

Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2017-2022



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Preface

This Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2017-2022) (Action Plan) outlines the overview of antimicrobial resistance (AMR) in global and local context. It provides a list of actions and activities that the Hong Kong Special Administrative Region Government is planning to pursue in an effort to contain the growing threat of AMR in Hong Kong.

Mid-term and final reviews on the actions proposed will be conducted within the five-year period by the High Level Steering Committee on Antimicrobial Resistance (HLSC). New actions will be added as needed and existing actions may be modified or removed depending on progress or changes to the development of AMR problem.

The HLSC and all participating bureaux, departments and organisations will continue to keep abreast of international and local development such that the Action Plan can be updated over time and tailored to local needs.

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Abbreviations

AFCD	Agriculture, Fisheries and Conservation Department
AI	Avian influenza
AIDS	Acquired Immunodeficiency Syndrome
AMR	Antimicrobial resistance
ASP	Antibiotic stewardship programme
AST	Antibiotic sensitivity testing
ATC	Anatomical therapeutic chemical
BCG	<i>Bacillus Calmette-Guerin</i>
BDO	Bed day occupied
CA-MRSA	Community-associated methicillin-resistant <i>Staphylococcus aureus</i>
CCIDER	HA Central Committee on Infectious Diseases and Emergency Response
CFS	Centre for Food Safety
CHP	Centre for Health Protection
CLSI	Clinical and Laboratory Standards Institute
CPD	Continuous Professional Development
CPE	Carbapenemase-producing <i>Enterobacteriaceae</i>
CRA	Carbapenem-resistant <i>Acinetobacter</i>
DDD	Defined daily dose
DH	Department of Health
<i>E. coli</i>	<i>Escherichia coli</i>
EDB	Education Bureau
eHR	Electronic health record system
ESBL	Extended-spectrum β -lactamase
ESBL <i>E. coli</i>	Extended-spectrum β -lactamase producing <i>Escherichia coli</i>
EUCAST	European Committee on Antimicrobial Susceptibility Testing
FAO	Food and Agriculture Organization of the United Nations
FEHD	Food and Environmental Hygiene Department
FHB	Food and Health Bureau
GLASS	Global Antimicrobial Resistance Surveillance System
GMP	Good Manufacturing Practice
HA	Hospital Authority
HIV	Human immunodeficiency virus
HLSC	High Level Steering Committee on Antimicrobial Resistance
HMRF	Health and Medical Research Fund
HPPAR	Health Protection Programme on AMR
ICID Portal	Hong Kong Training Portal on Infection Control and Infectious Disease
ICN	Infection control nurse

IMPACT	Inter-hospital Multi-disciplinary Programme on Antimicrobial Chemotherapy
KAP	Knowledge, attitude and practice
MDR-TB	Multi-drug-resistant tuberculosis
MDROs	Multi-drug-resistant organisms
MRL	Maximum residue limits
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
NDM-1	New Delhi metallo-beta-lactamase-1
OECD	Organisation for Economic Co-operation and Development
OIE	World Organisation for Animal Health
PHLC	Public Health Laboratory Centre
PHLSB	Public Health Laboratory Services Branch
PIC/S	Pharmaceutical Inspection Co-operation Scheme
PPBHK	The Pharmacy and Poisons Board of Hong Kong
SENIC	Study on the efficacy of nosocomial infection control
STI	Sexually transmitted infections
TB	Tuberculosis
TB&C	Tuberculosis and Chest Service
TFCM	Task Force on Clinical Management
UK	United Kingdom
UN	United Nations
URTI	Upper respiratory tract infection
WG-ASP	Working Group on Antibiotic Stewardship Programme
WHO	World Health Organization
WPRO	World Health Organization Regional Office for the Western Pacific
XDR-TB	Extensively drug-resistant tuberculosis

Executive summary

Antimicrobial resistance (AMR) occurs when microorganisms change in ways that render the medications used to cure the infections they cause ineffective. AMR is a global public health concern that results in reduced efficacy of antimicrobials, making the treatment of patients difficult, costly or even impossible. While AMR in bacteria, viruses, fungi and parasites are all significant to human health, this Action Plan focuses on resistance in bacteria that present an urgent or serious threat to public health. For *Mycobacterium tuberculosis* and sexually transmitted pathogens such as *Neisseria gonorrhoeae* which are governed by disease-specific programmes, their relevant AMR control measures would be monitored by the respective disciplines and will not be discussed in detail here.

As it is well-recognised that the health of humans is connected to the health of animals and the environment, the 'One Health' approach has been distinguished as a major element of AMR control and prevention strategies by international agencies, including the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE). The rising threat of AMR should be addressed by a comprehensive framework taking a multi-sectoral and whole-of-society approach as resistant bacteria arising either in humans or animals may spread from one sector to another and from one country to another. Human medicine, veterinary medicine, agriculture and the food sector should therefore take collective actions to minimise the emergence and spread of AMR. Investment and resources should be drawn to ensure effective implementation and sustained efforts from relevant stakeholders.

The Government of the Hong Kong Special Administrative Region (the Administration) has all along recognised the growing problem of AMR. Different sectors have been implementing control measures with a common view to contain its spread. In recognition of the major threat posed by AMR, the Administration announced in the 2016 Policy Address the setting up of a High Level Steering Committee on Antimicrobial Resistance (HLSC) to formulate strategies in collaboration with the relevant sectors to tackle the threat. This Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2017-2022) (Action Plan) is developed around the following goals to provide guidance to not only public health and veterinary partners, but also to coordinate efforts from all sectors of the community.

Goals

- Adopt the principles of the WHO Global Action Plan as the main strategies to tackle AMR in Hong Kong;
- Develop a territory-wide network across different sectors to strengthen surveillance on AMR and antimicrobial use;
- Promote appropriate therapeutic use of antimicrobials in humans and animals under the oversight of health and veterinary professionals and discourage misuse and overuse;
- Encourage collaboration among different stakeholders, including the private sector, to enhance awareness of AMR;
- Promote research for innovations in medicines, diagnostics and related interventions and to understand drivers of resistance including operational research in the local context; and
- Participate in global collaborative research activities.

Strategic framework

To achieve the set goals, six key areas, with a total of 19 objectives, have been identified with an aim to slow the emergence of AMR and prevent its spread.

1. Strengthen knowledge through surveillance and research;
2. Optimise use of antimicrobials in humans and animals;
3. Reduce incidence of infection through effective sanitation, hygiene and preventive measures;
4. Improve awareness and understanding of AMR through effective communication, education and training;
5. Promote research on AMR; and
6. Strengthen partnerships and foster engagement of relevant stakeholders.

These actions have been made after consulting stakeholders from across sectors, disciplines and organisations, and most importantly soliciting their support for implementing them. The list of recommended actions is summarised in the **Summary table** on pages 74-81.

Introduction

1. Antimicrobial resistance (AMR) occurs when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render the medications used to cure the infections they cause ineffective. AMR is a global public health concern. For the past few decades, AMR has been a growing threat to effective treatment of an ever-increasing range of infections caused by bacteria, viruses, fungi and parasites. AMR results in reduced efficacy of antimicrobials, making the treatment of patients difficult, costly or even impossible. The impact is felt particularly by vulnerable patients, as it can result in prolonged illness and increased mortality. The magnitude of the problem worldwide and its impact on animal and human health, on costs for the relevant sectors and in wider society are still largely unknown¹.

2. The emergence and dynamics of AMR genes in bacteria circulating among humans, the environment and animals are not entirely known. AMR develops when microorganisms adapt and grow in the presence of antimicrobials (including properly used antimicrobials). Resistance develops more rapidly through the misuse and overuse of antimicrobials. AMR bacteria are often acquired through ingestion or contact (and enriched especially during antimicrobial treatment), from colonised or infected animals/food, humans, or their contaminated environment² (**Figure 1**). The World Health Organization (WHO) stated in its Global Report on Surveillance 2014 that ‘food-producing animals are reservoirs of pathogens with the potential to transfer resistance to humans. The magnitude of such transmission from animal reservoirs to humans remains unknown, and will probably vary for different bacterial species.’. It must be emphasised that AMR has no respect for borders and direction and can be transmitted in a bi-directional manner from animals to humans and vice versa.

Figure 1: Antibiotic Resistance- How it spreads



Antimicrobial resistance (AMR) is a broader term that encompasses resistance to drugs to treat infections caused by pathogens including bacteria, viruses, fungi and parasites. While all are significant to human health, the discussion will focus on resistance in bacteria that present an urgent or serious threat to public health.

Global situation on antimicrobial resistance

3. It is estimated by the Organisation for Economic Co-operation and Development (OECD) that about 700,000 deaths may be caused each year by AMR globally³. Morbidity and mortality caused by these strains of microorganisms are estimated to be two to three times those of the non-resistant strains⁴. The healthcare and societal cost due to loss of productivity will also be much increased. If no effective strategies are put in place, this toll will exceed 10 million each year by 2050 and will cost the world over 100 trillion USD in lost output⁵.

WHO response

4. In response to this serious public health issue, a Global Action Plan on AMR was drafted by WHO⁶ and adopted by Member States at the Sixty-eighth World Health Assembly in May 2015. Member States agreed on the importance of developing national action plans aligned with the WHO Global Action Plan and incorporating the strategic objectives.

5. The World Assembly of Delegates of the World Organisation for Animal Health (OIE) adopted a resolution for Member Countries also in May 2015 to follow the guidance of the WHO Global Action Plan by developing national action plans in respect of the use of antimicrobials in animals and ensuring their close collaboration with public health officials⁷. In June 2015, the Thirty-ninth Conference of the Food and Agriculture Organization of the United Nations (FAO) adopted a resolution and status report on AMR. The FAO resolution urges members to develop or strengthen national plans, strategies and international collaboration for the surveillance, monitoring and containment of AMR in food, agriculture and the environment, in close coordination with related plans for human health⁸.

6. In response, the Sixty-fifth session of the WHO Regional Committee for the Western Pacific published in 2015 the Action Agenda for AMR in the Western Pacific Region⁴. The action agenda focuses on three priority areas:

- Developing and implementing comprehensive national plans to contain AMR and raising awareness of the issue in multiple sectors;
- Improving surveillance on AMR and the monitoring of antimicrobial use; and
- Strengthening the health system response to contain AMR.

7. Global leaders recognised the threat of AMR to global health. At the United Nations (UN) General Assembly in New York in September 2016, they committed to fighting AMR together. This was the fourth time in history that a health topic was discussed at the UN General Assembly (human immunodeficiency virus (HIV), non-communicable diseases and Ebola were the others). Heads of State and Heads of Delegations addressed the seriousness and scope of the situation and agreed on sustainable, multi-sectoral approaches to addressing AMR.

One Health approach

8. The One Health concept is based on the recognition that the health of humans is connected to that of animals and the environment, and that AMR must be tackled at all three levels (**Figure 2**). The international consensus is that the selective pressure by antibiotics on the microbiota (the ecological community of commensal, symbiotic and pathogenic microorganisms that share our body space) of animals and humans, and their associated environments (especially farms and healthcare institutions), sewage systems and soil are likely to confer survival advantages upon bacteria with antimicrobial resistance genes, which may be further disseminated through mobile plasmids or transposons with integrons⁹⁻¹². There are many examples of disease spreading between animals and humans such as avian flu and rabies. Animals also share humans' susceptibility to environmental hazards. Cooperation among human, animal and environmental health communities is therefore required for successful public health intervention^{13,14}.

Figure 2: One Health



National action plans

9. International strategic guidelines and operational frameworks have been developed to provide guidance on best practice in formulating actions. In particular, all plans should reflect the principles identified in the WHO Global Action Plan:

- Whole-of-society engagement, including One Health approach;
- Prevention first;
- Ensuring access while avoiding excess;
- Sustainability of interventions; and
- Incremental targets for implementation.

10. As different countries are at different stages combating AMR, the activity planning and priority setting are often diverse depending on the availability of coordinating mechanisms, existing legislation, laboratory capacity and data on the impact of AMR on society.

Mainland China

11. In mainland China, the National Health and Family Planning Commission of the People's Republic of China, together with another 13 ministries/commissions issued the National Action Plan for Containment of Bacterial Resistance (2016-2020) (《遏制细菌耐药国家行动计划(2016-2020年)》) in August 2016 outlining major strategies and actions in the following nine areas with emphasis on the importance of increasing investment in drug-resistant control-related activities and infrastructure¹⁵⁻¹⁷.

- Every department shall play their joint roles and perform their perspective duties;
- Intensify antibacterial research and development efforts;
- Strengthen the assurance and management of antibacterials supply;
- Intensify efforts on developing a sound system to monitor and control the use of antibacterials;
- Optimise the antibacterials application and AMR monitoring system;
- Enhance the medical staff abilities to prevent and control AMR;
- Strengthen prevention and control of environmental pollution caused by antibacterials;
- Strengthen efforts on public education and publicity; and
- Carry out extensive international exchanges and cooperation.

United Kingdom (UK)

12. The UK Five Year AMR Strategy 2013 to 2018 was published to set out actions to address the key challenges to AMR with the following seven key areas of actions¹⁸:

- Better access to and use of surveillance data, in human and animal sectors;
- Optimise prescribing practice by technologies, through good antibiotic stewardship;
- Improve infection prevention and control practices in human and animal health;
- Improve professional education, training and public engagement;
- Develop new drugs, treatments and diagnostics through better collaboration between research councils, academia, industry and others;
- Better identification and prioritisation of AMR research needs; and
- Strengthen international collaboration.

Serial reports have also been released on measuring success reporting progress in implementation¹⁹⁻²¹.

Sweden

13. The Swedish Strategy to Combat Antibiotic Resistance was published in 2016 to curb the development and spread of antibiotic resistance, which highlighted seven objectives as follows²²:

- Increased knowledge through enhanced surveillance;
- Continuous strong preventive measures;
- Responsible use of antibiotics;
- Increased knowledge for preventing and managing bacterial infections and antibiotic resistance with new methods;
- Improved awareness and understanding in society about antibiotic resistance and counter-measures;
- Supporting structures and systems; and
- Leadership within the European Union and in international cooperation.

United States of America

14. An Executive Order was issued by the President of the United States in 2014 to accord high priority to the rising challenge of AMR²³. A national action plan was developed in March 2015 to outline steps to control infections caused by ‘urgent and serious’ antibiotic-resistant bacteria such as *Clostridium difficile*, carbapenem-resistant *Enterobacteriaceae* and *Neisseria gonorrhoeae* through²⁴:

- Integrated One Health approach to enhance and integrate data from surveillance systems that monitor human and animal pathogens;
- Create regional public health laboratory network to standardise testing and enhance capacity on genetic characteristics of bacteria;
- Enhance monitoring of antibiotic sales, usage and resistance in multiple points along food-production chain;
- Implement Antibiotic Stewardship Programme (ASP) in healthcare, animal production and veterinary settings;
- Support development and use of rapid and innovative diagnostic tests; and
- Improve collaboration with international bodies and capacities for prevention, surveillance, research and development.

Australia

15. In Australia, the First National Antimicrobial Resistance Strategy 2015-2019 was released in 2015 with the following priority areas for action²⁵:

- Develop nationally coordinated One Health surveillance on AMR and antimicrobial usage;
- Implement effective antimicrobial stewardship practices across human health and animal care settings;
- Improve infection prevention and control measures across human health and animal care settings to help prevent infections and the spread of AMR;
- Increase awareness and understanding of AMR, its implications, and actions to combat it through effective communication, education and training;
- Agree on a national research agenda and promote investment;
- Strengthen international partnerships and collaboration; and
- Establish and support clear governance arrangements at local, jurisdictional, national and international levels to ensure leadership, engagement and accountability for actions to combat AMR.

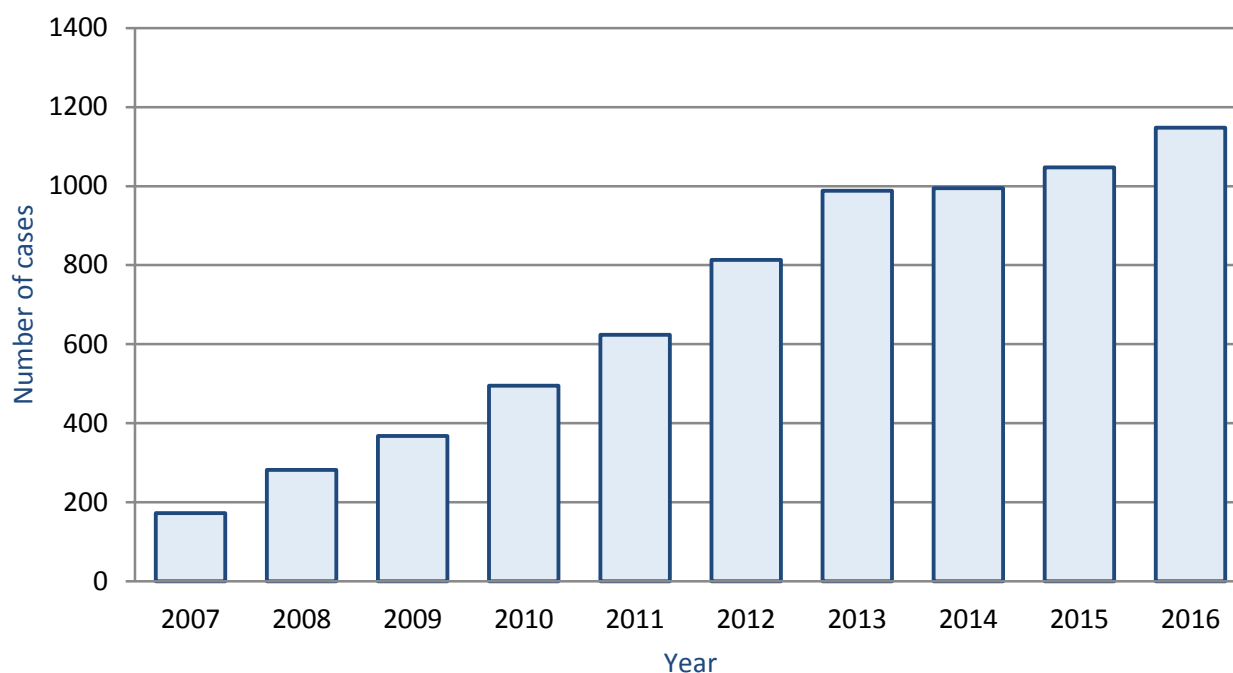
Hong Kong situation

16. Hong Kong's population of about 7.32 million is provided with a comprehensive range of medical and health services by the public and private sectors. The Department of Health (DH) is the Government's health adviser and agency to execute health policies and statutory functions. It safeguards community health through promotive, preventive, curative and rehabilitative services as well as fostering community partnerships and international collaboration. The Hospital Authority (HA) is a statutory body responsible for the management of all public hospitals. There are about 27,900 beds in 42 public hospitals²⁶ and institutions under HA and 4,500 beds in 12 private hospitals.

17. In Hong Kong, about 70% of out-patient consultations are provided by the private sector. In contrast, about 20% of patients attend private hospitals and 80% attend HA hospitals as in-patients.

18. Hong Kong, like many other developed economies, is experiencing a significant public health threat from AMR. DH and HA regularly monitor the situation of drug resistant organisms. According to DH statistics, the number of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) cases notified to the Centre for Health Protection (CHP) of DH has increased five-fold in the past nine years, with approximately 1,000 reports annually in the recent three years (**Figure 3**).

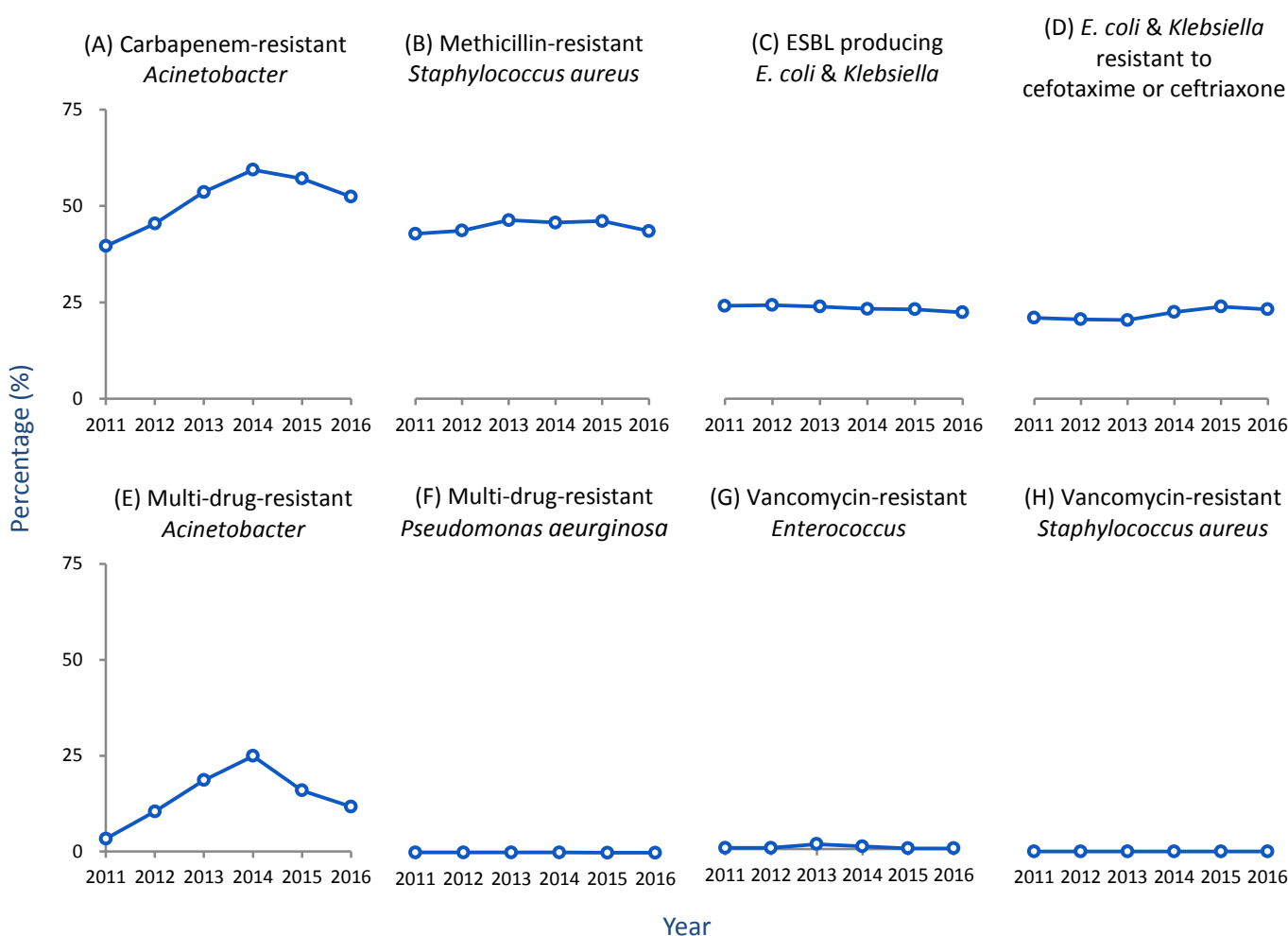
Figure 3: Number of CA-MRSA cases recorded in Hong Kong



Source: Department of Health (2007-2016)

19. When microorganisms become resistant to antimicrobials, they are often referred to as ‘superbugs’. HA actively monitors selected superbugs with multi-drug-resistance through their routinely collected laboratory statistics from in-patient and out-patient microbiological investigations. The Superbug Report (2011-2016) showed different degrees of drug resistance among bacteria (**Figure 4**) with around 50% of *Acinetobacter* resistant to carbapenem, 40% of *Staphylococcus aureus* resistant to methicillin and 20% of *Escherichia coli* being extended-spectrum β -lactamase (ESBL) producing. Since the implementation of an active bacterial screening program for early detection of asymptomatic superbugs carriers, HA also detected an increase in carbapenemase-producing *Enterobacteriaceae* (CPE) cases in recent years (from 19 patients in 2011 to 340 patients in 2016).

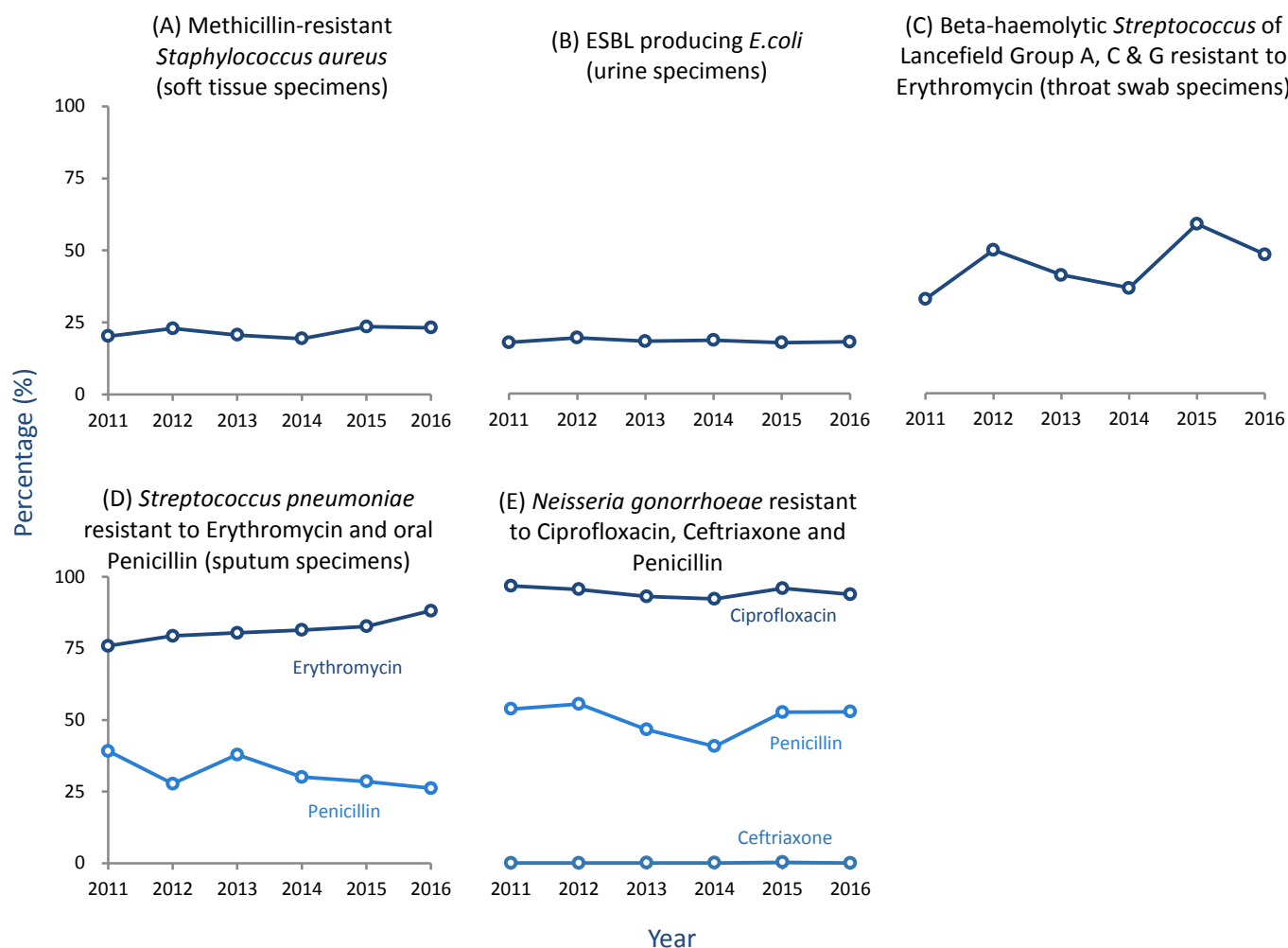
Figure 4: Percentage of isolate cultured to be multi-drug-resistant organism



Source: Hospital Authority Superbug Report (2011-2016)

20. The Public Health Laboratory Services Branch (PHLSB) of CHP also performed bacterial isolation and antimicrobial susceptibility tests on bacterial isolates collected from public and private out-patient settings (**Figure 5**).

Figure 5: Bacterial pathogen isolation and percentage of antimicrobial resistance (out-patient setting)



Source: Public Health Laboratory Services Branch, Centre for Health Protection

(Note: Numbers and trends presented here should be interpreted with caution in light of the small specimen numbers in particular categories.)

21. For *Mycobacterium tuberculosis*, viruses (hepatitis B, hepatitis C and HIV) and sexually transmitted pathogens such as *Neisseria gonorrhoeae*, disease-specific programmes are in place under DH.

22. The Social Hygiene Service is responsible for the prevention and control of sexually transmitted infections (STI). The Anti-Venereal Disease Office carries out contact tracing, health education and outreach activities to control the spread of STI. The Social Hygiene Service together with PHLSB has all along been monitoring the emergence of resistance in *gonococcus* (Figure 5).

23. The Tuberculosis and Chest Service (TB&C) plays a key role in the prevention and control of tuberculosis (TB). Its main activities cover the surveillance and case finding of tuberculosis, the provision of directly observed treatment, the *Bacillus Calmette-Guerin* (BCG) vaccination programme for new-borns and children aged under 15, and health education and research. Besides coordinating TB control activities among different health sectors, TB&C operates chest clinics in Hong Kong, providing out-patient service to patients suffering from tuberculosis and various chest diseases. Hong Kong has been classified by WHO as a place of intermediate TB burden with good health infrastructure. The notification rate of TB decreased from 113.7 per 100,000 in 2000 to 60.5 per 100,000 in 2015. Bacillary resistance rates to the first-line TB drugs were also on a declining trend, with only about 1% of all culture-confirmed TB being MDR-TB (multi-drug-resistant tuberculosis) and about 0.1% being XDR-TB (extensively drug-resistant tuberculosis)²⁷.

24. The Special Preventive Programme of DH is responsible for the prevention, surveillance and clinical management of HIV/acquired immunodeficiency syndrome (AIDS) and the prevention of viral hepatitis. Its four main areas of activities include clinical programme, HIV prevention and health promotion, policy development as well as research and epidemiology programme. A HIV Drug Resistance Working Group was set up in 2008 to collect surveillance data on primary, transmitted HIV drug resistance, compile data on early warning indicators from major treatment centres, monitor development of resistance upon treatment, and report and make recommendations on the prevention and control of HIV drug resistance in Hong Kong. Primary transmitted HIV drug resistance fluctuates at around 3% from 2010 to 2014²⁸.

Significance of various superbugs^{1,29}

Carbapenem-resistant *Acinetobacter* (CRA)

Acinetobacter can cause pneumonia or blood stream infections especially among critically ill patients. CRA's resistance to carbapenems (often considered last-resort antibiotics) render these infections difficult to treat with a limited drug choice.

Methicillin-resistant *Staphylococcus aureus* (MRSA)

Staphylococcus aureus can be a part of normal flora on the skin and in the nose. It is one of the commonest causes of infection of skin, soft tissue, bone and blood stream, as well as the commonest cause of post-operative wound infection.

Resistance to methicillin renders commonly used antibiotics (as well as prophylactic antibiotics) useless. This poses significant risk to orthopaedics and surgical procedures. Second-line antibiotics to treat MRSA are not without significant side-effects.

Extended-spectrum β -lactamase-producing *Escherichia coli* (ESBL *E. coli*)

E. coli is part of the gut flora, as well as the commonest cause of urinary tract infection and blood stream infection.

Resistance to third-generation cephalosporins means the use of second-line, often last resort, antibiotics such as carbapenems is needed. This drives the development of resistance towards these last-resort antibiotics and could lead to future untreatable infection.

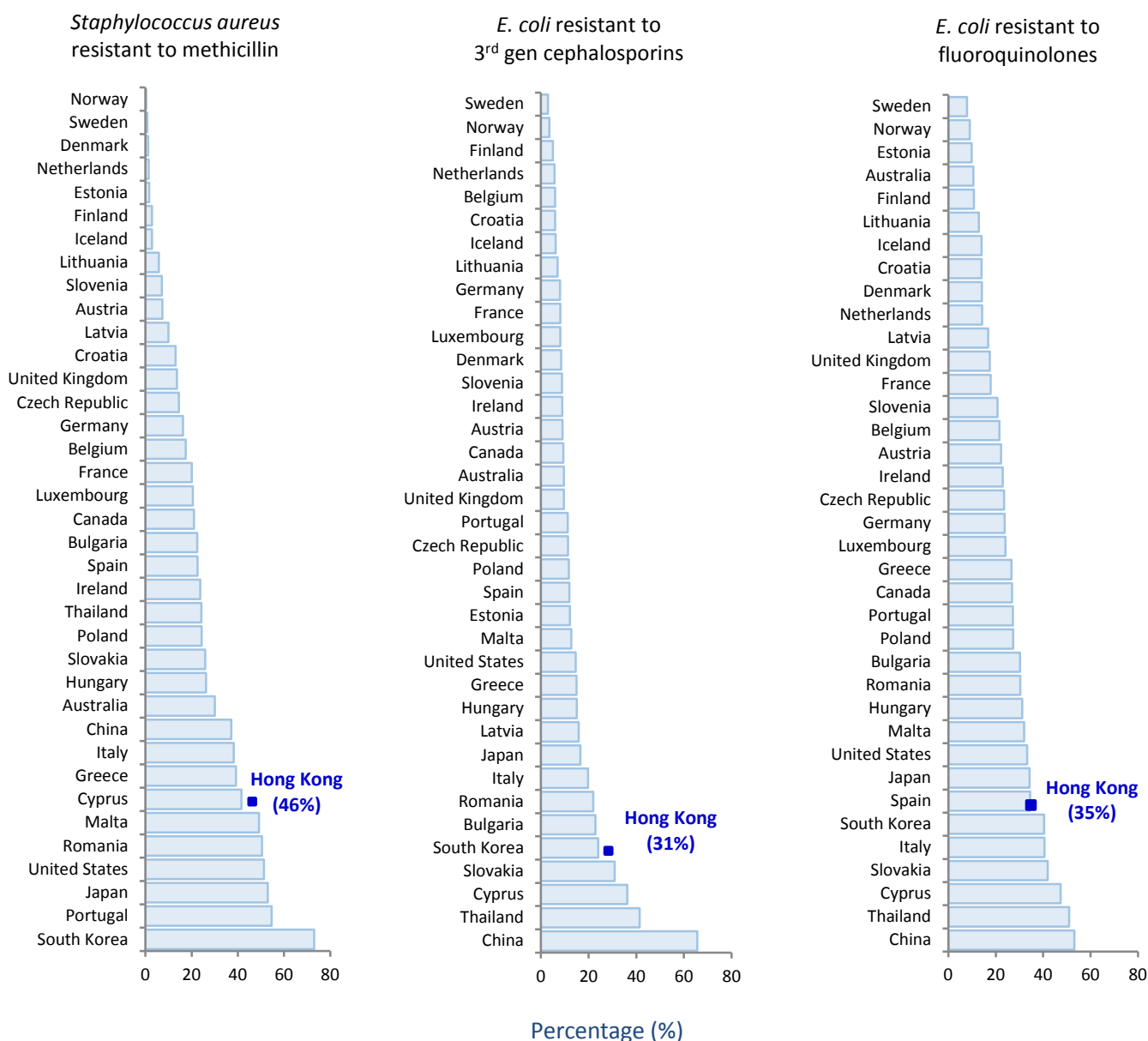
Carbapenemase-producing *Enterobacteriaceae* (CPE)

CPE are bacteria (which include gut flora such as the *Klebsiella* species and *E. coli*) that can produce enzyme(s) which can inactivate carbapenems and other beta-lactams such as penicillins. These enzymes, such as NDM-1 (New Delhi Metallo-beta-lactamase-1), are usually encoded on plasmids that harbour multiple resistance determinants and are transmitted easily from one bacterium to another. CPE are commonly resistant to multiple antimicrobials, limiting therapeutic options and rendering severe clinical infections difficult to treat. Infections vary from being asymptomatic to potentially life-threatening or fatal. The level of risk depends on which part of the body is affected by the infection, and the general health of the patient.

Introduction

25. When compared to mainland China and overseas countries, the proportions of AMR in both Gram-positive and Gram-negative bacteria, represented by HA’s data on *Staphylococcus aureus* resistant to methicillin and *E. coli* resistant to third-generation cephalosporins and fluoroquinolones respectively, are both at a high level in Hong Kong (Figure 6).

Figure 6: Percentage of resistant bacterial isolates in mainland China and overseas countries



Source: Hospital Authority Laboratory Data (2014)

(Note: These data should be interpreted with caution due to variation in study methodology among different countries¹.)

Food animal production

26. Hong Kong has a relatively small scale food animal (including pigs, poultry and fish) farming sector, comprising 72 livestock farms (43 pig farms and 29 chicken farms) and some 1,300 marine and freshwater fish farms. The total production of these farms accounts for around 2% of livestock and fresh meat and around 1% of live and fresh fish consumed in Hong Kong. As such, Hong Kong relies heavily on food imported from elsewhere, including mainland China and overseas countries.

27. All livestock farms are subject to licensing control in accordance with the Public Health (Animals and Birds) (Licensing of Livestock Keeping) Regulation (Cap. 139L). The Agriculture, Fisheries and Conservation Department (AFCD) conducts regular inspection of these farms to ensure their compliance with the licensing conditions and provisions under Cap. 139L and other relevant regulations. AFCD also enforces the Public Health (Animals and Birds) (Chemical Residues) Regulation (Cap. 139N), which aims to regulate the feeding of drugs and chemicals to food animals. Cap. 139N stipulates a list of seven prohibited chemicals and a list of 37 veterinary chemicals with the respective maximum residue limits (MRL) in meat and tissues.

28. Currently, there is very little surveillance being done in terms of AMR in animals. Serum, urine, faecal and environmental samples are taken regularly from pigs and poultry farms to monitor animal diseases and chemical residues to safeguard human health. Necessary actions will be taken for any positive findings on the samples. For fish farms, regular farm visits are made by AFCD to provide technical assistance to fish farmers in good aquaculture practices including the proper use of antibiotics. Fish and feed samples are collected from farms during the visits for surveillance on antimicrobial usage.

29. The Centre for Food Safety (CFS) has put in place a food surveillance programme and collects about 65,000 food samples each year at the import, wholesale and retail levels to ensure that food is fit for human consumption. The food samples undergo microbiological examinations, chemical analyses and radiation level tests to assess their compliance with legal standards. The overall satisfactory rate of these tests has consistently been above 99%. The current food regulatory regime is not designed for addressing the issue of AMR and CFS's food surveillance programme does not collect data on AMR in food. Specifically, as far as meat, poultry and other non-ready-to-eat foods are concerned, the current focus of CFS's surveillance and enforcement work understandably rests with food safety and fitness for human consumption (such as the presence of veterinary drug residues and preservatives). As a natural corollary, even if such non-ready-to-eat foods detected with bacteria or pathogens (regardless of whether the bacteria/pathogens are AMR or non-AMR) exceed the levels under CFS's Microbiological Guidelines for Food, follow up and enforcement actions are not warranted under the existing mechanism.

Local action plan

30. The Government of the Hong Kong Special Administrative Region (the Administration) has all along recognised the growing problem of AMR. Different sectors have been implementing control measures with a common view to contain its spread. In recognition of the major threat posed by AMR, the Administration announced in the 2016 Policy Address the setting up of a High Level Steering Committee on Antimicrobial Resistance (HLSC) to formulate strategies in collaboration with the relevant sectors to tackle the threat. The One Health approach, in which the human and veterinary health, agricultural and food production sectors work together, is identified by the Administration for containing the spread of AMR. As such, the HLSC which is chaired by the Secretary of Food and Health, includes representatives from the Administration, public and private sectors, academia and professional bodies in the above fields.

31. Under the HLSC, an Expert Committee on Antimicrobial Resistance was established in October 2016 to provide expert opinions on priority areas for actions for the HLSC's consideration when drawing up the local action plan. The Expert Committee on Antimicrobial Resistance comprises local and overseas experts in the fields of human and veterinary medicine, microbiology, public health, pharmacology and agriculture.

32. Since its establishment in October 2016, the Expert Committee on Antimicrobial Resistance has met twice to discuss the following in making a Recommendation to Combat AMR in Hong Kong to the HLSC:

- The effect of AMR on population health;
- The global burden of AMR;
- Overseas strategies and interventions in reducing AMR-related harm and evidence of their effectiveness; and
- The current Hong Kong situation in relation to AMR and its interventions.

Feasibility and practicality considerations

33. The assessment in various sectors has provided remarkable insight into the local situation and revealed that major information gaps exist which imply huge resource and policy implications. In this connection, an incremental stepwise approach would be more practical in the battle against AMR. As a start, fact-finding, research and gap analysis should proceed alongside stakeholder engagement and consultation, with a view to gauging the difficulties faced by the stakeholders, and which in turn would facilitate the formulation of a pragmatic and feasible implementation plan that can optimally combine support and pressure in inducing sustainable and progressive improvement by the stakeholders. Such could also provide a congenial backdrop to the introduction of a statutory regulatory regime with enforcement and sanction powers.

Goals

34. The following goals are identified by the Administration to guide strategies and actions:

- Adopt the principles of the WHO Global Action Plan as the main strategies to tackle AMR in Hong Kong;
- Develop a territory-wide network across different sectors to strengthen surveillance on AMR and antimicrobial use;
- Promote appropriate therapeutic use of antimicrobials in humans and animals under the oversight of health and veterinary professionals and discourage misuse and overuse;
- Encourage collaboration among different stakeholders, including the private sector, to enhance awareness of AMR;
- Promote research for innovations on medicines, diagnostics and related interventions and to understand drivers of resistance including operational research in the local context; and
- Participate in global collaborative research activities.

Strategic framework

35. To achieve the set goals, six key areas, in accordance with the objectives of the WHO Global Action Plan, have been adopted for action. A total of 19 objectives are identified with an aim to slow the emergence of AMR and prevent its spread (**Figure 7**).

- Strengthen knowledge through surveillance and research;
- Optimise use of antimicrobials in humans and animals;
- Reduce incidence of infection through effective sanitation, hygiene and preventive measures;
- Improve awareness and understanding of AMR through effective communication, education and training;
- Promote research on AMR; and
- Strengthen partnerships and foster engagement of relevant stakeholders.

Figure 7: Framework of Hong Kong Strategy and Action Plan on Antimicrobial Resistance



36. These actions have been made after consulting stakeholders from across sectors, disciplines and organisations, and most importantly soliciting their support for implementing them. The list of recommended actions is summarised in the **Summary table** on pages 74-81.

Key Area 1

Strengthen knowledge through surveillance and research

37. Research and surveillance on AMR and antimicrobial use help inform evidence-based interventions, prioritise action, steer the direction of policy and evaluate programmes on the containment of AMR. To echo the WHO's call for a harmonised surveillance system in the region and globally, the current local situation and recommended interventions are described in this chapter.

Objective 1

Set up antimicrobial resistance surveillance system under One Health for Hong Kong

Objective 2

Build laboratory capacity to support surveillance activities in both human and animal sectors

Objective 3

Monitor antimicrobial use in humans and animals



Surveillance on antimicrobial resistance

Background

38. A comprehensive surveillance system is essential for determining the size and nature of the AMR problem in Hong Kong and for monitoring the effectiveness of measures implemented. Currently, data relevant to AMR are being collected through various systems under different sectors.

39. CHP collects AMR data from medical practitioners, laboratories and private hospitals through different platforms. CA-MRSA, a statutory notifiable disease, is required by law to be reported to DH. Sentinel points have also been set up at general out-patient clinics in public sector and private clinics to collect AMR data. Some private hospitals voluntarily report data on the occurrence of resistant strains of pathogens through collaborative projects with CHP. PHLSB of CHP supports public and private health service providers in bacterial isolation and antimicrobial susceptibility testing.

40. HA routinely collects laboratory statistics on in-patient and out-patient microbiological investigations in public hospitals and out-patient clinics. Seven selected multi-drug-resistant organisms (MDROs) are being actively monitored by HA and the results are presented in media briefs regularly. HA has also set MRSA as one of their key performance indicators, and developed an MRSA surveillance system which provides information on epidemiology and clinical data to monitor the trend. Ad hoc point prevalence surveys are performed to understand the nature and distribution of infections in public hospitals and the burden on health service utilisation.

41. The current regulatory and management regime on local food animal farms is mainly concerned with the proper usage of antibiotics and non-exceedance of residue levels for the purpose of safeguarding food safety, rather than addressing the AMR issues. As such, there is no comprehensive, systematic surveillance programme on the AMR situation in local food animal production farms. Similarly, CFS does not collect data on AMR in food in Hong Kong, as the current food regulatory regime is not designed for addressing the issue of AMR.

Objective 1 – Set up antimicrobial resistance surveillance system under One Health for Hong Kong

42. The existing AMR monitoring systems fall within different sectors but not across sectors. Existing strategies against AMR laid down by the Scientific Committee on Infection Control are confined to human medicines and a holistic plan among all sectors (public health, food and agricultural industries, human and veterinary pharmaceutical sectors) is yet to be developed.

43. Although a number of data sources are available in the public health sector, they are currently uncoordinated and without alignment with regional or global surveillance systems – the Global Antimicrobial Resistance Surveillance System (GLASS). The burden of AMR infection, including the incidence and prevalence of AMR, its related morbidity, mortality, other health outcomes and the associated economic cost, remains largely unknown²⁹. Surveillance on AMR will therefore be strengthened, in particular the information in private medical practice, animal and food industry.

44. As the improper or widespread use of antimicrobials in food animal production, especially as growth promoters, is thought to be one of the factors leading to the AMR problem, there is a need to put in place a structured surveillance system to monitor the prevalence of AMR microorganisms in food animals and farm environments, and the amount and type of antimicrobials used in food animals. A regulatory regime should also be adopted to ensure proper use of antimicrobials in food animal production. Concerted efforts by the authorities concerned and the food animal farming and veterinary sectors are required to address AMR in a holistic manner.

45. Although food-producing animals are considered as reservoirs of pathogens with the potential to transfer resistance to humans, the magnitude of such transmission remains unknown. Information on key elements such as identification of risk of individual microorganisms, high-risk food types and control measures are required to guide development of a surveillance system. The Codex Alimentarius Commission of the Joint FAO/WHO Food Standards Programme has been working on guidance on the design and implementation of an integrated surveillance on foodborne AMR along the food chain aiming to promote a harmonised approach for a better exchange and analysis among countries and areas. The guidance will cover the approaches and key components of an integrated surveillance system of AMR, including sampling sources, target microorganisms, sample design, laboratory testing and data management, as well as incorporation of information from integrated surveillance into risk analysis. The discussion on the work is expected to start in 2017 and will be adopted in 2020.

Strategic Interventions

1.1 Establish a coordination structure for One Health surveillance on AMR

Establish a Working Group on AMR One Health Surveillance (tentative name) to steer and oversee the development of surveillance on AMR and antimicrobial use:

- Form a network to gather, analyse, share and link data from multiple surveillance and monitoring systems including HA, Public Health Laboratory and future surveillance platforms covering food animals and food.
- Regularly disseminate data on AMR and antimicrobial use.

1.2 Strengthen AMR surveillance in healthcare settings

- Continue to collect AMR data in healthcare settings by HA and DH. Efforts will be put to strengthen and align AMR surveillance in healthcare settings with international standards, i.e. GLASS of WHO. It is aimed that data (clinical and laboratory) from both in-patient and out-patient service providers would be collected with a focus on priority specimens, pathogens and a selected panel of antibiotic sensitivity tests according to GLASS and opinions from the Expert Committee on Antimicrobial Resistance.

1.3 Develop AMR surveillance programme on animals

- AFCD will commission a consultancy study to devise a plan for the surveillance on AMR microorganisms in food animal production farms that are particularly pertinent to Hong Kong. The study would include drawing up a list of AMR microorganisms to be monitored in local farms with reference to the latest 'watch list' of AMR microorganisms in the region, and devising sampling and testing methodologies for assessing the prevalence and sources of AMR microorganisms in farms, including food animals and farm environment.
- Help devise the above-mentioned surveillance plan and future measures for addressing the AMR issues associated with food animal production. Actions will be taken in parallel with the consultancy study to conduct surveillance studies on imported day-old chicks and breeding pigs to ascertain if they are significant carriers of AMR microorganisms.
- Upon the adoption of the surveillance plan devised by the consultants, AFCD will carry out systematic surveillance on the AMR situation in food animal production farms and, based on the information collected, conduct assessment on the prevalence and sources of AMR microorganisms in farms.

1.4 Develop AMR surveillance programme on food

- Conduct a pilot survey to gather the required information to guide the development of a future surveillance system on food in accordance with relevant advice and the standards of pertinent international authorities such as the Codex Alimentarius Commission.

1.5 Set up a centralised platform for AMR surveillance data on human, animal, food and environment

- A centralised platform on AMR surveillance will be set up in the long run to provide information and facilitate analysis of transmitting factors of AMR among sectors. Studies and literature reviews have to be conducted to guide the scope and scale of future surveillance. Collection of data on antimicrobial resistance from both private and public health, veterinary, food and environmental (e.g. sewage) sectors in an incremental step-wise approach is of fundamental importance to objectively document the burden of the AMR problem, and to provide a rational basis for monitoring the effect of the control measures.

Objective 2 – Build laboratory capacity to support surveillance activities in both human and animal sectors

46. In order to foster standardised AMR surveillance globally, WHO has developed the GLASS³⁰ which can be taken as a reference for Hong Kong's surveillance on AMR. HA Microbiology Laboratory Network has standardised antibiotic sensitivity testing (AST) methods in accordance with the Clinical and Laboratory Standards Institute (CLSI) or the European Committee on Antimicrobial Susceptibility Testing (EUCAST). However, little is known regarding practices in performing AST in private medical laboratories.

47. Adequate funds and human resources will be identified to conduct and coordinate the surveillance activities and provide education for all participants in the surveillance system, including laboratories, epidemiologists and clinicians who handle and analyse patient data, which are currently insufficient in Hong Kong.

Strategic Interventions

2.1 Strengthen laboratory support in AMR surveillance

- Public Health Laboratory Centre (PHLC) under DH has been identified as the local reference laboratory to advise and support local medical laboratories in AMR surveillance. PHLC will support laboratories in microbiological testing such as antimicrobial susceptibility testing, confirming resistant phenotypes and molecular characterisation of resistant strains. The reference laboratory will also advise the Administration on up-to-date knowledge of emerging resistance problems.

2.2 Standardise laboratory antimicrobial susceptibility testing method for AMR surveillance

- Adoption of international standards and guidelines for antimicrobial susceptibility tests, such as CLSI or EUCAST, will be promulgated to standardise testing methods for AMR surveillance so as to enable uniformed comparison and evaluation in different sectors.

2.3 Support establishment of quality assurance programme and promote introduction in medical laboratories

- The local reference laboratory will coordinate with laboratories in conducting a quality assurance programme for continuous improvement of standards of laboratories in Hong Kong. This will be especially promoted to laboratories providing surveillance data to the AMR surveillance system.

Surveillance on antimicrobial use

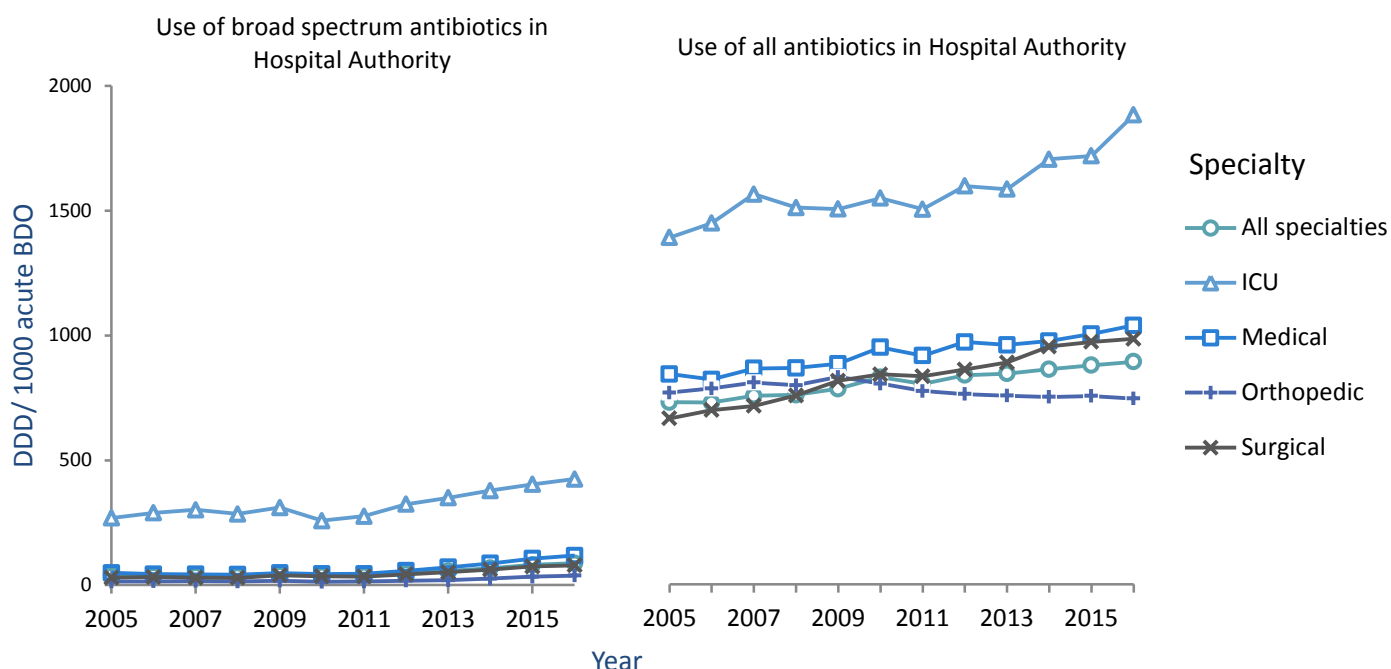
Background

48. According to the Pharmacy and Poisons Ordinance (Cap. 138) and the Antibiotics Ordinance (Cap. 137), suppliers of pharmaceutical products and antibiotics are statutorily required to keep transaction records with supporting documents. Although the wholesale supply data is not equivalent to the actual consumption data of antimicrobials in Hong Kong, they can serve as a surrogate to reflect the usage. DH has been collecting the supply data for analysis of all antibacterials for systemic use under WHO Anatomical Therapeutic Chemical (ATC) code J01 to various sectors, including HA, DH, private hospitals, private practitioners, pharmacies, dentists and veterinarians.

49. Data on antimicrobial use is available from the public health sector through their electronic dispensing system. The HA 2010 Point Prevalence Survey of Infection estimated the antibiotic use among HA hospitals. The observed overall prevalence of antimicrobial use in 2010 (30.3%) was about 3.7% higher than that in 2007. The three most common antimicrobials used were augmentin, cefuroxime and levofloxacin. The ranking was the same as in the 2007 survey³¹.

50. From a more comprehensive analysis of the use of antimicrobials by HA in 2016, it was observed that the consumption by defined daily dose (DDD) per 1,000 acute bed day occupied (BDO) of broad spectrum antibiotics (cefepime, ceftazidime, meropenem, piperacillin-tazobactam, cefoperazone-sulbactam and imipenem-cilastatin) by in-patients, by all specialties at all selected acute hospitals has increased by 108% in the past 10 years (2005-2015). When analysing the consumption of all antimicrobials together, about a 20% increase is seen in the same period (**Figure 8**).

Figure 8: Use of broad spectrum antibiotics and all antibiotics in Hospital Authority



Source: Hospital Authority (2005-2015)

(Note: The trend of antibiotic use has to be interpreted with caution because multiple factors including host factors (population age, multiple comorbidities), changing disease patterns and treatment (increasing complexity of medical conditions and wider use of immunomodulators/immunosuppressants, and indwelling devices), and emergence of MDROs could affect antibiotic use.)

51. As there is no mandatory requirement with regard to keeping records on drugs being used in local food animal farms, there is limited data on antimicrobial use at the farm level.

52. The Harmful Substances in Food Regulations (Cap. 132AF) regulates the import and sale of food containing harmful substances. Currently, the maximum concentrations of 38 veterinary drugs (the majority of which are antibiotics) in different foods are specified in the First Schedule of these Regulations. Moreover, a total of seven veterinary drugs (including two antibiotics) that are prohibited in any fish, meat or milk, dried milk, condensed milk or reconstituted milk are listed in the Second Schedule of these Regulations.

53. CFS collected about 9,500 food samples at import, wholesale and retail levels for antibiotics testing under the Food Surveillance Programme for the period from 2014 to 2016. Among these samples, malachite green was detected in 15 samples of fish and fish products, while chloramphenicol was detected in two common oriental clam samples and one fish sample. All other samples were satisfactory. The surveillance focus at present is premised on food safety and fitness for human consumption (such as the presence of veterinary drug residues, including but not limited to antibiotics and preservatives). No follow up and enforcement action are warranted for non-ready-to-eat foods detected with antibiotic residue levels below the statutory maximum concentrations under the Regulations or bacteria or pathogens (regardless of whether the bacteria/pathogens are AMR or non-AMR) exceeding the levels under CFS's Microbiological Guidelines for Food.

54. In addition, CFS also monitors residues of agricultural chemicals and veterinary drugs (including antibiotics) in food animals admitted to slaughterhouses and in imported poultry. Urine, blood and tissue samples are collected from these food animals to test for the presence of the prohibited chemicals and restricted chemicals listed in the Public Health (Animals and Birds) (Chemical Residues) Regulation (Cap. 139N). For the period from 2014 to 2016, over 150,000 samples of food animals admitted into slaughterhouses and imported poultry were tested. All samples were satisfactory except for one sample which contained a prohibited antibiotic (chloramphenicol) and nine samples had antibiotic residues exceeding the maximum statutory level (**Table 1**).

Table 1: Data on antibiotic testing in slaughterhouses (covering local and imported livestock) and imported poultry in 2014-2016

Year	Total no. of samples tested under Cap. 139N (all drugs)	No. of Confirmed Positive Samples	
		Prohibited Chemical (Chloramphenicol)	Restricted Chemical
2016	48,351	0	0
2015	50,968	1	8
2014	52,958	0	1

Objective 3 – Monitor antimicrobial use in humans and animals

55. Dispensing data on antimicrobials is available from HA but similar data is not currently available from the private medical and dental practitioners, veterinarians, food animal farmers and pharmacies. On the other hand, licensed wholesale drug traders are required by law to record all transactions of pharmaceutical products. It is therefore more feasible to obtain the supply data of antimicrobials from traders to reflect the trend of antimicrobial utilisation.

Strategic Interventions

3.1 Establish a coordination structure for antimicrobial use surveillance

- The Working Group on AMR One Health Surveillance (tentative name) will also coordinate and plan on the collection and dissemination of antimicrobial use data from different sectors. At the beginning, annual supply data of antimicrobials would be obtained as proxy to reflect the overall use and trend of antimicrobial use. Supply data on antimicrobials, according to WHO ATC code J01 (Antibacterials for Systemic Use), will be collected annually by DH.
- Standardised reporting formats and units, such as the DDD in human use and mg/kg of meat produced in food animals, will be adopted to facilitate comparison and trend monitoring of antimicrobial use.

3.2 Monitor antimicrobial use in humans

- The monitoring of antimicrobial use in medical institutions will continue using the existing antibiotic prescription or dispensing data collection platform of public hospitals and clinics under HA.
- Participation from private medical practitioners will be encouraged through exploring the potential platform of electronic health record (eHR) system. Studies and surveys such as retrospective record checking, prospective survey or collection of prescriptions (such as the electronic collection of prescription bags recommended by the Expert Committee on Antimicrobial Resistance) could also be explored to assess the pattern of antimicrobial use.

3.3 Monitor antimicrobial use in animals

- AFCD will commission a consultancy study to devise methodologies for estimating antimicrobial usage in food animal production farms as well as the sampling plan and testing methods for collecting the necessary data for making the estimation, and to devise methodologies for detecting antimicrobials in wastes discharged from farms. Upon the adoption of the monitoring plan devised by the consultants, AFCD will carry out systematic monitoring on antimicrobial usage in food animal production farms.
- In parallel with the consultancy study, AFCD will strengthen surveillance on antimicrobial usage in local food animals, through requiring farmers to keep antimicrobial usage records in accordance with standardised templates, conducting surprise inspections at farms to check for antimicrobial stocks and usage, and collecting samples at farms to check for any abuse of antimicrobial usage. AFCD will further collaborate with the Drug Office of DH on the inspections of farms under the Antibiotics Ordinance (Cap. 137).

Key Area 2

Optimise use of antimicrobials in humans and animals

56. Ensuring judicious use of quality-assured antimicrobials is important for minimising the occurrence of antimicrobial-resistant infections and reducing disease burden. Antibiotic stewardship programme (ASP) has been identified as a key measure for reducing unnecessary prescriptions, suppressing AMR emergence, and at the same time controlling medical expenses. The development and implementation of ASP is relatively mature in local hospital settings. However, the support for and promotion of proper use of antimicrobials can be enhanced in the primary health care, veterinary and agriculture settings.

Objective 4

Strengthen regulation on over-the-counter purchase of prescription-only antimicrobials

Objective 5

Implement and enhance training in prescribing antimicrobials through antibiotic stewardship programme in human health sector

Objective 6

Monitor compliance with antibiotic prescription guidelines of human health practitioners

Objective 7

Ensure proper use of antimicrobials in animals



Optimise antimicrobial use in humans

Existing interventions to ensure appropriate use of quality-assured antimicrobials

57. Antibiotics are among the most commonly prescribed drugs used in human medicine. Overseas data showed that up to 50% of all the antibiotics prescribed for humans are not needed or are not optimally effective as prescribed²⁹. Though the use of antimicrobials for treatments of diseases is inevitable, the misuse or overuse of antimicrobials is considered to be a major driving force towards AMR^{32,33}. WHO, in its Global Action Plan, postulated that high use of antibiotics may reflect over-prescription or easy access through over-the-counter sale. Moreover, poor quality antimicrobials would further encourage emergence of AMR. To control AMR, it is essential to ensure the quality and appropriate use of antibiotics.

Regulation and enforcement - Drug quality

58. Hong Kong has established a system to ensure the quality of pharmaceutical products. Under the Pharmacy and Poisons Regulations (Cap. 138A), pharmaceutical products must be registered before they can be sold. The Pharmacy and Poisons Board of Hong Kong (PPBHK) has been established under the Pharmacy and Poisons Ordinance (Cap. 138) to carry out functions in accordance with the provisions of the Ordinance and its subsidiary legislation including registration of pharmaceutical products. Regulation 37(1) of the Pharmacy and Poisons Regulations (Cap. 138A) has further stipulated that a pharmaceutical product will only be approved for registration if it meets the criteria of safety, efficacy and quality.

59. In 2016, PPBHK became the 47th Participating Authority of the Pharmaceutical Inspection Co-operation Scheme (PIC/S), which is an international organisation comprising pharmaceutical inspection authorities around the world with a mission to lead the international development, implementation and maintenance of harmonised Good Manufacturing Practice (GMP) standards and quality systems of inspectorates in the field of medicinal products.

60. All pharmaceutical manufacturers must obtain a licence from PPBHK to produce medicines in Hong Kong. One of the key requirements for licensing a pharmaceutical manufacturer is the full compliance with the PIC/S GMP standards. The Drug Office of DH provides licensure support to the PPBHK and conducts GMP inspections to ensure compliance. With effect from 1 January 2016, new applications for registration of pharmaceutical products must include evidence on compliance with the PIC/S GMP standards. The same standard has been applied to all registration renewal from 1 January 2017.

61. Currently, all local manufactured or imported pharmaceutical products are required to be analysed, either by manufacturers themselves or a third-party accredited laboratory, on every batch of products as part of their quality assurance procedures before releasing the products for sale. The tests include assay with validated methods to ensure the content of the active ingredients meets the product specifications. All local manufacturers are required to conduct microbiological assay or validated chemical assay for their antibiotics products.

62. Moreover, DH has put in place a system under which samples of registered pharmaceutical products are collected from the market for detection of substandard medicines. DH has also established a mechanism for reporting adverse incidents relating to drugs so as to conduct risk assessment, management and reporting.

Regulation and enforcement - Possession and supply

63. Currently, the Pharmacy and Poisons Ordinance (Cap. 138) and Antibiotics Ordinance (Cap. 137) regulate the possession and supply of antibiotics. The Import and Export Ordinance (Cap. 60) also provides that all pharmaceutical products must be imported and exported under authorised licenses.

64. Only traders with appropriate license(s) are allowed to possess and deal in antimicrobial products. Licensed wholesale traders are legally obliged to record the acquisition and disposal of all pharmaceutical products, including antimicrobials, by means of wholesale dealing, including the quantity acquired and supplied, names of suppliers and to whom the drugs are supplied in Hong Kong.

65. The Drug Office of DH, the drug regulatory agency, and the Customs and Excise Department, the law enforcement agency regarding import and export, perform regular and surprise inspections on drug traders to ensure compliance of regulations. Unannounced inspections (1,229 inspections in 2014) and unannounced test purchases (4,363 test purchases in 2014) by outsourced undercover agents are conducted to Authorised Sellers of Poisons, i.e. pharmacies. From 2010 to 2014, zero to three cases annually were brought up to PPBHK for disciplinary actions, after a successful prosecution with conviction related to antibiotics³⁴.

66. While the Antibiotics Ordinance (Cap. 137) and the Pharmacy and Poisons Ordinance (Cap. 138) conferred authorised officers the authority to inspect the transaction records of antimicrobials kept by the authorised sellers of poisons (i.e. licensed pharmacies that are authorised to possess and supply antimicrobials in accordance with legal requirements), the Ordinances neither require the authorised sellers of poisons to keep the balance after each transaction nor stipulate that it is an offence if there is a discrepancy between the physical stock and recorded transactions. In fact, such stringent requirements, i.e. to require the authorised sellers of poisons to keep the balance after each transaction and ensure that the physical balance tallies with the recorded transaction, are only applicable to dangerous drugs under the Dangerous Drugs Ordinance (Cap. 134) due to their high potential of abuse and the serious harms that may result if abused. Major revamp of the relevant sections of the Ordinances will be required to enhance the record-keeping requirements. In addition, if such stringent requirements will apply, they may have to be applied to all parties who are authorised to possess the antimicrobials, including doctors and public institutions, for fairness sake. This may impose a heavy burden on the daily operation of the healthcare professionals and public institutions.

Guidelines for antibiotic use in human medicine

67. In 1999, CHP, in collaboration with HA and local universities, developed a reference on antibiotic use for medical practitioners (Inter-hospital Multi-disciplinary Programme on Antimicrobial Chemotherapy (IMPACT)) based on local epidemiology and international practice. Now in its fourth edition, IMPACT is available in form of booklet and mobile application³⁵. The mobile application contains medical calculators and antibiograms by hospital clusters in addition to the contents of IMPACT.

Antibiotic stewardship

68. Scientific Committee on Infection Control under CHP organised a consensus meeting titled Optimising antimicrobial prescriptions in hospitals by ASP in Hong Kong: rationale and requirement in 2005. It was agreed that ASP should be in place for both public and private hospitals.

69. HA Central Committee on Infectious Diseases and Emergency Response (CCIDER) - Working Group on ASP (WG-ASP) and Task Force on Clinical Management (TFCM) work closely with CHP through the Health Protection Programme on AMR (HPPAR) in promoting compliance with IMPACT on antibiotic use.

70. ASP is now implemented in all clusters of HA hospitals and some private hospitals. ASP teams of HA hospitals consist of microbiologists, infectious disease physicians and pharmacists. Regular monitoring and feedback to user departments on the utilisation of broad spectrum antibiotics has been put in place. HA manages to continue ASP with the existing scope in light of manpower constraints. Further resource implications would be assessed. The programmes are constantly reviewed for their effectiveness and enhancements.

71. ASP, coupled with an electronic dispensary system, can provide a platform for feedback and evaluation of prescription behaviour in public hospitals. In settings where such infrastructure is not available, some researchers have conducted studies to assess the prescription pattern of antibiotic prescription objectively by retrospective review of medical records³⁶ to minimise reporting bias. Other methods such as conducting prospective surveys on prescription^{37,38} or collection of prescriptions³⁹ have also been used.

Objective 4 – Strengthen regulation on over-the-counter purchase of prescription-only antimicrobials

72. To echo WHO's suggestion on optimising the use of antimicrobials in human health, DH has strengthened and will continue to enhance relevant regulatory control on over-the-counter sales of prescription-only antimicrobials as part of the overall strategy.

Strategic Interventions

4.1 Enhance inspection against authorised sellers of poisons

- Identify those authorised sellers of poisons that purchase large volumes of antibacterials by collecting and evaluating the supply data from suppliers.
- Conduct special unannounced inspections against these identified authorised sellers of poisons with large volume purchases to examine the transactions records of antibiotics and to investigate the whereabouts of the antibiotics. Prosecutions would be initiated if the authorised sellers of poisons do not comply with the legal requirements on the sale and record-keeping of antibiotics.

4.2 Enhance test purchase of antibiotics against authorised sellers of poisons

- Enhanced test purchase, i.e. a higher frequency and with different purchasing strategies, of antibiotics would be conducted against those large volume purchasers of antibiotics.

4.3 Review disciplinary actions against offences related to antimicrobials

- According to the Pharmacy and Poisons Ordinance (Cap. 138), the PPBHK may appoint a disciplinary committee to inquire into the conduct of an authorised seller of poisons or to impose disciplinary actions against a listed seller of poisons if the retailer is convicted of an offence under the Pharmacy and Poisons Ordinance (Cap. 138) or the Antibiotics Ordinance (Cap. 137)
- DH would advise the PPBHK to consider reviewing disciplinary actions against offenders so as to increase the deterrent effect.

4.4 Solicit support from licensed drug retailers

- Please refer to Strategic Intervention 13.1 ‘Strengthen health information provision’ for details.

4.5 Keep in view the necessity to amend relevant ordinances

- With the above strengthened measures, DH will timely review the effect of the measures taken and the necessity to amend the relevant ordinances to further enhance the record-keeping requirements of antimicrobials by authorised sellers of poisons if necessary.

Objective 5 – Implement and enhance training in prescribing antimicrobials through antibiotic stewardship programme in human health sector

73. ASP is now implemented in all clusters of HA hospitals and some private hospitals, but not in primary care setting yet.

74. HA has noted an increasing trend of antimicrobial use and plans are being deliberated to further consolidate and strengthen the ASP team in cluster hospitals for timely feedback on appropriate antibiotic use. However, it is anticipated that additional resources are essential to effectively implement the set goals of ASP in hospitals.

Strategic Interventions

5.1 Ensure adequate resources for implementation and evaluation of ASP in healthcare settings

- The resources implication for sustaining ASP in public hospitals and clinics, and its extension to private and primary care settings, will be assessed to ensure adequate financial and manpower resources and expertise.

5.2 Promote antibiotic prescription according to evidence-based guidelines for doctors and dentists

- Evidence-based antibiotic prescription guideline IMPACT has been issued and updated by CHP and HA to guide clinical management of infectious diseases. The guideline will continue to be reviewed according to the latest AMR development and local surveillance data. Its use in in-patient settings will be promulgated to encourage adoption and compliance.
- ASP will also be advocated to private hospitals through existing networks with their infection control teams.
- The programme for primary care settings, such as the development of guidelines for common infections, is being developed in consultation with key stakeholders such that measures can be tailored to their needs.

Objective 6 – Monitor compliance with antibiotic prescription guidelines of human health practitioners

75. ASP has been rolled out in public and private hospitals to various extents. Regular evaluation with audit and feedback to prescribers should be performed for identifying facilitating factors and barriers for programme improvement.

Strategic Interventions

6.1 Monitor compliance with antibiotic prescription guidelines of human health practitioners

- Evaluation and audit with feedback mechanisms to prescribers is an essential component of ASP in hospital settings to objectively reflect prescription behaviour. Studies and surveys can be conducted to evaluate the adherence of prescribers to antibiotic prescription guidelines. A review of overseas experience on strategies and measures to improve compliance to guidelines will be conducted while surveys on assessing knowledge, attitude and practices of the general public and target groups such as prescribers should continue for monitoring of trends and evaluation of AMR containment strategies. [Linked to Objective 16]

Optimise antibiotic use in animals

76. All livestock farms are subject to licensing control in accordance with the Public Health (Animals and Birds) (Licensing of Livestock Keeping) Regulation (Cap. 139L). AFCD conducts regular inspection on these farms to ensure their compliance with the licensing conditions and provisions under Cap. 139L and other relevant regulations.

77. Administration of antimicrobials to food animals (excluding fish) and their presence in animal feed (excluding fish feed) is regulated by the Public Health (Animals and Birds) (Chemical Residues) Regulation (Cap. 139N). Seven chemicals (including two antibiotics) are prohibited for use in food animals, whereas 37 chemicals (36 of which are antibiotics) are allowed to be used in food animals, provided that the levels of such chemicals in the meat and tissues must not exceed the specified MRL when the animals are supplied for human consumption. To enforce the above-mentioned regulations, AFCD, jointly with the Food and Environmental Hygiene Department (FEHD), have put in place a comprehensive surveillance programme under which samples from food animals are collected for testing of veterinary chemicals controlled under Cap. 139N. As veterinary chemicals may be pre-mixed in animal feed or added to the feed by farmers, AFCD officers would pay attention to the animal feed kept at farms during regular farm inspection and collect feed samples for testing when necessary. Any irregularities or non-compliance would be investigated and followed up as appropriate, including taking enforcement actions against the farmers concerned. Apart from enforcement, AFCD provides advice and education to all livestock farmers on the proper usage of antimicrobials, the withdrawal period on drugs and the prohibition on the possession and use of prohibited chemicals.

78. Due to the presence of various infectious diseases in pigs and poultry which are endemic in the region, there is an inevitable need for farmers to use antimicrobials for the control of such diseases. In this connection, AFCD, by virtue of section 6(2) of the Antibiotics Ordinance (Cap. 137), has issued a written permit to local pig and chicken farmers to enable them to purchase and possess antimicrobials for the treatment of diseases of their farm animals. The permit covers 20 antibiotics that are commonly used in livestock farming and is valid for six months. No such permit has been issued to fish farmers. In addition, Cap. 137 does not apply to antibiotic substances contained in livestock feed or to such substances which have been specially manufactured for the purpose of supplementing foods for livestock.

79. Unlike livestock farming, there is no legislation specifically governing the animal and public health aspects such as the use of veterinary chemicals in local fish farms (e.g. Cap. 139N does not apply to food fish and fish feed). Notwithstanding this, AFCD has implemented a number of administrative schemes under which regular farm visits are carried out to help fish farmers adopt good aquaculture practices and fish health management. Fish and feed samples are collected during the farm visits to monitor the food safety aspects including the use of antimicrobials in cultured fish. Any irregularities would be investigated and followed up as appropriate.

80. According to the surveillance results and information gathered from the farmers by AFCD, antimicrobials are only administered to the animals in livestock farms in case of disease outbreaks and in the very early stage of rearing when the piglets and young chicks are generally subject to a higher risk of infection. As regards fish farming, the use of antimicrobials is not common as bacterial infection is not a major threat to the aquaculture production in the local context. There is no sign of abuse of antimicrobials such as using antimicrobials as a growth promoter in local livestock and fish farms.

81. As noted from the above, the current regulatory and management regimes on local food animal farms is mainly concerned with the proper usage of antibiotics and non-exceedance of residual levels for the purpose of safeguarding food safety, rather than addressing the AMR issues. As such, there is lack of comprehensive information on the prevalence of AMR microorganisms in food animals and farm environments and the amount and type of antimicrobials used in food animals.

Objective 7 – Ensure proper use of antimicrobials in animals

82. The current regulatory regime is mainly concerned with the proper usage of antimicrobials and non-exceedance of residual levels, rather than addressing the AMR issues. Further, there is no international consensus to ban the use of antimicrobials as growth promoter. There is also difficulty to distinguish the use of antimicrobials for growth promotion or disease prevention or treatment. In order to ensure the sustainability of livestock production, the efficacy of antimicrobials must be preserved through the industry's responsible and prudent use. However, there is low awareness and a lack of knowledge, understanding and information on AMR in the food animal farming communities.

83. As a result, the scale of antimicrobial use in the local food animal production sector remains relatively unknown and the use of antimicrobials in food animals is often not supported by professional guidance. Despite the fact that local livestock production accounts for only around 2% of our consumption, the AMR in local livestock production is an issue that we should pay more attention to and handle seriously, including engaging veterinarians to provide services to local food animal farms in using antimicrobials. It is recognised that farmers may have concerns over the availability of veterinary services if a prescription is required for the use of antibiotics in farm animals.

Strategic Interventions

7.1 Strengthen support to food animal production and veterinary sectors

- AFCD will facilitate and support the development and implementation of projects for the provision of veterinary services to food animal production farms by the non-government veterinary sector through engaging relevant local institutions, the non-government veterinary sector and the farming sector. It will help encourage more participation of the non-government veterinary sector in providing veterinary services for food animal production farms, thereby achieving the segregation of roles played by non-government veterinarians (advisory) and AFCD Veterinary Officers (regulatory).
- Apart from the provision of general veterinary services, the scope of the above-mentioned projects will include formulation of tailor-made farm-specific disease management plans for the purpose of disease prevention, management of disease spread and minimising the usage of antimicrobials, and assisting farmers in sourcing vaccines and other relevant veterinary medications for disease prevention and management.
- AFCD will arrange activities (e.g. training workshops and seminars, farm familiarisation visits) for non-government veterinarians to help build up their capacity for the provision of veterinary services to local food animal production farms.

7.2 Promote proper antimicrobial use according to evidence and local epidemiology

- AFCD will develop guidelines and a code of practice on the proper use of antimicrobials and the use of critically important antimicrobials in animal disease management in accordance with prevailing international guidelines.
- Education and publicity programmes will be organised for food animal farmers and veterinarians on the proper use of antimicrobials according to evidence and local epidemiology.

7.3 Enhance regulation of antimicrobial use in food animals

- At an appropriate juncture (e.g. when proper support and veterinary services are available to the local food animal production sector in respect of disease prevention and treatment), AFCD will stop issuing the Antibiotics Permit to farmers, and advise DH to initiate legislation amendment to repeal the exemption of antimicrobials in animal feeds, so that the use of antimicrobials in food animals will be subject to veterinary prescription for the implementation of a 'veterinary prescription-only medication supply' policy. In particular, the use of critically important antimicrobials in animal husbandry will be tightly regulated in accordance with prevailing international guidelines.

Key Area 3

Reduce incidence of infection through effective sanitation, hygiene and preventive measures

84. AMR can arise naturally and may be an inevitable consequence of antimicrobial use. However, suboptimal infection control measures further promote the spread and emergence of AMR. It is evident that infection control measures, such as hand hygiene practices, significantly reduced infections, which in turn reduces the need for antimicrobial prescription. The same principle applies to the animal health sector, where good farm management and biosecurity can contribute greatly to the reduction of susceptibility to infections and the need for antimicrobial use in animals.

Objective 8

Strengthen infection prevention and control measures in healthcare settings

Objective 9

Strengthen infection control training for healthcare workers

Objective 10

Develop and strengthen infection prevention and control programmes in veterinary settings and along food supply chain

Objective 11

Enhance vaccination uptake



Infection prevention and control

Existing infection prevention and control infrastructure in Hong Kong

Human health

85. All along, CHP has been the major coordinating body for AMR infection control in human health in Hong Kong. CHP set up HPPAR under Scientific Committee on Infection Control. CHP has been working with HA on hospital outbreak control, guidelines formulation and infection control training.

86. Infection control programmes usually encompass activities on hand hygiene, environmental hygiene, equipment disinfection and sterilisation, and are supplemented by proper use of personal protective equipment and isolation of infectious cases. Outbreak management, including prompt case detection, isolation and contact tracing are especially relevant in preventing and controlling spread of antimicrobial resistance.

87. HA set up a Task Force on Infection Control to oversee infection control policy of HA hospitals at corporate level. Each HA hospital has an infection control team to oversee the policy and implementation of infection control programmes. Each team usually consists of doctors and a team of infection control nurses (ICNs). The manpower of ICNs in HA hospitals is set at one ICN per 250 patient beds.

88. The infection control teams are also responsible for surveillance, audit and implementation of infection control and training programmes. Frontline staff has also been involved as link-nurses to build a culture where 'infection control is everybody's business'.

89. HA provides mandatory infection control basic training for newly recruited healthcare workers and refresher training every 24 months for current staff. Further specific, dedicated and advanced-level training is offered based on work nature, and is centrally coordinated by HA Infectious Disease Control Training Centre. A five-year infection disease and infection control training plan starting in 2017 has been formulated.

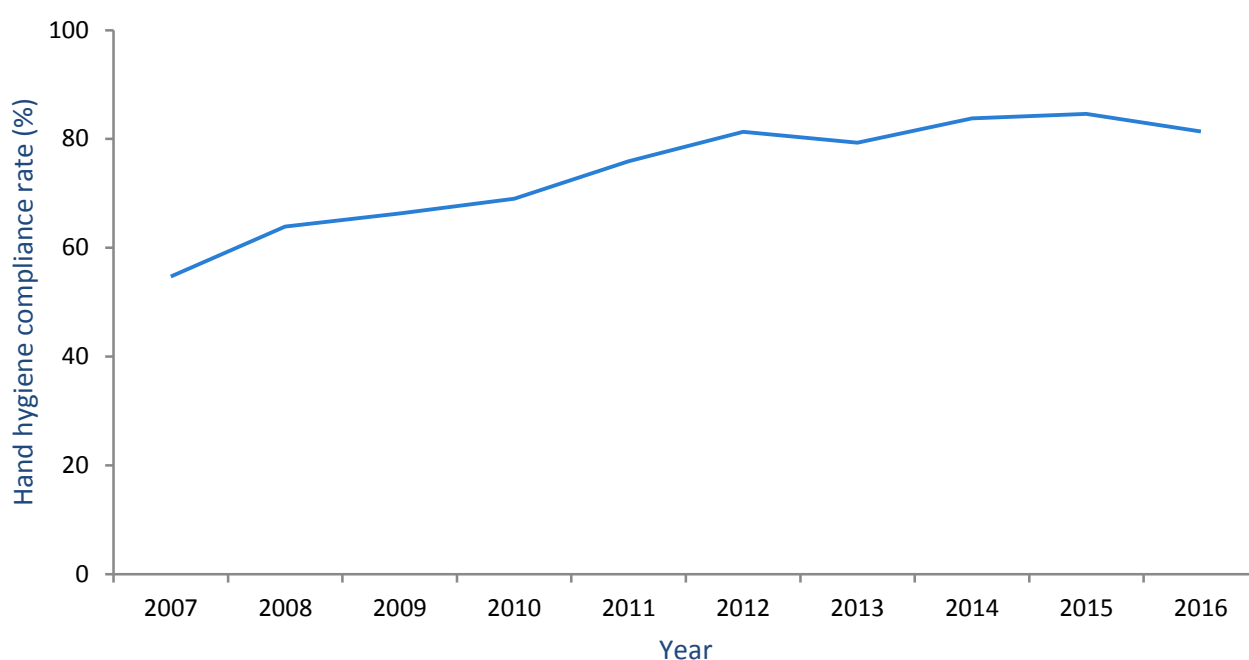
90. Regarding private hospitals, each hospital has an infection control team to oversee policy and implementation of infection control programmes. CHP has set up a Working Group of Collaboration between CHP and Private Hospitals on Safe Use of Antibiotics and Infection Control to cultivate skills, information and experience sharing.

Hand hygiene

91. Hand hygiene by healthcare workers is often considered the single most important infection control measure in healthcare settings. Hand hygiene is one of the top infection control priority areas in HA hospitals. Apart from promoting and strictly enforcing WHO's Five Moments for Hand Hygiene for healthcare workers, the involvement of patients and relatives is also being pursued.

92. The hand hygiene compliance as reflected by HA's audit has improved from 54.7% in 2007 to around 80% since 2012, and has plateaued since then (**Figure 9**).

Figure 9: Hand hygiene compliance rate in public hospitals



Source: Hospital Authority (2007-2016)

93. Hand hygiene was being promoted extensively in community settings, through WHO's annual Hand Hygiene Day, hand hygiene posters in public washrooms, clinics and wards, television advertisements and specific programmes targeting high-risk groups such as elderly homes.

Patient engagement

94. Apart from healthcare workers, patients also play an important role in infection control. Since 2009, WHO has been advocating patient empowerment in healthcare settings. WHO defines empowerment as a process through which people gain greater control over decisions and actions affecting their health and should be seen as both an individual and a community process⁴⁰. Yet, a local survey of 952 local orthopaedic in-patient/family members revealed that 94% of the interviewees did not consider hand hygiene important during their hospital stay⁴¹. Another local study in 2015 showed that the overall compliance of patient self-initiated hand hygiene during hospital stays was only 37.5%⁴².

Bed spacing and ward design in hospital setting

95. Adequate bed spacing and conducive ward design is one of the essential elements to facilitate the proper implementation of infection control measures and isolation precautions. Overcrowding is considered one of the important factors that impede the successful implementation of an infection control programme⁴³. From an infection control perspective, four- to six-bed cubicles with physical electrical doors (either foot operated or automatic) and built-in toilets with the provision of hand-washing facilities are recommended by the Expert Committee on Antimicrobial Resistance in general wards of newly built HA hospitals. Currently, ensuite toilet/shower facilities and hand-washing facilities are provided in HA hospitals, however, doors are not usually provided in multi-bed settings due to practical reasons. Extra resources would also need to be allocated to capital works projects.

Vaccination

96. The WHO Global Action Plan encourages the use of vaccinations as an important measure in the prevention of infection and AMR control. Influenza activity is a strong driver of antibiotic prescription patterns and seasonal influenza vaccinations can potentially reduce inappropriate antibiotic use^{44,45}.

97. The Administration provides fully subsidised vaccinations for all children through the Hong Kong Childhood Immunisation Programme. Apart from that the Administration has been providing free or subsidised seasonal influenza vaccinations for the high-risk population, including children, the elderly, patients with chronic medical problems and healthcare workers. Free or subsidised pneumococcal vaccinations are also provided to elders aged 65 or above. The promotion to maximise vaccination coverage among healthcare workers is also an on-going task for HA hospitals.

98. A survey conducted by CHP in 2013 revealed the seasonal influenza vaccination coverage of the local population was 14%. The administrative data under the Government Vaccination Programme showed that coverage of healthcare workers in 2015/16 was around 32%. The vaccination coverage rate for seasonal influenza was 41% for elders aged 65 or above and 80% for residents of Residential Care Homes for the Elderly in 2015/16.

Animal Health

Biosecurity in food animal farms

99. As part of the licensing conditions, all poultry farms must implement the biosecurity plan and measures tailored for each farm in accordance with AFCD's requirements that aim at minimising the risk of dissemination of infectious agents, including avian influenza (AI) virus. For instance, in view of the possible transmission of AI virus from wild birds and migratory birds to local chickens, all local farms are required to install bird-proof facilities. Other measures to reduce the risk of spreading of infectious agents through human activities include disinfection pools, hand-washing facilities, separation of production areas and maintenance of entry and exit records, etc. AFCD staff inspect poultry farms at least once a week to check on farm hygiene and bird/flock health conditions, and to ensure strict compliance with the licensing conditions.

100. Vaccination can improve overall herd health by preventing diseases so that fewer antibiotics will be required for treatment of diseases. Since the introduction of a mandatory AI vaccination programme for chickens in local farms in 2003, only one AI outbreak has occurred in a local chicken farm so far. With respect to pig farms, pig farmers are required to ensure the licensing conditions are adhered to. Advice on general concepts of biosecurity, including disinfection pools, general hygiene and the separation of production areas, etc. are provided to farmers by AFCD during routine inspections.

Food handling environment

101. CFS has always been promoting the importance of good personal and environmental hygiene during all preparation and handling processes, part and parcel of WHO's Five Keys to Safer Food programme. The Five Keys to Safer Food target the basic principles that each individual, including food handlers, should know to prevent foodborne diseases, including preventing foodborne infections due to AMR bacteria.

102. As stated by WHO, inappropriate food-handling encourages the spread of AMR⁴⁶. A research study has shown that MRSA was found on a variety of household surfaces, including kitchen sinks, kitchen faucet handles, dish towels, etc⁴⁷. Food preparation areas, facilities, equipment and all food contact surfaces should, therefore, be kept clean to prevent the spread of bacteria and pathogens (regardless of whether the bacteria/pathogens are AMR or non-AMR) via a food-handling environment.

103. A cleaning programme has been developed for food business operators to ensure that cleaning and sanitising procedures are carried out in a systematic, regular and effective manner⁴⁸. To reduce the chance of infection (regardless of whether the infection is related to resistant bacteria from foods or not), the US Centers for Disease Control and Prevention has advised washing hands, utensils and kitchen surfaces during meal preparation to prevent animal products from contaminating other foods⁴⁹.

Objective 8 – Strengthen infection prevention and control measures in healthcare settings

104. The existing manpower allocation, such as the number of ICNs designated to implement infection control programmes in public hospitals, followed a ratio of one ICN to 250 patient beds which has made reference to the Study On The Efficacy Of Nosocomial Infection Control (SENIC) Projects in the 1980s^{50,51}. The manpower ratio often could not cater to the increasing workload due to the expanded spectrum of infection control activities as suggested by WHO guidelines⁵². A review of the manpower structure and infection control service model would be beneficial for enhancing the implementation of essential infection control measures while identifying non-core services to other appropriate parties. A resource model for manpower planning that takes into account the complex and expanded spectrum of infection control activities should also be developed in the long run.

105. According to WHO's Guidelines on Core Components of Infection Prevention and Control Programmes, the bed-to-bed distance should be no less than one metre in order to meet the requirement for standard and droplets precautions⁵². For patients with MDROs, contact precautions should be enforced by patient segregation. It is often noted that there is difficulty in maintaining optimal space between beds during winter surge when bed occupancy rate exceeds the ceiling of ward capacity. High bed occupancy is associated with increased incidence of infection and the occurrence of outbreaks of MRSA and other hospital-acquired infections⁴³. This problem is especially amplified in Hong Kong where land space is scarce. The requirement of at least one metre between patients can be theoretically achieved in newly built hospitals, but may impact greatly on the number of beds that can be provided in existing hospitals.

106. Despite efforts in promoting hand hygiene in healthcare settings, the compliance rate in public hospitals has plateaued at around 80% since 2012. Barriers and facilitating factors have to be identified to sustain or further improve compliance.

Strategic Interventions

8.1 Secure resources for implementing infection control programmes in hospitals

- The resources implication for implementation of infection prevention and control programmes, in particular those required to sustain designated infection control personnel to institute hand hygiene in healthcare settings, will be assessed. The Administration will work with relevant stakeholders, including HA, to review current manpower resources such as clinical microbiologists, infectious disease physicians, ICNs, infectious disease pharmacists, medical laboratory technicians and supporting staff of infection control programmes.

8.2 Enhance infection control infrastructure in hospitals

- The physical design and infrastructure of a hospital is an essential component of its infection control measures and is therefore an important factor that has to be taken into consideration during the planning stages of a building. Infection control can be engineered in hospital ward design such as ensuring optimal bed spacing and accessible hand hygiene facilities. HA will continue to keep abreast of international guidelines and recommendations on infection control infrastructure for newly built hospitals.

8.3 Promote hand hygiene in healthcare settings

- Hand hygiene programmes in healthcare settings will be evaluated to identify factors for sustaining and improving hand hygiene compliance. Researches on initiatives to improve hand hygiene will also be promoted. Patient compliance with hand hygiene practices will be encouraged especially during important moments, e.g. before every meal and when taking oral medications, through supportive healthcare staff (e.g. direct observation by healthcare staff and active provision of alcohol hand rubs).

Objective 9 – Strengthen infection control training for healthcare workers

107. Infection control training is an important component of an infection control program. This helps healthcare workers acquire up-to-date knowledge, recognise the importance of infection control and understand their responsibilities in infection prevention.

Strategic Interventions

9.1 Strengthen infection control training among healthcare workers

- Training and education materials will be developed to promulgate standards and good practice to healthcare professionals and allied healthcare personnel. Infection control training will continue to be provided to new intakes of healthcare workers under HA with regular refresher courses.
- While the responsibility for hand hygiene rests with the healthcare worker, as part of a multimodal hand hygiene improvement strategy as advocated by WHO's Guidelines on Hand Hygiene in Health Care⁴⁰, positive engagement with patients in the pursuit of improving hand hygiene compliance by healthcare workers will also be promoted. Studies have shown that organisation culture and staff perception are essential in patient empowerment programmes. Training to raise awareness and solicit healthcare workers' support for patient engagement programmes on reminding healthcare workers to perform hand hygiene will also be conducted. Researches or review of literature will be needed to provide insight to what is achievable in the local community. Patient engagement in hand hygiene is recognised as an important part in improving hand hygiene among healthcare workers. The acceptability and benefits of various forms of patient engagement in hand hygiene compliance will be explored in HA hospitals.

Objective 10 – Develop and strengthen infection prevention and control programmes in veterinary settings and along food supply chain

108. As the route for AMR acquisition and transmission among humans, food and environment is not entirely understood, risk assessment and studies for AMR transmission along the food supply chain will be required to guide development of infection control guidelines and programmes.

109. It is recognised that there is a need to enhance the biosecurity measures and husbandry practices as well as management and control of food animal production farms with a view to ensuring the prudent usage of antimicrobials in these farms.

Strategic Interventions

10.1 Develop infection prevention and control policies and strategies

- AFCD will work with the veterinary and food animal farming sectors to devise tailor-made farm-specific disease management plans for the purpose of disease prevention, management of disease spread and minimising the usage of antimicrobials, and assisting farmers in sourcing of vaccines and other relevant veterinary medications for disease prevention and management. [Refer to Strategic Intervention 7.1]
- Where necessary, AFCD may consider facilitating relocation and consolidation of livestock farms (without expanding the overall footprint) in order to enable farmers to make significant biosecurity improvement in their farms.

10.2 Identify risk and potential control points for AMR containment along food supply chain

- Based on the surveillance results on AMR in local food animal production farms [Refer to Strategic Intervention 1.3], AFCD will commission a consultancy study to assess the significance of food animal production sector in contributing to the AMR problem in Hong Kong and formulate suitable measures to address the AMR issues associated with food animal production, which may include exploring the necessity and feasibility of self-supply of day-old chicks and breeding pigs in consultation with relevant stakeholders.
- Review overseas studies and perform pilot surveys to identify potential points to contain AMR along the food supply chain.

10.3 Strengthen infection control training for workers along food supply chain

- AFCD will continue to provide regular education and training on farm management, biosecurity, and disease prevention and control to local food animal farmers and their workers.
- AMR-related content will continue to be provided in training courses under the Hygiene Manager and Hygiene Supervisor Scheme.

Objective 11 – Enhance vaccination uptake

110. Factors to enhance the uptake of seasonal influenza and pneumococcal vaccines should be explored such that the vaccination rate can be improved.

Strategic Interventions

11.1 Promote vaccinations contributing to prevention of antimicrobial resistant infections

- To reduce the risk of infection and use of antimicrobials, the use of vaccines contributing to the prevention of AMR infections (e.g. seasonal influenza and pneumococcal vaccines) will be promoted to maximise coverage according to the recommendations of the Scientific Committee on Vaccine Preventable Diseases.

Key Area 4

Improve awareness and understanding of antimicrobial resistance through effective communication, education and training

111. In order to deliver Key Areas 2 and 3, specific actions are required to maintain and raise awareness of appropriate antimicrobial use and infection control measures. As the public is not a homogenous group, health messages have to be tailored to the needs and gaps identified in different audience groups to drive greater ownership and actions. Therefore, on top of public media campaigns led by DH, it is important to conduct coordinated and targeted awareness-raising and educational activities by various parties.

Objective 12

Raise awareness of antimicrobial resistance among general public, students and target population

Objective 13

Engage patients in adopting infection control measures and proper use of antibiotics

Objective 14

Include antimicrobial resistance and related topics in school curricula and continuous training of human health and veterinary professionals



Existing interventions for raising public awareness

112. Currently, various government departments and local organisations actively participate in raising public awareness of AMR. For example, DH launches mass media campaigns and conducted media briefings from time to time to promote hand hygiene and awareness of antimicrobial resistance. DH has also organised promotional activities on the annual Hand Hygiene Awareness Day (5 May) since 2011, and annual Antibiotic Awareness Day/Week (November) since 2012 and has engaged doctors, public hospitals and clinics, private hospitals and long-term care facilities.

113. DH, HA and academia have jointly produced health education materials to remind patients taking antibiotics of the importance of maintaining personal hygiene. Health information is provided at point-of-care in hospitals, clinics and dispensaries under HA and DH. Various forms of communication are in place, including posters, admission leaflets and video clips.

Education and training – students, healthcare and veterinary professionals, farming and food industry

114. The Education Bureau (EDB) has incorporated AMR (understanding the causes and effects of the misuse of antibiotics and the possible approaches to rectifying the situation) into the liberal studies curriculum in high schools⁵³. An educational television programme on AMR targeting primary school students was also launched in 2016.

115. Undergraduate nursing, medical and dental courses have included AMR in their core curriculum. CHP and HA infection control teams have been organising trainings to update healthcare workers on infection control, including topics in AMR. These trainings were delivered through forums, conferences, seminars, workshops and an online platform (the Hong Kong Training Portal on Infection Control and Infectious Disease (ICID Portal)). Private hospitals are also providing in-house training for their staff while HA is providing infection control courses for new intakes and refresher courses for healthcare workers every two years.

116. All along, AFCD provides advice and education to all livestock farmers on the proper usage of antibiotics, the withdrawal period on drugs and the prohibition on the possession and use of prohibited chemicals.

117. Regarding education and publicity on AMR in food, CFS promotes the Five Keys to Food Safety primarily developed by WHO, to explain the basic principles that each individual (including food handlers and consumers) should know and practice in order to prevent foodborne diseases, regardless of whether the pathogens are AMR or non-AMR. The Five Keys to Food Safety: (1) Choose (choose safe raw materials), (2) Clean (keep hands and utensils clean), (3) Separate (separate raw and cooked food), (4) Cook (cook thoroughly), and (5) Safe temperature (keep food at a safe temperature). These are simple health messages based on scientific evidence to tackle major contributing factors causing foodborne diseases. The five keys have all along been advocated by CFS to food handlers as well as consumers to prevent foodborne diseases, regardless of whether the pathogens are AMR or non-AMR.

118. There is currently no international consensus on the definition of ‘antibiotic-free’ food. As in other jurisdictions, there is no AMR-related regulation on pre-packaged food labelling in Hong Kong. Having said that, there are calls for exploring the merits and feasibility of the labelling of pre-packaged ‘antibiotic-free’ food items, taking into account the development of an internationally acceptable and verifiable definition of the term ‘antibiotic-free’, as part of the overall public engagement process to enhance community awareness of AMR.

119. The topic of AMR has been incorporated as one of the training components in the hygiene supervisor training courses under the Hygiene Manager and Hygiene Supervisor Scheme with effect since 2017. Other recognised institutes under the above scheme have been informed to include this topic in training materials for Hygiene Manager Courses in 2017.

Knowledge, attitude and consumption of antibiotics

120. DH has conducted surveys targeting the general public⁵⁴, secondary school students⁵⁵ and medical doctors⁵⁶ to gauge their understanding of antibiotics and AMR, as well as their consumption and the prescription behaviour of antibiotics.

General public

121. A Survey on Usage of Antibiotics and Awareness of Antimicrobial Resistance was conducted among Hong Kong residents in 2010/11⁵⁴. The majority of the respondents understood that antibiotics use would increase the chance of acquiring resistant bacteria and the additional risks associated with resistant bacteria. However, around one-fourth of the respondents misunderstood that antibiotics are effective against influenza. The majority (98%) of respondents obtained antibiotics with a doctor's prescription and most of them (88%) adhered to the doctor's instructions on taking antibiotics.

Secondary school students

122. A survey was conducted in 2012/13 to evaluate newly developed teaching material (covering AMR, the use of antibiotics and personal hygiene) for liberal studies in the new senior secondary curriculum⁵⁵. This survey showed that the educational material had effectively improved students' understanding of antibiotic indications and ownership of the AMR problem.

Medical doctors

123. Another survey targeting all doctors registered with the Medical Council of Hong Kong was conducted in 2012 (response rate 14.8%, 1,743 valid respondents)⁵⁶ to understand their attitude and antibiotic prescription practice. According to this survey, around half (48%) of the responded doctors considered AMR severe in Hong Kong. Only less than 0.5% of respondents reported that they always prescribed antibiotics to patients with upper respiratory tract infection (URTI). The commonest reasons for prescribing antibiotics for URTI are diagnostic uncertainty (66%), a second visit for the same episode of URTI (40%), clinical features suggestive of bacterial infection or superinfection (21%) and to satisfy the patient or his or her carer (20%).

Objective 12 – Raise awareness of antimicrobial resistance among general public, students and target population

124. Based on the best available population-based knowledge, attitude and practices (KAP) surveys conducted⁵⁴⁻⁵⁶, the majority of respondents had a good understanding of the problem of AMR and the importance of proper antibiotics use. Yet, there was still a significant number of people who misunderstood the indicated use of antibiotics. Local experience showed that the provision of teaching aids, tailored for liberal studies education, to teachers can effectively improve understanding of and the attitude to AMR among secondary students. In order to guide future publicity campaigns and evaluate the effectiveness of interventions, these surveys should be repeated at suitable intervals to provide more up-to-date information. Information gaps in the veterinary, food animal production and food sectors should also be filled.

Strategic Interventions

12.1 Develop and implement targeted evidence-based health promotion programme for specific audience including students and personnel working in healthcare, animal health, food animal production and food hygiene settings

- Surveys will be conducted to assess KAP towards AMR and antimicrobial use among the general public and target population such as healthcare workers, veterinarians and farmers. Such KAP surveys will be repeated at suitable intervals to gauge the effectiveness of interventions and steer future direction.
- Key messages will be developed for different target populations to raise awareness and enable them to use antimicrobials appropriately. Messages will be reviewed and fine-tuned based on KAP results and upon evaluation of interventions.
- DH will continue participating in the annual World Antibiotic Awareness Campaign and Hand Hygiene Day initiated by WHO to foster international collaboration and partnerships.
- Accurate and relevant information on AMR will be developed and disseminated through conventional publicity channels such as leaflets, posters and websites. New channels including social media will be employed to reach out to different target groups.
- AFCD will disseminate AMR related information to farmers, stakeholders and veterinarians to increase their awareness of this issue. AFCD will also provide regular education and training to food animal farmers regarding the proper use of antimicrobials and the introduction of the newly enhanced measures on the control of veterinary pharmaceutical products and antibiotics in food animal farms.
- Keep in view international development of an internationally acceptable and verifiable definition of the term 'antibiotic-free', and explore the merits and feasibility of labelling of pre-packed antibiotic-free food items.

12.2 Introduce AMR and related topics to students

- Age-specific education materials will be developed to facilitate students, parents and teachers to appropriately communicate AMR risks and preventive measures with children and adolescents. These educational programmes and the liberal studies curriculum of secondary school students will be regularly reviewed.

Objective 13 – Engage patients in adopting infection control measures and proper use of antibiotics

125. It is recognised that the primary responsibility for delivery of safe care and environment is within the healthcare system, but informing and educating patients about their potentially powerful role in supporting improvement is equally important. According to WHO guidelines⁴⁰, patients can be empowered only after having gathered enough information, understanding how to use the information and are convinced that it gives them the opportunity to participate in helping to keep healthcare safe while not deflecting responsibility away from their healthcare workers. A patient engagement programme will be developed with reference to international guidance with consideration given to local culture and needs.

126. Health education on the risks of infectious diseases and the importance of personal protective measures has all along been promulgated by DH and HA. Education materials, in the form of websites, mobile applications and printed materials on DH and HA premises are freely accessible to the general public, patients and healthcare workers.

127. Creating a supportive environment is effective in facilitating behavioural change. For example, making alcohol-based hand rub and hand-washing facilities readily accessible and clarifying who may use them, in combination with a multimodal improvement strategy, can increase the likelihood of patients, visitors and healthcare workers performing hand hygiene.

Strategic Interventions

13.1 Strengthen health information provision

- Health promotion efforts will be strengthened at point-of-care settings including waiting areas of dispensaries, pharmacies, accident and emergency rooms, and hospital wards.
- In particular, health information on personal hygiene measures related to antibiotic use will be encouraged to be printed on drug prescription bags (of antibiotics) of public pharmacies in stages.
- Information will be provided to patients to support appropriate antibiotic use. Emphasis will be put on correcting patients' misconceptions regarding the use of antimicrobials (e.g. antibiotics are not indicated for uncomplicated upper respiratory infections which are usually of viral origin).

Strategic Interventions

13.2 Provide supportive environment to facilitate hand hygiene practices by patients

- Essential hardware to facilitate hand hygiene has been made available in close proximity to where patients are located (e.g. bedsides, toilets, entrances and exits to wards and clinics) in HA and DH medical institutions and will be continued.

Objective 14 – Include antimicrobial resistance and related topics in school curricula and continuous training of human health and veterinary professionals

128. Reducing the emergence and spread of AMR requires ASP and infection control training. To foster ASP and infection control among professionals, a behavioural change based on an increased knowledge and understanding AMR is crucial apart from strengthening regulations.

Strategic Interventions

14.1 Include prescribing competencies and infection control practices as core component of professional education and continuous development

- DH will continue to work with academia to facilitate inclusion of AMR in undergraduate courses of human health professionals. DH will also continue organising continuous professional development (CPD) activities and developing up-to-date education materials and tool kits to raise awareness of health professions to AMR-related harm, thereby enabling them in making informed decisions when prescribing antimicrobials.
- AFCD will encourage veterinarians to obtain CPD through existing mechanisms, and work with the Veterinary Surgeons Board, relevant institutions and associations in organising education and publicity programmes for veterinarians on the proper use of antimicrobials and related topics.

14.2 Strengthen infection control training for healthcare workers, veterinarians and workers along food supply chain

- Refer to Objectives 9 and 10 for details.

Key Area 5

Promote research on antimicrobial resistance

129. There are currently a number of international and local funding sources that are supporting research on AMR, such as respective university research funds, the Research Grant Council, the Innovative and Technology Fund, and the Health and Medical Research Fund (HMRF) of the Food and Health Bureau (FHB). AMR has been identified as one of the thematic priorities of the HMRF and researchers are welcome to submit applications for funding support through the HMRF's annual open call. Information gaps exist, ranging from fundamental questions such as transmission pathways between humans, animals and the environment to effective strategies for changing prescription behavioural and infection control practices locally. As such, the following research topics are identified as priorities with reference to recommendations made by the Expert Committee on Antimicrobial Resistance.

Objective 15

Promote research on innovative technology and medical science

Objective 16

Promote research on behavioural science and psychology

Objective 17

Promote research on health and economic burden



Objective 15 – Promote research on innovative technology and medical science

Strategic Interventions

15.1 Promote development of novel diagnostics tools to aid diagnosis and treatment of infections and AMR

- Diagnostic uncertainty was shown to be the commonest cause of potentially unnecessary antibiotic prescriptions, according to a local survey of doctors⁵⁶. The feasibility of the local adaptation of rapid point-of-care tests should be explored.

15.2 Promote development of novel preventive measures on AMR

- Promote research on novel preventive measures, such as infection control tools (novel surface disinfectants) and vaccines against multi-drug-resistant microorganisms.

15.3 Promote development of novel antimicrobials or other alternative agents

- Promote research on novel antimicrobials or alternative agents, such as phage therapy, antibodies, immune therapy, lysins, gut polymers or probiotics.

Objective 16 – Promote research on behavioural science and psychology

Strategic Interventions

16.1 Promote research on awareness and education regarding AMR, infection prevention and control, and antibiotic stewardship

- There is a substantial number of overseas studies on the effectiveness and cost-effectiveness of interventions to reduce AMR. However, local studies are limited and it is important to investigate the possible effect and feasibility of new measures such as patient engagement programmes on hand hygiene and the outcome of antibiotic stewardship in primary care settings to gauge prescribing practices. The research results will be valuable for guiding future evidence-based interventions in reducing AMR-related harm.
- Information on the KAP trend towards AMR and infection control would also be beneficial in assessing the effectiveness of interventions.

Objective 17 – Promote research on health and economic burden

Strategic Interventions

17.1 Promote research in estimating local health burden of AMR

- There are overseas studies on the health and economic burden of AMR. However, local studies are lacking. Information on the socio-economic burden of infections caused by AMR and MDROs will help inform policy makers of the scale of the problem and provide investment incentive for research and AMR control measures.

Key Area 6

Strengthen partnerships and foster engagement of relevant stakeholders

130. AMR is a global issue affecting health and economy. Hong Kong is committed to adopt global directions in AMR containment measures including the One Health approach. Hong Kong will continue to support the WHO and its regional offices in its work against AMR.

Objective 18

Strengthen international partnerships and regional collaboration

Objective 19

Inform public policy and facilitate stakeholder engagement



Objective 18 – Strengthen international partnerships and regional collaboration

Strategic Interventions

18.1 Continue participating in international, regional and country initiatives in implementing the Action Plan on AMR

- A regional symposium on AMR will be organised to raise awareness of the local community to AMR problems and provide a platform for experience sharing by experts in the Western Pacific region [linked with Objectives 9 and 14].

Objective 19 – Inform public policy and facilitate stakeholder engagement

Strategic Interventions

19.1 Inform public policy and facilitate stakeholder engagement

- Health promotion and disease prevention require the involvement of not only the Administration but the whole community. Working in partnership with all relevant stakeholders at the community level is crucial to the success of AMR control.
- Given the complexity and challenges related to AMR prevention, relevant stakeholders will be engaged at an early stage of strategy development with leadership from DH, AFCD, FEHD, representatives and experts encompassing environmental protection, consumers, restaurants, farmers, food traders and pharmacies together with public and private human and animal health practitioners. The Administration will either play a bridging role or participate as a contributor to the process, bringing together stakeholders and promoting sharing of experience and good practice.

Monitoring and evaluation

131. Mid-term and final reviews with reference to the following examples of indicators are proposed in accordance with the five strategic goals of the WHO Global Action Plan^{6,57} to provide a quantitative measurement of the progress of the proposed interventions.

WHO five strategic goals	Example of indicator
1. Establish surveillance on AMR and antimicrobial use	<ul style="list-style-type: none"> • Number of medical institutions and type of medical organisations participating in AMR surveillance and its research • Number of surveillance reports issued • Number of medical organisations adopting standards in antimicrobial susceptibility testing
2. Optimise antimicrobial use	<ul style="list-style-type: none"> • Number of training organised to advocate and educate healthcare workers in adopting ASP • Number of medical institutions that implemented an ASP programme • Statistics on supply of antimicrobials
3. Reduce infection	<ul style="list-style-type: none"> • Compliance rate to infection control, e.g. hand hygiene compliance in medical institutions • Vaccination coverage rate
4. Improve awareness and understanding of AMR	<ul style="list-style-type: none"> • Level of AMR awareness of general public and target populations • Number of access to AMR information platforms (websites and training) and performance of training conducted
5. Promote research for innovation	<ul style="list-style-type: none"> • Number of researches conducted in relevant areas

Summary table of actions

Key area 1: Strengthen knowledge through surveillance and research					
Objective 1 – Set up AMR surveillance system under One Health for Hong Kong					
Strategic interventions	Activities	Lead action party	Target(s) and Timeframe		
1.1	Establish a coordination structure for One Health surveillance on AMR	1.1.1	Setup a ‘Working Group on AMR One Health Surveillance’ to coordinate and plan on collection and dissemination of AMR/ antimicrobial use data	- DH - AFCD - CFS	Commence by 2017
1.2	Strengthen AMR surveillance in healthcare settings	1.2.1	Harmonise AMR surveillance reporting criteria with reference to GLASS of WHO	- DH - HA	Set criteria by 2017
		1.2.2	Develop surveillance at laboratory level for in- and out-patient service providers	- DH - HA	Commence data collection from HA by 2018
1.3	Develop AMR surveillance programme on animals	1.3.1	Commission a consultancy study to devise a plan for the surveillance on AMR microorganisms in food animal production farms	- AFCD - DH	Commission by 2018
		1.3.2	Conduct surveillance studies on AMR in imported day-old chicks and breeding pigs	- AFCD	Commence by 2017
		1.3.3	Carry out surveillance on AMR in food animal production farms	- AFCD	Commence by 2019
1.4	Develop AMR surveillance programme on food	1.4.1	Conduct pilot survey to guide development of a surveillance system on food	- CFS - DH	Develop preliminary survey protocol by 2018
1.5	Set up a centralised platform for AMR surveillance data on human, animal, food and environment	1.5.1	Link data related to AMR surveillance and monitoring across different sectors	- DH - AFCD - CFS	Develop preliminary protocol by 2018

Key area 1: Strengthen knowledge through surveillance and research (con't)				
Objective 2 - Build laboratory capacity to support surveillance activities in both human and animal sectors				
Strategic interventions	Activities	Lead action party	Target(s) and Timeframe	
2.1	Strengthen laboratory support in AMR surveillance	2.1.1 Identify Public Health Laboratory under DH as a local reference laboratory on AMR to advise the Administration and to support local medical laboratories	- DH	On-going
2.2	Standardise laboratory antimicrobial susceptibility testing method for AMR surveillance	2.2.1 Promulgate adoption of international standards and guidelines for AST such as CLSI or EUCAST	- DH - HA	Commence by 2018
2.3	Support establishment of quality assurance programme and promote introduction in medical laboratories	2.3.1 Coordinate with laboratories to conduct quality assurance programme for continuous improvement of standards of laboratories in Hong Kong	- DH	Commence by 2018
Objective 3 - Monitor antimicrobial use in humans and animals				
3.1	Establish a coordination structure for antimicrobial use surveillance	3.1.1 Setup a 'Working Group on AMR One Health Surveillance' to coordinate and plan on collection and dissemination of AMR/ antimicrobial use data	- DH - AFCD - CFS	Commence by 2017
		3.1.2 Collect supply data on antibiotics from different sectors using standardised reporting formats	- DH - AFCD	First report by 2017
3.2	Monitor antimicrobial use in humans	3.2.1 Collect antibiotic dispensary data from HA and monitor antibiotic use in public hospitals and clinics	- DH - HA	First report by 2018
		3.2.2 Explore feasibility of using electronic health record (eHR) to capture prescription data from private sector	- DH - FHB	Commence by 2017
3.3	Monitor antimicrobial use in animals	3.3.1 Commission a consultancy to devise a plan for monitoring antimicrobial usage in food animal production farms	- AFCD	Commission by 2017
		3.3.2 Strengthen surveillance on antimicrobial use in local food animal production farms through interim measures such as imposing record keeping requirement and surprise inspection	- AFCD	Commence by 2017
		3.3.3 Carry out systematic monitoring of antimicrobial use in food animal production farms	- AFCD	Commence by 2019

Summary table of actions

Key area 2: Optimise use of antimicrobials in humans and animals					
Objective 4 – Strengthen regulation on over-the-counter purchase of prescription-only antimicrobials					
Strategic interventions	Activities	Lead action party	Target(s) and Timeframe		
4.1	Enhance inspection against authorised sellers of poisons	4.1.1	Conduct special inspection against authorised sellers purchasing large volumes of antimicrobials	- DH	On-going
4.2	Enhanced test purchase of antibiotics against authorised sellers of poisons	4.2.1	Enhance test purchase	- DH	On-going
4.3	Review disciplinary actions against offences related to antimicrobials	4.3.1	Advise PPBHK to consider reviewing the disciplinary action on offences related to antimicrobials	- DH	Commence by 2017
4.4	Solicit support from licensed drug retailers	4.4.1	Refer to Strategic Intervention 13.1	- DH	On-going
4.5	Keep in view the necessity to amend relevant ordinances	4.5.1	Review the effect of strengthened measures against authorised sellers of poisons and review the necessity to amend relevant ordinances	- DH	As and when necessary
Objective 5 - Implement and enhance training in prescribing antimicrobials through ASP in human health sector					
5.1	Ensure adequate resources for implementation and evaluation of ASP in healthcare settings	5.1.1	Assess resource implication for implementation of ASP	- DH - HA	On-going
5.2	Promote antibiotic prescription according to evidence-based guidelines for doctors and dentists	5.2.1	Continue to review and update the IMPACT guideline regularly for in-patient antibiotic stewardship and promulgate its use	- DH - HA	On-going
		5.2.2	Continue ASP in public hospitals	- DH - HA	On-going
		5.2.3	Advocate ASP in private hospitals	- DH - Private hospitals	On-going
		5.2.4	Formulate and promulgate evidence-based guidelines in primary care setting	- DH - HA - Professional bodies	Produce guideline by 2018
Objective 6 - Monitor compliance with antibiotic prescription guidelines of human health practitioners					
6.1	Monitor compliance with antibiotic prescription guidelines of human health practitioners	6.1.1	Encourage evaluation and audit of ASP and establish feedback loop to reflect performance	- DH - HA	On-going
		6.1.2	Conduct surveys to gauge knowledge, understanding and prescription behaviour of human health practitioners	- DH	Commission in 2017 to 2019

Key area 2: Optimise use of antimicrobials in humans and animals (con't)				
Objective 7 - Ensure proper use of antimicrobials in animals				
Strategic interventions	Activities	Lead action party	Target(s) and Timeframe	
7.1 Strengthen support to food animal production and veterinary sectors	7.1.1 Facilitate and support development of projects for the provision of veterinary services to food animal production farms by non-government veterinary sector	- AFCD	Commence by 2017	
	7.1.2 Formulate tailor-made farm-specific disease management plans	- AFCD	Commence by 2018	
	7.1.3 Assist farmers in sourcing vaccines and veterinary medications for disease prevention and management	- AFCD	Commence by 2018	
	7.1.4 Arrange training activities for non-government veterinarians to build up their capacity for providing veterinary services to local food animal production farms	- AFCD	Commence by 2018	
7.2 Promote proper antimicrobial use according to evidence and local epidemiology	7.2.1 Develop guidelines and code of practice on the proper use of antimicrobials and use of critically important antimicrobials in animal disease management in accordance with prevailing international guidelines	- AFCD	Commence by 2018	
	7.2.2 Organise education and publicity programmes for food animal farmers and veterinarians on the proper use of antimicrobials	- AFCD	On-going	
7.3 Enhance regulation of antimicrobial use in food animals	7.3.1 Implement 'veterinary prescription-only medication supply' policy and tightly regulate the use of critically important antimicrobials in animal husbandry	- AFCD	Commence by 2019	
	7.3.2 Review relevant legislation on exemption of using antimicrobials in animal feeds	- AFCD - DH	Commence by 2017	

Summary table of actions

Key area 3: Reduce incidence of infection through effective sanitation, hygiene and preventive measures				
Objective 8 - Strengthen infection prevention and control measures in healthcare settings				
Strategic interventions	Activities	Lead action party	Target(s) and Timeframe	
8.1	Secure resources for implementing infection control programmes in hospitals	8.1.1 Assess resource implication for implementation of the infection control programmes	- DH - HA	On-going
8.2	Enhance infection control infrastructure in hospitals	8.2.1 Review ward design according to international guidelines and recommendations in planning new hospitals	- DH - HA	On-going
8.3	Promote hand hygiene in healthcare settings	8.3.1 Review and strengthen hand hygiene programmes to improve compliance by healthcare workers	- DH - HA	On-going
Objective 9 - Strengthen infection control training for healthcare workers				
9.1	Strengthen infection control training among healthcare workers	9.1.1 Continue to provide infection control training with refresher information to new intakes of healthcare workers	- DH - HA	On-going
		9.1.2 Raise awareness and solicit healthcare workers' support to patient engagement programme on reminding healthcare workers to perform hand hygiene	- DH - HA	Engage healthcare workers by 2018 Pilot by 2019
Objective 10 - Develop and strengthen infection prevention and control programmes in veterinary settings and along food supply chain				
10.1	Develop infection prevention and control policies and strategies	10.1.1 Devise tailor-made farm-specific disease management plan for the purpose of disease prevention, management of disease spread and minimise the usage of antibiotics	- AFCD	Commence by 2018
		10.1.2 Consider relocation and consolidation of livestock farms if necessary	- AFCD	As and when necessary
10.2	Identify risk and potential control points for AMR containment along food supply chain	10.2.1 Commission a consultancy to assess the significance of food animal production in contributing to AMR and formulate suitable measures to address the AMR issues associated with food animal production	- AFCD	Commence by 2020
		10.2.2 Review overseas studies to identify potential control points to contain AMR	- AFCD - CFS - FEHD	Commence by 2018
10.3	Strengthen infection control training and education for workers along food supply chain	10.3.1 Provide regular education seminars on biosecurity, disease control and prevention and farm management to farmers and their workers	- AFCD	On-going
		10.3.2 Include AMR in training courses under the Hygiene Manager and Supervisor Scheme	- FEHD	On-going
Objective 11 - Enhance vaccination uptake				
11.1	Promote vaccinations contributing to prevention of antimicrobial resistant infections	11.1.1 Encourage uptake of seasonal influenza and pneumococcal vaccines	- DH - HA	On-going

Key area 4: Improve awareness and understanding of antimicrobial resistance through effective communication, education and training
Objective 12 - Raise awareness of AMR among general public, students and target population

Strategic interventions	Activities	Lead action party	Target(s) and Timeframe
12.1 Develop and implement targeted evidence-based health promotion programme for specific audience including students and personnel working in healthcare, animal health, food animal production and food hygiene settings	12.1.1 Monitor KAP towards AMR and antimicrobial use among general public and target population by survey	- DH - AFCD - CFS	Commission in 2017 to 2019
	12.1.2 Develop and review key messages to raise public awareness and call for action based on KAP results	- DH - AFCD - CFS	On-going
	12.1.3 Support and participate in annual world Antibiotic Awareness Campaign and Hand Hygiene Day	- DH	On-going
	12.1.4 Develop and disseminate information on AMR and related topics through existing health promotion channels, healthcare service providers and platforms commonly used by target populations including patients, food animal farmers, private veterinarians and food business operators	- DH - AFCD - CFS - FEHD	On-going
	12.1.5 Provide regular education and training to food animal farmers on antimicrobial use and measures on control of veterinary products	- AFCD	On-going
	12.1.6 Explore the merits and feasibility of labelling of pre-packed antibiotic-free food	- CFS	On-going
12.2 Include AMR and related topics to students	12.2.1 Review high school liberal studies curriculum in relation to AMR	- DH	Commence by 2017
	12.2.2 Develop education materials on AMR and related topics for primary students	- DH	Training of staff in 2017 to 2018, Pilot in 2018. Commence by 2019 with on-going evaluation

Objective 13 - Engage patients in adopting infection control measures and proper use of antibiotics

13.1 Strengthen health information provision	13.1.1 Develop and provide health education materials in hospital wards, clinics and pharmacies	- DH - HA	On-going
	13.1.2 Encourage provision of health information on personal hygiene measures on antibiotic drug prescription bags	- DH - HA	On-going
	13.1.3 Educate patients to use antibiotic appropriately	- DH - HA	Produce guideline for primary care by 2018. Health promotion commence by 2019
13.2 Provide supportive environment to facilitate hand hygiene practices by patients	13.2.1 Continue to provide accessible hand hygiene facilities and products in healthcare settings	- DH - HA	On-going

Summary table of actions

Key area 4: Improve awareness and understanding of antimicrobial resistance through effective communication, education and training (con't)

Objective 14 - Include AMR and related topics in school curricula and continuous training of human health and veterinary professionals

Strategic interventions		Activities		Lead action party	Target(s) and Timeframe
14.1	Include prescribing competencies and infection control practices as core component of professional education and continuous development	14.1.1	Include AMR and related topics in undergraduate curricula for human health and animal health professionals and encourage continuous professional development	- DH - AFCD - Academia	On-going
14.2	Strengthen infection control training for healthcare workers, veterinarians and workers along food supply chain	14.2.1	Refer to Objectives 9 and 10	- DH - HA - AFCD - CFS - FEHD	

Key area 5: Promote research on AMR				
Objective 15 – Promote research on innovative technology and medical science				
Strategic interventions		Lead action party		Target(s) and Timeframe
15.1	Promote development of novel diagnostics tools to aid diagnosis and treatment of infections and AMR	- DH - Academia	Promote source of funding to stakeholders starting in 2017	
15.2	Promote development of novel preventive measures on AMR			
15.3	Promote development of novel antimicrobials or other alternative agents			
Objective 16 – Promote research on behavioural science and psychology				
16.1	Promote research on awareness and education regarding AMR, infection prevention and control, and antibiotic stewardship	- DH - Academia	Promote source of funding to stakeholders starting in 2017	
Objective 17 – Promote research on health and economic burden				
17.1	Promote research on estimating local health burden of AMR	- DH - Academia	Promote source of funding to stakeholders starting in 2017	
Key area 6: Strengthen partnerships and foster engagement of relevant stakeholders				
Objective 18 – Strengthen international partnerships and regional collaboration				
Strategic interventions		Activities	Lead action party	Target(s) and Timeframe
18.1	Continue participating in international, regional and country initiatives in implementing the Action Plan on AMR	18.1.1 Host a regional symposium on AMR	- DH - AFCD - CFS - FEHD	Organise symposium by 2018
Objective 19 – Inform public policy and facilitate stakeholder engagement				
19.1	Inform public policy and facilitate stakeholder engagement	19.1.1 Organise information sharing session(s) for different stakeholders and target audience	- DH - AFCD - CFS - FEHD	Commence by 2017

Making it happen

132. To take forward the Action Plan, the Administration will continue to engage professionals, non-government organisations and other community stakeholders to seek their views and encourage participation. In order to get across to people in all sectors of community for involvement and act together, the Action Plan will be publicised through various means, such as publications, the media and briefings.

133. With a leadership role in combating the challenge of AMR, the Administration will provide information on AMR and antimicrobial use and work closely with stakeholders in both the public and private sectors, and review licensing and enforcing regulations governing the sale and use of antimicrobials if necessary.

134. Partnerships between all relevant stakeholders are needed to increase social participation and ownership. The Administration, linking the efforts of everyone in Hong Kong, will continue to safeguard the health of the people of Hong Kong and contribute to the improvement of global health.

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Annex I

Membership of High Level Steering Committee on Antimicrobial Resistance

Chairman

Secretary for Food and Health

Non-official members

Ms CHAN So Kuen, Sabrina

Prof. HUI Shu Cheong, David

Prof. LEE Wing Yan, Vivian

Prof. YUEN Kwok Yung

Institutional members

Hong Kong Academy of Medicine

Hong Kong Dental Association

Hong Kong Medical Association

Hong Kong Private Hospitals Association

Hong Kong Veterinary Association

Hospital Authority

Consumer Council

Ex-officio members

Permanent Secretary for Food and Health (Food)

Permanent Secretary for Food and Health (Health)

Director of Health

Director of Agriculture, Fisheries and Conservation

Director of Food and Environmental Hygiene

Controller, Centre for Health Protection

Controller, Centre for Food Safety

Annex II

Terms of reference of High Level Steering Committee on Antimicrobial Resistance

1. To provide governance and leadership on antimicrobial resistance ('AMR');
2. To develop and coordinate comprehensive, multi-sectoral policies to combat AMR;
3. To monitor and oversee the development and implementation of a territory-wide action plan for current and future work related to AMR; and
4. To monitor that actions are within a congruent 'One Health' framework.

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July 2017

The Government of the Hong Kong Special Administrative Region