international exchanges and cooperation. The following goals will be achieved by 2020:

- 1.To launch 1-2 new initiative antibacterial agents and 5-10 new diagnostic instruments and reagents.
- 2.The proportion of sales with prescription of antibacterial agents in retail pharmacies will be basically realized in whole country with full-coverage. The proportion of sales with veterinary

prescription of antibacterial agents in animal sector will be realized in 50% in Provinces (autonomous regions and municipalities).

3.To optimize the surveillance networks of antibacterial agents consumption and antimicrobial resistance in both healthcare and food animal sectors; to set up reference laboratories of antimicrobial resistance and bacterial strain banks; to establish evaluation system for antimicrobials use and antimicrobial resistance control in healthcare system and animal husbandry.

4.To establish the antimicrobial stewardship program in secondary- and tertiary-level hospitals. To effectively control the increasing trend of the main antimicrobial-resistant bacteria in healthcare system.

5.The antimicrobials shared by humans and animals or easily producing cross-resistance should be gradually withdrawn from the market of animal growth promoters. To effectively control the increasing trend of the main animal origin antimicrobial-resistant bacteria.

6.To develop and implement educational efforts to ensure that medical staff, veterinarians and animal producers receive information and training of rational use of antibacterial agents. To implement education and training about rational use of antibacterial agents in primary and secondary schools. To set up publicity week of the rational use of antimicrobials.

### **III. Major Strategies and Actions**

1.To exploit advantages of joint prevention and control, and fulfill the department responsibility.

National Development & Reform Commission and its subordinate organizations promote the R&D and industrialization of antibacterial agents; Ministry of Science & Technology and its subordinate organizations support the overall innovative research of antibacterial agents and antimicrobial resistance by setting up science and technology projects (e.g., special funds, grants, etc.); Ministry of Finance and its subordinate organizations arrange budget for antimicrobial resistance control and strengthen the budget for regulation and supervision; State Drug & Food Administrative and its subordinate organizations enhance the management of drug approval, production and circulation, particularly strengthen the regulation of antimicrobials sales with prescription in retail pharmacies; Ministry of Industry & Information Technology and its subordinate organizations optimize the policy of medicine industry and promote industrialization of green manufacturing of antibacterial agents; National Health & Family Planning Commission and its subordinate organizations are responsible for strengthening the regulation of clinical use of antibacterial agents, and coordinate and supervise implementation of the antimicrobial resistance control plan; State Administration of Traditional Chinese Medicine (TCM) and military healthcare authorities are responsible for the regulation of clinical use of antibacterial agents in TCM institutions and army healthcare facilities, respectively; Ministry of Agriculture and its subordinate organizations strengthen the regulation of producing, sale

and usage of antibacterial agents in animal sector to decrease veterinary antimicrobial resistance; Ministry of Land & Resources and its subordinate organizations enhance capacity building of environmental surveillance of antibacterial agents in soil; Ministry of Environmental Protection and its subordinate organizations strengthen the prevention and control of environmental contamination, law enforcement, and capacity building of environmental surveillance associating with antibacterial agents, and stimulate the setup of the evaluation system for the indicators of antibacterial drug contamination; Ministry of Education and its subordinate organizations are responsible for including the knowledge of rational use of antibacterial agents into the health education in primary and secondary schools; Ministry of Culture and its subordinate organizations, State Administration of Press, Publication, Radio, Film and Television and its subordinate organizations rely on public media to promote public awareness and understanding of rational use of antibacterial medicines.

## 2.To increase investment in research and development of antimicrobials

1)To encourage the research of molecular epidemiology and resistance mechanisms of antimicrobial resistant bacteria. To timely track the development, spread and prevalence divergence of antimicrobial resistant bacteria in different geographic areas, population, medical institutions, and animals. To increase investment in fundamental research to elucidate bacterial pathogenicity and resistance mechanisms, and subsequently provide scientific evidence for making strategies of resistance control and the R&D of new drug and technology.

2)To Support the R&D of new anti-infection drugs, apparatus and instruments, and vaccines. To strengthen the deployment of prevention and control for antimicrobial resistant bacteria, and support the R&D of new anti-infection drugs, especially the drugs with diverse action mechanisms and molecular structures; To support the R&D of rapid diagnostic tools for the infections of antimicrobial resistant bacteria, especially the ones able to rapidly distinguish bacterial infections from non-bacterial infections, to rapidly identify antimicrobial resistant bacteria, and the microbial identification instrument suitable for use in primary medical institutions; To support the R&D of vaccines for antimicrobial resistant bacteria. To promote the R&D of veterinary-use antimicrobials, new disease-prevention strategies and products of growth promotion for animals to replace antimicrobials.

3)To support the research of diagnosis, treatment and control for the infections of antimicrobial resistant bacteria. To improve the capacity of clinical treatments for infectious diseases, the strategies include novel treatment regimen for antimicrobial resistant bacterial infections, dosage optimization, and reevaluation of antimicrobials that are rarely used in clinics.

4)To conduct the research on controlling environment contamination caused by antibacterial agents, including the development of de-contamination technology, and renewal technology for antimicrobial contaminated water and soil.



3.To strengthen the management of antibacterial agents supply security.

1)To improve the administration of antibacterial agent registration. According to the reform of the evaluation & approval system for drugs, the pre-market approval of antibacterial agents will be stringent. At the same time, the novel innovative drugs, equipment, and vaccines used for antimicrobial resistant bacterial infections will be prioritized for the pre-market evaluation & approval. To setup the evaluation system for the antimicrobial-caused environmental hazards, and conduct the evaluation of antimicrobial-caused environmental hazards for the registration of medicine, veterinary drugs and fertilizers.

2)To strengthen the management of production and circulation of antibacterial agents. To enhance the regulation of antibacterial agents on production and circulation. To implement measures of antimicrobials sales with prescription in retail pharmacies, forbid antimicrobials sales online, and combat the sales of counterfeit and shoddy antimicrobials. Retail pharmacies are required to keep prescriptions for inspection, and any actions to evade the rule of antimicrobials sales with prescription will get increased punishment.

3)To promote upgrading of antibacterial drug industries. To improve the policy of medicine industries, guide enterprises to develop novel antibacterial agents, and support the industrialization of novel antibacterial agents. To promote the merger and reorganization of antibacterial enterprise, and encourage the application of new technology and apparatus for the technological transformation and green manufacturing of antibacterial agents.

4.To strengthen the construction of antibacterial agent application and antimicrobial resistance control system.

1)To standardize management of clinical application of antibacterial agents and implement antimicrobials stewardship program. To strictly implement the relevant provisions such as Drug Administration Law, The Regulations of Medical Institutions, Prescription Administrative Policy, Pharmaceutical Affairs Management of Medical Institutions, The Administrative Regulations of Clinical Application of Antibacterial Drugs, Management of Hospital Prescription Evaluations (Trail), The Guidelines for Clinical Application of Antibacterial Drugs, and so on. To encourage the establishment of multidisciplinary cooperation mechanisms in hospitals. Multidisciplinary working groups consist of clinical departments; infectious diseases unit, clinical microbiology unit, pharmacy and hospital infection management unit to enhance the implementation of antimicrobial stewardship program. To continuously carry out the surveillance of clinical consumption of antibacterial agents and antimicrobial resistance. To timely release the survey results, and make effective use of the survey results. To strengthen the capacity building of clinical staff, especially personnel of primary healthcare institutions, in the rational use of antibacterial agents. To improve the environment of medical institutions and healthcare, and strengthen the management of hospital infections. To greatly

enhance the construction of information systems of medical institutions for antibacterial agent management through information-based methods, and gradually achieve scientific and efficient management to establish a sustainable development system of resistance control.

2) To strengthen the supervision and management of veterinary antibacterial agents. To formulate the application guidelines and administrative regulations of veterinary antibacterial drugs, and timely revise application specifications of animal feed additives and banned drug list. To implement veterinary drug classification management system and practice system of veterinary antibacterial agents sales with prescription. To strictly manage various sale channels of raw antibacterial drugs. To implement clean animal breeding, strengthen animal farm sanitation management, improve the animal breeding manner and guarantee animal health. To strengthen the management of animal feed additives, reduce preventive use of sub-therapeutic concentration antimicrobials, forbid husbandry use of important human antibacterial agents, intensify risk assessment of veterinary antibacterial agents, and speed up the elimination of high-risk drugs. To establish the classification schemes of human and veterinary antibacterial drugs to define different types of antibacterial drugs, and classify the levels of these agents on the basis of drug importance, cross resistance and clinical application.

5. To optimize antimicrobials consumption and antimicrobial resistance surveillance system.

1) To optimize antimicrobials consumption and antimicrobial resistance surveillance network in clinics. To set up a national surveillance center for clinical antimicrobials consumption and antimicrobial resistance on the basis of existing resources. The center is responsible for the surveillance of antimicrobials use and antimicrobial resistance in healthcare settings. The center is also responsible for developing surveillance standards and protocols, and launching the surveillance into practice. In order to improve the performance, universal survey, active monitoring and target bacterial monitoring will be implemented. To obtain the comprehensive data of antimicrobial resistance epidemiology, the surveillance system is expected to cover the tertiary, secondary and primary healthcare institutions, and both inpatients and outpatients will be included in the monitoring objects.

2) To establish and improve the surveillance network of antimicrobials consumption and antimicrobial resistance in animal breeding. To set up a national surveillance center of animal antimicrobials consumption and antimicrobial resistance on the basis of existing resources. The center is responsible for surveillance of antimicrobials consumption and antimicrobial resistance in livestock, developing the surveillance standards and protocols, and launching the surveillance into practice. In order to improve the performance, universal survey, active monitoring and target bacterial monitoring will be implemented. To get the epidemiological data of animal origin antimicrobial-resistant bacteria,

the surveillance will cover different geographic areas, various animal breeding methods, different farming sizes (households) and the markets of representative animal products (food).

3) To develop interactive mechanisms between health care system and breeding industry in the surveillance of antimicrobials consumption and antimicrobial resistance; to achieve the mutual reference of the data from the two areas. In order to provide the evidence for strengthening the management of antibacterial use in healthcare and animal industry, a scientific and reasonable evaluation system will be established.

4) To establish antimicrobial resistance reference laboratories and bacterial strain banks. The laboratories are responsible for identifying antimicrobial-resistant bacteria, standardizing the resistance research and surveillance technology, collecting and storing the antimicrobial-resistant isolates, and providing type strains for clinics and research.

6. To improve the capacity of professional personnel in antimicrobial resistance prevention and control

1) To strengthen the training of med-pharm students. To encourage med-pharm schools and universities to set up the course of rational use of drugs. To encourage agriculture and forestry universities to set up the course of animal infectious disease therapy.

2) To strengthen the training of professional healthcare staff. To enhance the training of professional personnel in rational use of antimicrobials and antimicrobial resistance, especially in infectious diseases, clinical pharmacy, and clinical microbiology, to meet the requirement of staffing healthcare institutions with proper number of practitioners. To strengthen continuing education of healthcare staff in rational use of antimicrobials and antimicrobial resistance. Healthcare staff should have a certain number of continuing education and get CME points.

3) To strengthen the education of the animal industrial practitioners and veterinarians. To train and strengthen the veterinary team. To enhance the education of rational use of antimicrobials among the veterinarians and breeding industrial practitioners. To promote the implementation of related regulations, and improve rational antimicrobials use in veterinary settings by conducting regular or irregular trainings.

7. To strengthen the prevention and management of environmental pollution of antimicrobials

From the perspective of planning and planning environmental impact assessment (EIA), to strictly choose the sites for antibacterial pharmaceutical companies and EIA must be strictly enforced in the new setup, reconstruction, extension of antibacterial pharmaceutical projects. To accelerate formulating the evaluation system for indicators of antimicrobial pollution, and strengthen environmental law enforcement on antimicrobials contamination. To improve the capacity-building of surveillance techniques and regulations about antimicrobials environmental pollution in water, soil,

and solid waste. To carry out research on the ecological impact of antibacterial agent contamination, develop the prevention and management strategies of antimicrobials environmental pollution, and promote the emission reduction of antibacterial agents waste.

#### 8.To strengthen publicity and education of antimicrobial resistance

To improve awareness and understanding of antimicrobial resistance through widely promoting the knowledge of rational use of antibacterial agents via traditional media (e.g., radio, television) and new media (e.g., Internet, micro-blog, WeChat, etc.). To combine the rational use of antibacterial agents with construction of a new socialism countryside project, bring scientific and literacy knowledge and medical services to rural areas, and integrate other policies of supporting and benefiting agriculture, rural areas and farmers to remove the unnecessary antimicrobials use. To conduct popular science education and publicity activities of rational antimicrobials use and antimicrobial resistance in primary and secondary schools to establish view of antimicrobials rational use from childhood. Healthcare institutions should strengthen education of rational antimicrobials use for patients and correct the behavior of self-medication of antibacterial agents. A publicity week on rational use of antimicrobials should be held regularly and promotion activities with the WHO should be carried out every year.

#### 9.To conduct extensive international exchanges and cooperation

To actively participate in activities organized by international organizations such as WHO, OIE and FAO, including the development of prevention and control strategies and technical standards, antimicrobials consumption and antimicrobial resistance surveillance, and personnel training and seminars. To collaborate with other countries and regions in anti-microbial resistance surveillance to control cross-border spread of anti-microbial resistant strains. To share antimicrobial resistance surveillance data and research achievement with international community to develop joint global control strategies for international hazard antimicrobial-resistant bacteria. To participate in international collaborative research to support the development of novel techniques and drugs for resistance control. To actively assist countries and regions in need to carry out drug resistance control activities.

### **IV. Supporting and guaranteeing measures**

1.To strengthen security investment. According to government health input policy, economic and social development and antimicrobial resistance trend, investment in the containment of antimicrobial resistance should be increased for the establishment of drug resistance control related facilities, equipment and personnel training. To link task completion and performance evaluation results of containment of antimicrobial resistance to government financial compensation.

2.To exert professional power. To set up National Consultative Expert Commission of Antimicrobial Resistance Containment, which consists of experts of medicine (basic and clinical medicine, TCM), veterinary medicine (veterinary drugs), microbiology, pharmacy, biological pharmaceuticals, health management, environmental protection, commercial circulation management, epidemiology, biological statistics, economics, education, media and information technology. The Commission provides consultation and policy recommendations for the management of antibacterial agents and containment of antimicrobial resistance. By referring to the organization of the Commission, local areas can set up local consultative committees for containment of antimicrobial resistance.

3.To strengthen supervision and inspection. According to the requirements of this action plan, the work objectives and tasks should be distributed to specific departments and implemented responsibly. Relevant authorities should regularly inspect annual work situation, especially the antimicrobials use in healthcare and agriculture, sales with prescription in retail pharmacies. Failure to comply and violations will be punished to ensure the effective implementation of the action plan.