

Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2023 -2027

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This publication has been translated into Chinese. If there is any inconsistency or ambiguity between the English version and the Chinese version, the English version shall prevail.

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Foreword



Prof. Chung-mau LO , BBS, JP
Foreword by the Secretary for Health

With the ever-increasing infections caused by organisms no longer susceptible to the common medicines used to treat them, the rapid worldwide spread of multidrug-resistant organisms (also known as “superbugs”) that cause significant mortality among patients, in particular the elderly and those with chronic diseases, is especially alarming.

The World Health Organization (WHO) declared antimicrobial resistance (AMR) as one of the top ten global public health threats facing humanity in 2019. AMR contributes to almost 5 million deaths per year globally. It poses serious threats to human, animal and environmental health, and severely undermines the sustainability of agri-food systems. 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. The WHO promulgated the Global Action Plan on AMR in 2015, which underscores the need for an effective “One Health” approach involving coordination among numerous sectors and actors, including human and veterinary medicine, agriculture, finance, environment and consumers.

The Government of the Hong Kong Special Administrative Region recognises the threat posed by AMR and has all along attached great importance to tackling it. The High Level Steering Committee on Antimicrobial Resistance (HLSC) was set up in May 2016 to formulate the Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2017-2022) for preventing AMR from worsening in Hong Kong with the collaboration and synergy of all professional sectors under a “One Health” framework. Since the launch of the Action Plan, a series of actions against AMR have been implemented by the Government in accordance with the strategies laid out in the Plan. Positive outcomes were achieved in minimising the emergence and preventing the spread of AMR. The HLSC would review the implementation experience of the first Action Plan and draw up the second plan to map out response strategies towards AMR in the next five years.

I would like to express my gratitude to all experts and professionals who have generously contributed their time and provided insights in drawing up the second Action Plan. The Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2023-2027 provides an overview of the local situation of AMR and outlines a list of objectives, activities and targets that the Government is planning to pursue to combat the threat of AMR in Hong Kong during the period between 2023 and 2027. Apart from continuing and strengthening the existing objectives and detailed actions, the second Action Plan also features a number of priority interventions and target indicators to enable the Government and stakeholders to focus resources and address the threat of AMR more effectively.

The HLSC and all participating bureaux, departments and organisations will continue to keep abreast of international and local development in AMR such that the Action Plan can be reviewed timely to cope with local needs. I am confident that the second Action Plan can drive steadily towards achieving the ultimate goal of reversing the trend of emergence of AMR in Hong Kong.

Abbreviations

AFCD	Agriculture, Fisheries and Conservation Department
AMR	Antimicrobial resistance
ASP	Antibiotic stewardship programme
AST	Antibiotic sensitivity testing
ATC	Anatomical Therapeutic Chemical
CA-MRSA	Community-associated methicillin-resistant <i>Staphylococcus aureus</i>
CFS	Centre for Food Safety
CHP	Centre for Health Protection
CLSI	Clinical and Laboratory Standards Institute
COVID-19	Coronavirus disease 2019
DDD	Defined Daily Dose
DH	Department of Health
EC	Expert Committee on Antimicrobial Resistance
EDB	Education Bureau
EEB	Environment and Ecology Bureau
ESBL-E	ESBL-positive <i>Enterobacteriaceae</i>
EUCAST	European Committee on Antimicrobial Susceptibility Testing
FEHD	Food and Environmental Hygiene Department
GLASS	Global Antimicrobial Resistance and Use Surveillance System
HA	Hospital Authority
HDU	High dependency units
HHB	Health Bureau
HLSC	High Level Steering Committee on Antimicrobial Resistance
HMRF	Health and Medical Research Fund

ICU	Intensive care units
IMPACT	Interhospital Multi-disciplinary Programme on Antimicrobial ChemoTherapy
KAP	Knowledge, attitude and practice
MDROs	Multi-Drug Resistant Organisms
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
PHLSB	Public Health Laboratory Services Branch
RCHDs	Residential Care Homes for Persons with Disabilities
RCHEs	Residential Care Homes for the Elderly
WHO	World Health Organization
WPRO	Western Pacific Regional Office

Executive Summary

The World Health Organization (WHO) has declared that antimicrobial resistance (AMR) is one of the top 10 global public health threats facing humanity. As advocated by WHO, an effective response to the continuing rise of AMR requires a “One Health” approach with intersectoral collaboration between public health, animal and environment health sectors, as well as close coordination with global action.

Through the joint efforts of relevant Government bureaux/departments and organisations in implementing the *Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2017-2022)* over the past five years, we have achieved positive outcomes in minimising the emergence and preventing the spread of AMR. The Government has all along attached great importance to tackling the threat of AMR and the Policy Address of the Chief Executive of Hong Kong SAR announced on 6 October 2021 pledged to review the implementation experience of the Action Plan and draw up the second plan to map out response strategies for the next phase. Subsequently, the High-Level Steering Committee endorsed in May 2021 that the framework of the second Action Plan covering the period from 2023 to 2027, and at its meeting in May 2022 agreed on the strategic actions and indicators.

To tackle AMR as a public health threat, this Action Plan has its **Goals**:



This Action Plan adopts the **6 Key Areas** as in the last Action Plan, to slow the emergence of AMR and prevent its spread, namely

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 prevention measures;
4. Improve awareness and understanding of antimicrobial resistance through effective communication, education and training;
5. Promote research on AMR; and
6. Strengthen partnerships and foster engagement of relevant stakeholders.

It includes the expert inputs and wisdom upon consulting stakeholders across sectors, disciplines and organisations, and soliciting their support for implementation.

In this Action Plan, a total of **21 Objectives** with detailed **Strategic Interventions** under each key areas, in which 5 are identified as **Priority Interventions**, are recommended:

- Amending relevant Ordinance(s) to mandate recording of antimicrobial prescription and dispensing data systematically through electronic means
- Further enhancement of ASP in public hospitals
- Roll out territory-wide decolonisation programme in RCHes
- Surveillance and control of AMR in ready-to-eat food
- Regular survey with general public on AMR to inform strategies on health promotion

And time-bound **Indicators** have also been developed to facilitate monitoring and evaluation of the implementation of this Action Plan.

This Action Plan provides guidance not only for public health and veterinary partners, but also to co-ordinate efforts from all sectors of the community, to combat AMR in a multi-sectoral and whole-of-society approach. We also urge everyone to support the Action Plan and join hands to to minimise the development and spread of AMR.

Introduction

Antimicrobial resistance – a global public health threat

1. Antimicrobial resistance (AMR) arises when microorganisms (e.g. bacteria, viruses, fungi and parasites) evolve to become resistant to previously effective antimicrobials. This results in infections which are harder to treat, with an increased risk of further spread, morbidity and mortality¹. AMR has been declared as one of the top ten global public health threats facing humanity by the World Health Organization (WHO) in 2019². It is estimated by WHO that deaths attributed to AMR will be as high as 10 million in 2050, which is even larger than the current number of deaths caused by cancer (8.2 million)³.
2. AMR occurs naturally over time through genetic changes and can affect humans and animals. It develops when microorganisms adapt and grow in the presence of antimicrobials (including properly used antimicrobials). However, AMR is accelerated by the misuse and overuse of antimicrobials. Among all antimicrobials, resistance to antibiotics for treatment of bacterial infection is the most serious. Resistant microorganisms are often acquired through ingestion of or contact with colonised or infected animals, food or humans, or their contaminated environment. Microorganisms which are resistant to one or more classes of antimicrobials are termed Multidrug-Resistant Organisms (MDROs)⁴. Examples of important MDROs include Methicillin-resistant *Staphylococcus aureus* (MRSA), Carbapenemase-producing *Enterobacteriaceae* (CPE), Vancomycin-Resistant *Enterococcus* (VRE), Vancomycin-intermediate / resistant *Staphylococcus aureus* (VISA/VRSA), Multi-drug resistant *Pseudomonas aeruginosa* (MRPA) and *Candida auris*.

3. AMR has no respect for borders and direction and can be transmitted in a bi-directional manner from animals to humans and vice versa. To combat AMR, actions taken by the healthcare sector alone are not enough and concerted efforts from the public are crucial. “One Health”, an integrated, unifying approach that aims to achieve optimal and sustainable health outcomes for people, animals, and ecosystems, has been advocated by the WHO to ensure that all stakeholders and all sectors are involved and working with concerted effort⁵ (**Figure 1**).

Figure 1: One health approach to antimicrobial resistance



4. The **High Level Steering Committee on Antimicrobial Resistance (HLSC)** was set up in May 2016 to call for collaboration, synergy and cross-fertilisation of all professional sectors under a “One Health” framework in response to AMR. Chaired by the then Secretary for Food and Health, it comprises representatives from relevant government departments, public and private hospitals, healthcare organisations, academia and relevant professional bodies.
5. Under the HLSC, an **Expert Committee on Antimicrobial Resistance (EC)** was established in October 2016 to provide expert opinions on priority areas for actions for the HLSC’s consideration. It comprises local and overseas experts in the fields of human and veterinary medicine, microbiology, public health, pharmacology and agriculture.

Implementation of Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2017-2022)

6. Under the leadership of the HLSC, the **Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2017-2022)** was launched in July 2017. By adopting the “One Health” approach, it outlined a total of 19 objectives, 43 strategic interventions and 71 activities under six key areas –
 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.
7. Since the launch of the Action Plan, a series of actions against AMR have been implemented in accordance with the strategies laid out in the plan by different action parties, including the then Food and Health Bureau (FHB), Department of Health (DH), Hospital Authority (HA), Agriculture, Fisheries and Conservation Department (AFCD), and Food and Environmental Hygiene Department (FEHD).

8. A mid-term review⁶ conducted in 2020 showed that good progresses have been made in combating AMR in Hong Kong when compared with the situation of 2016. Relevant activities had been carried out according to the timeline pledged in the Action Plan. Towards the conclusion of the current Action Plan, a number of notable achievements in combating AMR had been made –

- Surveillance of AMR and antimicrobial use across the human, animal and food sectors in Hong Kong, which encompasses data collection, analysis and dissemination, is now conducted via a centralised platform⁷;
- Adoption of WHO GLASS surveillance standard and use of WHO AWaRe benchmark as a benchmarking of the drug usage in Hong Kong;
- Inter-sectoral contribution under the “One Health” approach had been put into practice;
- Surveillance findings are published on a regular basis to the stakeholders and public via different channels, including the website of the Centre for Health Protection, as well as submission to Regional Office for the Western Pacific of WHO;
- Regulatory and control measures were promoted at the community pharmacy level to reduce the illegal sales of antimicrobials.

9. Nevertheless, despite the above successes, the threat of AMR still remains. The situation of MDROs in Hong Kong remained worrisome. Some notable examples include –

- Local public hospitals have reported a higher rate of methicillin-resistant *Staphylococcus aureus* (MRSA) bacteraemia detected after 48 hours of admission in 2020, 2021 and the first quarter of 2022, compared with previous years⁸;
- The number of cases of Carbapenemase-producing *Enterobacteriaceae* (CPE) discharged to Residential Care Homes for the Elderly (RCHEs) rose from 242 cases in 2019 to 260 cases in 2020, and then sharply to 526 cases in 2021;
- The first case of *Candida auris*, an emerging multidrug resistant fungus, was reported in Hong Kong in July 2019. More cases have been reported since, with outbreaks involving public hospitals.

10. Undoubtedly, the impact of the Coronavirus disease 2019 (COVID-19) pandemic on the AMR situation cannot be overlooked as it spanned across the second half of the current Action Plan. While the pandemic is still on-going, a number of effects have been identified^{9,10,11} –

- Diversion of resources, including laboratory capacity, healthcare and public health worker manpower, consumables, have undermined the efforts of antimicrobial stewardship programmes;
- Weakened infection control due to fatigue and heavy workload of healthcare workers, and shortages of personal protective equipment in the early phase of pandemic may have facilitated transmission of MDROs;
- Surge of hospital admission may increase the risk of healthcare-associated infections and the transmission of MDROs, which in turn may lead to increased antimicrobial use;
- Disruption to routine immunisation activities, due to COVID-19-related measures, has led to reductions in overall vaccination coverage globally, potentially leading to an overuse of antimicrobials;
- The increased risk of secondary bacterial infection among patients with COVID-19 has led to the increased use of antibiotics. Moreover, those with COVID-19 complications may require mechanical ventilation or other invasive devices, which increases the risk of acquiring hospital-associated MDROs;
- Nevertheless, the pandemic has led to enhanced infection control measures among healthcare workers and the high alertness of personal hygiene among the general public. Increased fear of attending healthcare facilities and postponement of elective hospital procedures has resulted in fewer medical consultations and antibiotic prescriptions;
- The various public health measures, such as wearing masks, personal hygiene and social distancing, has led to decreased transmission of other infectious diseases through the respiratory route and person-to-person contact¹².

11. Taking the above into account, it is important to carry forward the success and progress achieved in the first Action Plan and continue our fight against AMR.

Second Strategy and Action Plan on Antimicrobial Resistance for Hong Kong

12. As stipulated in the 2021 Policy Address, the Government will review the implementation experience of the first Action Plan and draw up the second plan to map out response strategies for the next phase. Under the steering of HLSC and EC, preparation of the second Action Plan was started in 2021.

13. In its 6th meeting held in May 2021, the HLSC endorsed the goals of the second Action Plan as follow -

- To slow the emergence of resistant bacteria and prevent the spread of resistant infections (i.e., minimise the development and spread of AMR) as the ultimate goal;
- Promote and support a “One Health” approach to AMR;
- Focus on strengthening existing systems and mainstreaming of efforts to combat AMR;
- Address major challenges identified in addressing AMR and build upon best practices across health, development, financing, and research and development; and
- The recommendations should support mobilisation and action by all stakeholders.

Strategic Framework of the Action Plan (2023-2027)

14. This second Action Plan, covering the years from 2023 to 2027, is aligned with the WHO’s *Global Action Plan on Antimicrobial Resistance*¹³. As endorsed by the HLSC, the **six key areas** of the first Action Plan will be adopted. Under the “One Health” approach involving various multi-sectoral key action parties, it highlighted a total of **21 objectives** and **48 strategic interventions (Figure 2)**.

Figure 2: Framework of the Hong Kong Strategy and Action Plan on Antimicrobial Resistance (2023-2027)



15. To enable the Government and stakeholders to focus resources and address the threat of AMR more effectively, this Action Plan will also feature a number of priority interventions. In addition, a series of indicators have been defined to facilitate monitoring of its progress and evaluation. They will be further described in the ensuing sections.
16. After consulting and soliciting the supporting from the relevant stakeholders from different sectors, disciplines and organisations, a list of activities were proposed under each strategic intervention. They are summarised in the **Summary Table of Actions**.

Key Area 1

Strengthen knowledge through surveillance and research

Objective 1

Enhance the existing antimicrobial resistance surveillance system under One Health for Hong Kong

Objective 2

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

Objective 3

Monitor antimicrobial use in humans and animals



17. A comprehensive surveillance system is essential for assessing the size and nature of the AMR situation in Hong Kong and for monitoring the effectiveness of corresponding measures and interventions.
18. In 2015, WHO launched the **Global Antimicrobial Resistance and Use Surveillance System (GLASS)** which provides a standardised approach to the collection, analysis, interpretation and sharing of data by different countries¹⁴. The system adopts a “One Health” Approach which covers the surveillance of AMR in human, animal and food sectors.
19. A **Working Group on AMR One Health Surveillance** was established in October 2017 to steer and oversee the development of surveillance on AMR and antimicrobial use in Hong Kong in accordance with the GLASS standards. This effort resulted in the development and launch of the *One Health AMR Information System (AMRIS)* in March 2022. Its major capabilities include the ability to gather, analyse, share and link data from multiple existing and future surveillance and monitoring systems under DH, HA, AFCD, and FEHD, and to generate standardised surveillance report on both regular and ad hoc bases. The major AMR surveillance data collected by different contributing parties are summarized in the ensuing paragraphs.

Objective 1 - Enhance the existing antimicrobial resistance surveillance system under One Health for Hong Kong

20. Currently, the Centre for Health Protection (CHP) of DH collects AMR data from medical practitioners, laboratories, private hospitals and pharmaceutical trade through AMRIS and other means. The Public Health Laboratory Services Branch (PHLSB) of CHP supports public and private health service providers in bacterial isolation and antimicrobial susceptibility testing on bacterial isolates collected from public and private out-patient settings. Statistics on AMR control are promulgated and regularly updated (available online in CHP website¹⁵) and highlights are provided below.
21. The number of CA-MRSA cases notified to CHP remained at around 1,200 between 2016 and 2019, then experienced a drop to below 600 in 2021. The drop in number is possibly due to improved personal and environmental hygiene and social distancing measures adopted during the COVID-19 pandemic.
22. HA actively monitors selected MDROs through their routinely collected laboratory statistics from in-patient and out-patient microbiological investigations. While there was an absence of VRE resurgence, an increase of *Acinetobacter* species resistant or intermediate to carbapenems was observed and the percentages of MRSA, resistant *E. coli* and *Klebsiella* species remained high in recent years.
23. The Food Surveillance Programme by the Centre for Food Safety (CFS) is designed to control and prevent food hazards. It is a key component of the Centre's food safety assurance programme and is aimed to find out the safety of our food supply. Inspectors of the Centre take samples at import, wholesale and retail levels for microbiological testings, which covers both bacteria and viruses. The Centre has been promoting public awareness and also promulgate surveillance results for public information. The food surveillance programme will be strengthened by making it more risk-based and with a wider coverage. In particular, raw or undercooked foods and ready-to-eat foods are associated with the risk of AMR microorganisms. For details of food surveillance on AMR, please refer to **Objective 11**.

24. Since 2019, AFCD has initiated AMR surveillance on local food animals with samples routinely collected from local pig, chicken and fish farms. The small size of the Hong Kong pig and chicken production sectors means that the surveillance programme designed for Hong Kong differs from those in places with many farms. Samples for this programme were collected on farms rather than in the slaughterhouse or markets to reflect events that are occurring just prior to sale. Studies conducted previously by other groups have already highlighted the high levels of resistance in commensal organisms and have also identified the genetic basis of resistance for a number of organisms from farm animals reared in or imported to Hong Kong^{16,17}. Similar findings have also been reported in the broader region¹⁸.
25. While no obvious trend could be observed, the findings of the first years of the surveillance programme showed that the percentage of ESBL-E remained relatively stable and there was an absence of VRE in both chicken and pig farms. For Carbapenem-resistant *Enterobacteriaceae*, a small amount of samples tested positive. For fish farms, there were absence of ESBL-producing *Vibrio* spp. and Carbapenem-resistant *Vibrio* spp. in marine fish farms, similarly, absence of ESBL producing *Aeromonas* spp. and Carbapenem-resistant *Aeromonas* spp. in pond fish farms were observed. These results are in line with observations in other studies in the region, and provide a baseline on which changes over time in resistance patterns and genes associated with reduced susceptibility to antimicrobials can be assessed. The details of the AMR figures can be found on the AFCD website¹⁹.
26. There is currently limited information available on ways to reduce ESBL-producing organisms in farms in Hong Kong. As such, in addition to routine AMR surveillance, AFCD will conduct research to determine the potential sources of ESBL-producing organisms in livestock farms, and subsequently determine and apply relevant interventions based on the evidence provided from the studies conducted. It should be noted that changes in resistance patterns are complex and a simple linear response between usage and resistance does not apply in all places/situation.

27. The existing AMR surveillance structure and system will be continued, with enhancements in response to the latest international and local trend and recommendations.

Strategic Interventions

1.1 Continue the current structure for One Health surveillance on AMR

- The Working Group on AMR One Health Surveillance will continue to deliberate on the collection and dissemination of AMR and antimicrobial use data, and provide recommendations to the EC for consideration

1.2 Continue to strengthen AMR surveillance in healthcare settings

- AMR surveillance based on WHO's GLASS reporting criteria will be continued, with updates of the surveillance activities in accordance to the latest development
- AMR surveillance at laboratory level for both in- and out-patient service providers will be continued. The WHONET software as promulgated by WHO for AMR surveillance in accordance with GLASS will be promoted for use by medical laboratories in Hong Kong

1.3 Continue AMR surveillance programme on animals

- To continue surveillance on AMR in food animal production farms
- To review AMR surveillance in local food animal production farms, with enhancement when appropriate
- To carry out supplementary studies, where necessary, related to AMR in local food animal production farms

1.4 Continue AMR surveillance programme on food

- To continue AMR surveillance in food

Objective 2 - Maintain laboratory capacity to support surveillance activities in both human and animal sectors

28. Laboratory support is essential to AMR surveillance. PHLSB under DH is currently the local reference laboratory to advise and support local medical laboratories in AMR surveillance. Both PHLSB and the HA Microbiology Laboratory Network has adopted 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). To allow uniformed comparison across different sectors, quality assurance and adoption of standardised AST method will also be required in other medical laboratories.

Strategic Interventions

2.1 Maintain laboratory support in AMR surveillance

- PHLSB under DH will continue to serve as the local reference laboratory to advise and support local medical laboratories in AMR surveillance

2.2 Standardise laboratory antimicrobial susceptibility testing method for AMR surveillance

- Both DH and HA will continue to adopt the latest international standards of AST, such as CLSI or EUCAST
- HHB will explore the registration of medical laboratories in Hong Kong to enhance quality assurance of laboratory performance, including those on antimicrobial susceptibility

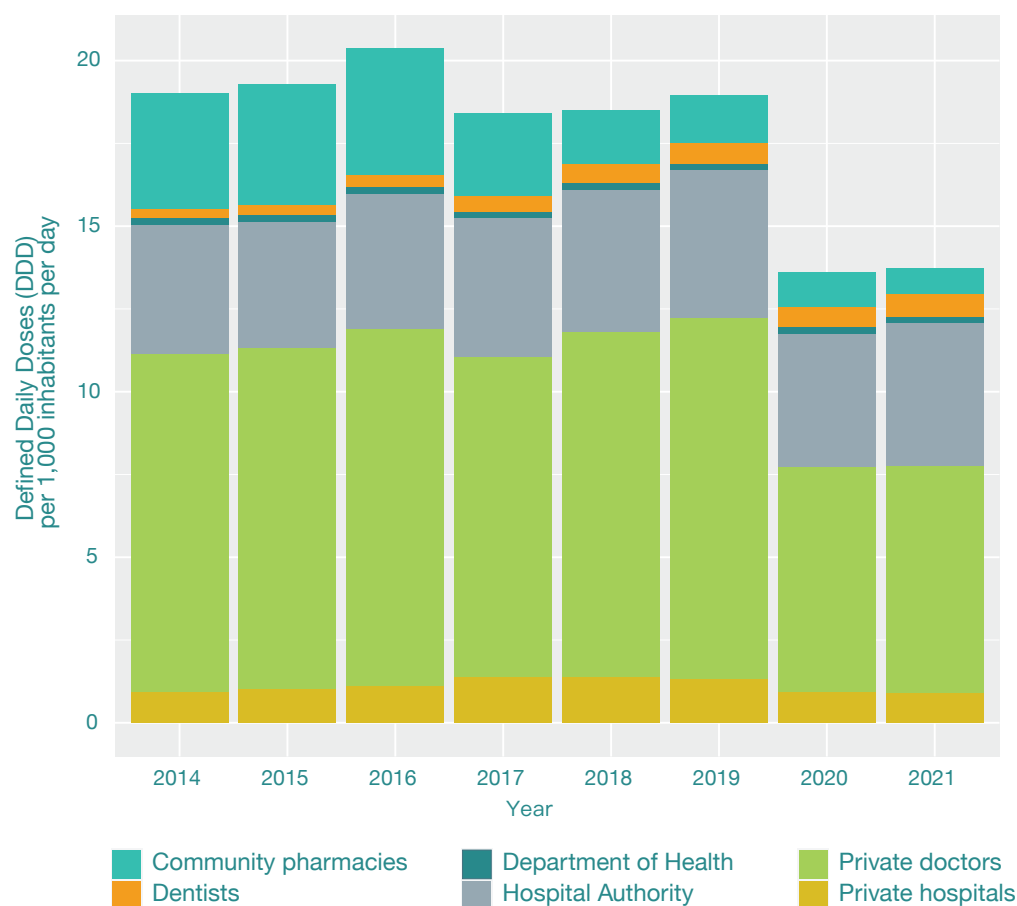
2.3 Continue quality assurance programme and promote introduction in medical laboratories

- PHLSB, as the local reference laboratory, will continue its coordination with medical laboratories in Hong Kong in conducting quality assessment programme for continuous improvement of standards

Objective 3 - Monitor antimicrobial use in humans and animals

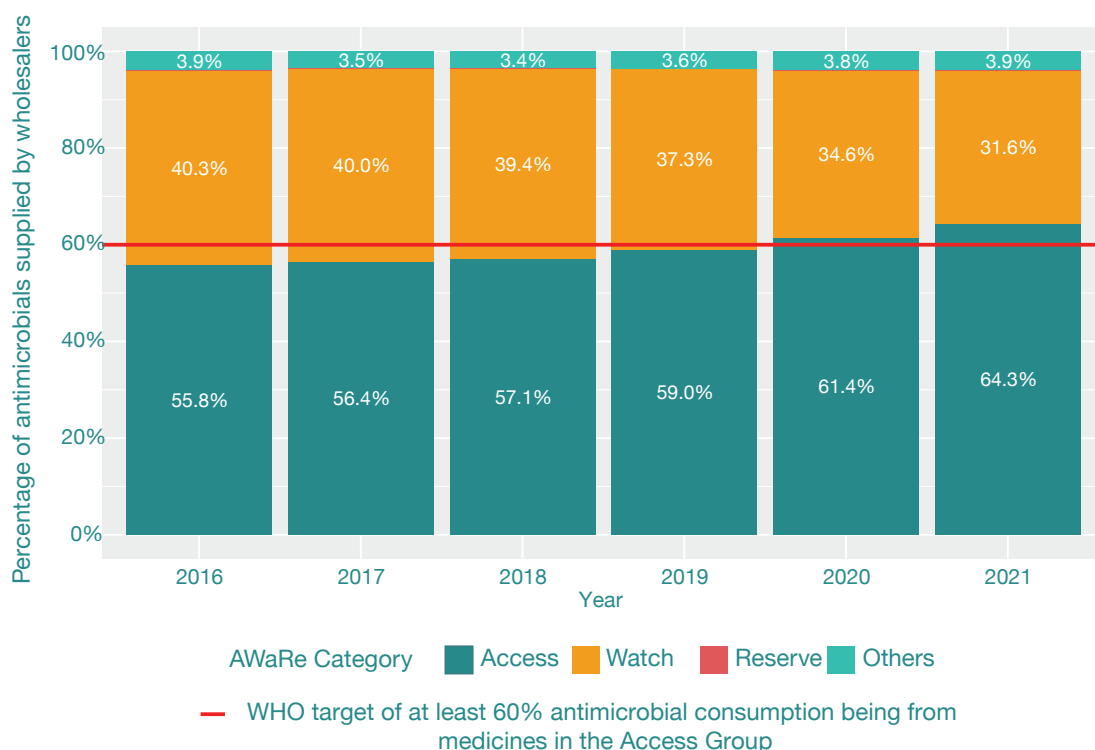
29. Currently, antimicrobial use (AMU) data in human and animal sector is collected, analysed and disseminated via the CHP website²⁰. Surveillance and monitoring systems are in place to assess and control the trends in AMU. The unit of the presented data of AMU below is in terms of defined daily doses (DDD) per 1,000 inhabitants per day or per 1,000 patient-days”, which provide a proxy for antimicrobial consumption in community setting and hospital setting respectively²¹.
30. On the human side, under 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 their usage. DH has been collecting the supply data for the 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. In Hong Kong, 49.4% of antimicrobials supplied in Hong Kong went to private doctors, followed by HA (29.0%) and community pharmacies (7.5%) in 2021. There is significant drop of antimicrobial use, in particular among private doctors and community pharmacies in 2020 and 2021 when COVID-19 pandemic occurred. The reduction might be due to decrease in respiratory infections including influenza and drop in health seeking behavior by the general public^{9,22}.
31. Data on antimicrobial use in the healthcare facilities under HA is available through its electronic dispensing system. Despite the initiative on AMR control in Hong Kong, there has not been any noticeable reduction of AMU in HA in the past few years. Currently, prescription and dispensing data on antimicrobials from the private human sector lacking (to be discussed in detail under **Objective 4**).
32. Regarding AMU in the community, data on antimicrobial supply are collected from licensed wholesale traders to monitor the trend of antimicrobial utilisation. There has been a drastic decrease in the wholesale supply during COVID-19 pandemic (2020 and 2021) when compared with that of 2019 (**Figure 3**), and a continuous drop in the supply of antimicrobials to community pharmacies, from 18.5% in 2016 to 5.6% in 2021.

Figure 3: Total wholesale supply of antimicrobials



33. WHO has set a country-level target of “at least 60% of total antibiotic consumption being Access group antibiotics” under its Access, Watch, Reserve (AWaRe) Classification of antibiotics. Access group antibiotics refer to those antibiotics which are deemed less likely to induce AMR, for example, amoxicillin, cefazolin, cloxacillin, doxycycline, and metronidazole. In 2020 and 2021, the proportion of the antimicrobials under the “Access” classification reached 61.4% and 64.3% of the total antimicrobial supply in Hong Kong respectively, which were higher than WHO’s target (**Figure 4**).

34. On the animal side, the system adopted for local pig and chicken farms is based on monthly reports submitted voluntarily by farmers to AFCD, backed by audit testing. The surveillance programme officially commenced in 2019. Data collected at farm level can provide a relatively granular and accurate picture of AMU. Collection and testing of audit samples such as animal feed and faecal wastes on pig and chicken farms to help detect unreported or inadvertent AMU have also been implemented. It was noted from the first years of surveillance that there were limited usage of antimicrobials in chicken and fish production with a decrease in their total usage, while

Figure 4: Proportions of antimicrobials under the AWaRe classification

there was no representable increase observed in total usage in pig production (**Table 1**). These data on AMU can be used as a baseline for measuring changes in practices over time given action to reduce AMU on farms is relatively recent. Generally speaking, chicken producers use less antimicrobials than pig producers due, in part, to the shorter life span of chicken than pigs and the manner in which they are reared. Fish farms are not significant users of antimicrobials and there appears to be little scope to reduce levels used in this sector.

35. Overall, AMU in the food animal sectors in Hong Kong is higher than places with longstanding surveillance programmes (such as United Kingdom, Netherlands, Denmark), but is likely to be below those in some major pig producing European nations (such as Spain, Italy) (ESVAC 2019 and 2020 report). Note that results from different countries are not directly comparable given different systems for data recording and for animal production.

Table 1: AMU surveillance in chicken, pig and fish farms (2019-2020)

		2019	2020
Chicken farms	Calculated total quantity of AMU in kg	143.57	43.4
	AMU in mg/kg (Target animal biomass)	20.62	5.83
Pig farms	Calculated total quantity of AMU in kg	1753.49	1933.04
	AMU in mg/kg (Target animal biomass)	111.18	123.72
Fish Farms	Calculated total quantity of AMU in kg	15.73	0.37
	AMU in mg/kg (Target animal biomass)	4.97	0.12

Strategic Interventions

3.1 Continue antimicrobial use surveillance

- The CHP website will continue to serve as the centralised platform dissemination of antimicrobial use data from different sectors
- The use of standardised reporting formats and units, such as DDD in human use and mg/kg of meat produced in food animals, will be continued to facilitated comparison and trend monitoring

3.2 Monitor antimicrobial use in humans

- Collection of antibiotic dispensing data from HA and monitoring of antibiotic use in public hospitals and clinics will be continued through the AMRIS
- Please refer to **Strategic Intervention 4.4** for the details of “collection of prescription and dispensing data on antimicrobials from the private human sector”

3.3 Monitor antimicrobial use in animals

- To continue monitoring antimicrobial use in local food animal production farms
- To review monitoring on antimicrobial use in local food animal production farms, with enhancement when appropriate
- To carry out supplementary studies, where necessary, related to antimicrobial use in local food animal production farms

Key Area 2

Optimise use of antimicrobials in humans and animals

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 antimicrobial prescription guidelines of human health practitioners

Objective 7

Ensure proper use of antimicrobials in animals



36. Ensuring judicious use of antimicrobials is important for minimising the occurrence of antimicrobial-resistant infections and reducing disease burden. It should be promoted in every step along the antimicrobial supply chain, from the wholesale supply, prescription to dispensing, using the “One Health” approach.



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

37. Currently, the possession and supply of antimicrobials are regulated under the Pharmacy and Poisons Ordinance (Cap. 138) and Antibiotics Ordinance (Cap. 137). Sales of prescription-only antimicrobials without a prescription from a registered medical practitioner, a registered dentist or a registered veterinary surgeon is an offence.
38. Only traders with appropriate license are allowed to possess and deal in antimicrobial products. Licensed wholesale dealers 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.
39. The Drug Office of DH, as the drug regulatory agency, perform regular and surprise inspections on drug traders to ensure compliance of relevant requirements of the legislation and the codes of practice. On top of test purchases being conducted regularly against drug retailers, the Drug Office also carry out inspections under the authorities conferred by the Antibiotics Ordinance (Cap. 137) and the Pharmacy and Poisons Ordinance (Cap. 138) at authorised sellers of poisons and prosecutions would be initiated if the authorised sellers of poisons are found not comply with the legal requirements on the sale and/or record-keeping of antibiotics.
40. However, the Ordinances do not require the authorised sellers of poisons to record the stock balance after each transaction and it is impossible for the inspections to detect any discrepancy between the physical stock and recorded transaction. There is room for strengthening relevant requirements of proper record-keeping for surveillance purpose, applicable to those authorised to possess and supply antimicrobials and to deter potential illegal supply of prescription-only antimicrobials.

Strategic Interventions

4.1 Enhance inspection against authorised sellers of poisons

- DH will initiate special inspections against authorised sellers using a risk assessment approach based on, e.g., the volume of antimicrobials purchased, past irregularities and intelligence. Prosecutions will be initiated as necessary

4.2 Continue to enhance test purchase of antimicrobials against authorised sellers of poisons

- DH will enhance test purchases. Prosecutions will be initiated as necessary

4.3 Continue engagement with licensed drug retailers

- Please refer to **Strategic Intervention 14.1** on ways to strengthen health information provision on antimicrobial use

4.4 Review and consider amending relevant ordinances

- DH will review and consider amending relevant Ordinance(s) to mandate recording of antimicrobial prescription and dispensing data systematically through electronic means and ensure proper record keeping of antimicrobials along the supply chain, from wholesale to supply to end users, so as to combat the sales of antimicrobials without prescription

Objective 5 - Implement and enhance training in prescribing antimicrobials through Antibiotic Stewardship Programme in human health sector

41. 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 expense.
42. Currently, ASP is aimed to be implemented in all clusters of HA hospitals and all 12 private hospitals, although to different extent in the latter. In view of manpower constraints, HA has not been able to deploy much human resources to address all aspects of ASP. With EC's direction on ASP, HA is working towards a more automated approach through enhancement of IT system for guiding and monitoring antibiotic prescriptions, as well as evaluating prescription behaviours.
43. In 1999, the Interhospital Multi-disciplinary Programme on Antimicrobial ChemoTherapy (IMPACT) Editorial Board, comprising experts from CHP, HA and local universities, taking into account the local context and AMR epidemiology, developed and published the IMPACT guideline as a reference on antimicrobial use for medical practitioners in Hong Kong. IMPACT is currently at its fifth edition and is available in booklet and as a mobile application. Promotion of adherence to IMPACT is an integral component of ASP.
44. In the primary care setting, under the Antibiotic Stewardship Programme in Primary Care²³, new guidance notes and patient information sheets on seven common infections (acute pharyngitis, acute uncomplicated cystitis in women, simple (uncomplicated) skin and soft tissue infections, acute otitis media, acute rhinosinusitis, community acquired pneumonia and acute exacerbations of chronic obstructive pulmonary disease) have been developed and promulgated for use by primary care doctors since 2017.

Strategic Interventions

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

- The Government has committed resources for sustaining ASP in different healthcare settings to ensure adequate financial and manpower resources and expertise

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

- To review and update the IMPACT guideline, as a deliverable of this Action Plan, based on the local context and AMR epidemiology, and promulgated among medical practitioners for evidence-based antimicrobial use in the corresponding health care settings
- To continue and strengthen ASP in public hospitals, based on objective assessment criteria, including the enhancement of IT systems
- To continue and strengthen ASP in private hospitals based on evaluation against objective assessment criteria
- The evidence-based guidelines on antimicrobials use in primary care setting will be reviewed, to ensure consistency with IMPACT, updated and promulgated as a deliverable of this Action Plan

Objective 6 - Monitor compliance with antimicrobial prescription guidelines of human health practitioners

45. Apart from development and promulgation of antimicrobial prescription guidelines, regular monitoring and evaluation with audit and feedback to prescribers are as important for identifying facilitating factors and barriers for quality improvement.
46. A survey of medical practitioners was conducted in 2019 to assess their knowledge, attitude and practice (KAP) on AMR²⁴. One of the key findings was that 17% of respondents would prescribe antimicrobials for cold, flu or upper respiratory tract infection whenever the patient requested for it, due to different reasons including patients' or carers' expectation and fear of litigation. Target measures are required to address unnecessary antimicrobial prescription. Subsequent KAP surveys would provide more information regarding their antimicrobial prescribing behaviours and would serve as objective evidence of effectiveness of the targeted measures.
47. In HA, the appropriateness of antibiotic use is being monitored in medical, surgical and orthopaedic specialty of acute hospitals, by taking Piperacillin/tazobactam and Meropenem, the two mostly consumed Group 1 "Big-gun antibiotics", as the surrogate markers. In 2021, 94.5% of antibiotic use were assessed to be appropriate on day 4 of prescription while 94.0% of the concurrent feedback has been accepted by the clinicians. To avoid the undesirable consequence of the "squeezing the balloon" effect (i.e. increase in using some antibiotics due to restriction of the others), comprehensive surveillance of AMU for all antibiotics are required to provide a complete picture of appropriateness of antibiotic use.

Strategic Interventions

6.1 Monitor compliance with antimicrobial prescription guidelines of human health practitioners

- To evaluate and audit ASP and establish feedback loop to reflect performance
- To implement target measures to address any identified inappropriate use of antibiotics
- To conduct regular surveys to monitor knowledge, understanding and prescription behaviours of human health practitioners on AMR to determine effectiveness of interventions
- To ensure monitoring of antibiotic use is comprehensive to provide a complete unbiased picture, to reveal areas requiring attention

Objective 7 - Ensure proper use of antimicrobials in animals

48. To prepare for the implementation of the “veterinary prescription-only medication supply” measure (the Measure), AFCD has facilitated and supported development of projects for the provision of veterinary services to food animal production farms by non-government veterinary sector. With the veterinary services provided to farmers continue to mature, it is tentatively planned to stop issuing the permit to farmers and to fully implement the Measure in 2024.

Strategic Interventions

7.1 Strengthen support to food animal production and veterinary sectors

- To continue to facilitate and support development of projects for the provision of veterinary services to food animal production farms by non-government veterinary sector, including formulation of tailor-made farm-specific disease management plans
- To facilitate and support farmers in sourcing vaccines and veterinary medications for disease prevention and management by both government and non-government veterinary sectors
- To continue to support non-government veterinarians to build up their capacity for providing veterinary services to local food animal production farms

7.2 Promote proper antimicrobial use according to evidence and local epidemiology

- To review and update 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
- To organise education and publicity programmes for food animal farmers and veterinarians on the proper use of antimicrobials

7.3 Enhance regulation of antimicrobial use in food animals

- To implement “veterinary prescription-only medication supply” policy and tightly regulate the use of critically important antimicrobials in animal husbandry
- To review relevant legislation on exemption of using antimicrobials in animal feeds

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

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

Develop and strengthen surveillance and interventions to combat antimicrobial resistance in food

Objective 12

Enhance vaccination uptake



49. AMR can arise naturally and can be an inevitable consequence of antimicrobial use. Various infection control measures, such as hand hygiene and environmental hygiene, has been proven to significantly reduce the risk of infections, which in turn reduces the need for antimicrobial prescription. Nevertheless, suboptimal infection control measures further promote the emergence and spread of AMR.
50. The same principle applies to the animal health sector, where good farm management and biosecurity can contribute tremendously to the reduction of susceptibility to infections and the need for antimicrobial use in animals.
51. The local farm animal problem is not very significant in Hong Kong as they constitute a minority of the food supply in Hong Kong. On the contrary, the issue of AMR in ready-to-eat food, including those imported to Hong Kong, have more significant impact. Monitoring of the AMR bacteria inside such food items, with regular promulgation of the findings and the education of the trade and public on the potential health implications of acquisition of AMR from ready-to-eat food should be strengthened.

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

52. Infection control programmes usually encompass promotional 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, contact tracing and quarantine are especially relevant in preventing and controlling spread of AMR.
53. Infection Control Branch of CHP has been the major coordinating body for AMR infection control in human health in Hong Kong. CHP has been working with HA on hospital outbreak control, guidelines formulation and infection control training.

Infection control measures in public and private hospitals

54. HA set up a Task Force on Infection Control to oversee infection control policy of public 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 ratio of one ICN per 250 hospital beds has been adopted in hospitals, but there is a growing challenge on the staffing requirement as a result of the expanding scope of the hospital infection control programmes. 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’.
55. HA provides mandatory basic infection control 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 2022 has been formulated.
56. 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 programme. 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 EC 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.

57. Each private 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.
58. 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. The hand hygiene compliance as reflected by HA's unannounced audit has remained stable at around 90% in the recent 5 years.

Hand hygiene and other prevention programmes under the Department of Health

59. In DH, trainings and audits on hand hygiene measures are conducted on a regular basis. Infection Control coordinators are identified to use audit tools to ensure compliance with infection control standards. DH also issues and regularly updates guidelines on prevention of communicable diseases to RCHEs and Residential Care Homes for Persons with Disabilities (RCHDs). Integrated assessment of RCHEs is being conducted by DH annually.
60. 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 schools and RCHEs.
61. 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 process²⁵. Through different health promotions and patient engagement programmes, both DH and HA have been actively engaging members of the public and patients on the importance of hand hygiene and their roles in reminding healthcare workers to clean their hands.

Management of MDROs in RCHEs

62. The prevalence of MDROs in RCHEs was on a worrying trend. For example, the prevalence of MRSA colonisation among RCHE residents experienced a more-than-10-fold increase between 2005 and 2017, from 2.8% to 37.9% (**Figure 5**); a more-than-10-fold rise of CPE cases in RCHE residents were reported from 2016 to 2021 (**Figure 6**). These trends are alarming, since they occurred despite the previous 5-year Action Plan.

Figure 5: Prevalence of MRSA colonisation among RCHE residents, 2005 to 2017 ^{26,27,28,29}

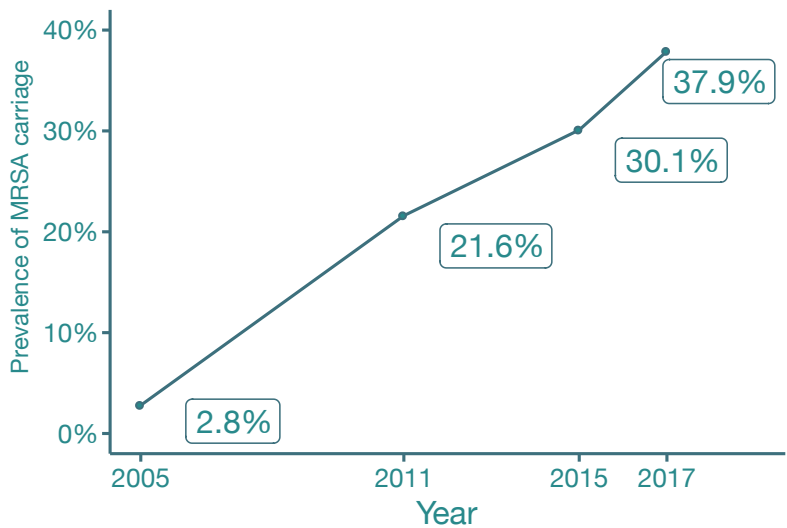
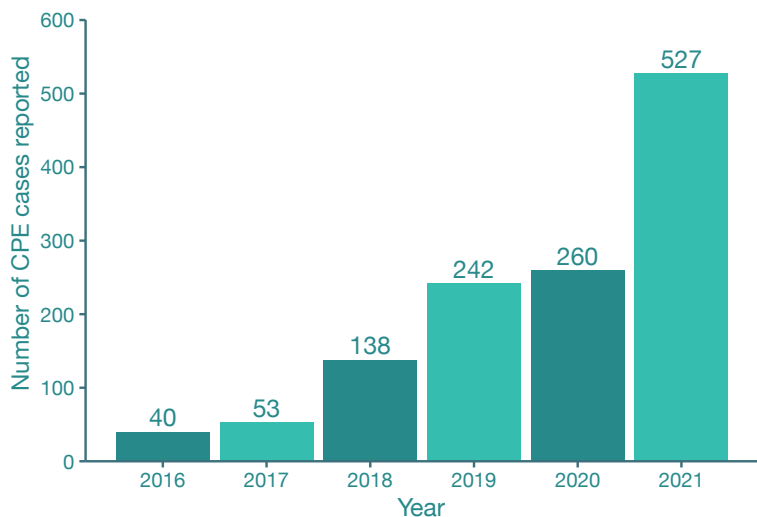


Figure 6: Number of CPE cases involving RCHE residents reported to CHP, 2016 to 2021



63. MDROs colonisation in RCHE residents was associated with prolonged hospitalisations as well as increased risks of morbidity and mortality^{30,31}, which resulted in a vicious cycle of transmission between the RCHE and the hospital. To address the MDRO situation, synergistic measures in both RCHEs and hospitals are necessary.
64. Currently, there is established workflow between CHP and HA for managing MDROs in RCHE. Upon identification of an inpatient MDRO case or carrier involving RCHE resident, HA will notify CHP which will conduct risk assessment and implement relevant control measures in the RCHE, including infection control advice, site visit, and contact tracing if required. CHP also issued guidelines on infection control and management of MDRO carriers to RCHEs and conducted visits to RCHE to provide assessment and support on infection control measures.

65. In view of the apparent lack of effect of the above measures, based on EC's recommendations, a pilot programme on universal decolonisation for MDRO carriers in about 150 RCHEs under the catchment areas of Queen Mary Hospital and Queen Elizabeth Hospital was started in September 2021. The decolonisation regimen comprised of 2% chlorhexidine gluconate solution for bathing, and application of 10% povidone iodine ointment to nostrils once daily two times per week, which was found to be effective in a previous study³². Admission MDRO screening and decolonisation therapy of RCHE residents were also implemented at the two public hospitals. Preliminary evaluation revealed a statistically significant reduction in positive rate for MRSA in the RCHE environment and a slight reduction of MRSA colonisation proportion upon admission screening. Nevertheless, with the waves of COVID-19 experienced in Hong Kong, the outcome of this pilot programme is uncertain and results will need to be interpreted with caution. The programme was planned to progressively expand to cover all RCHEs over the territory in 2022/2023.

Strategic Interventions

8.1 Secure resources for implementing infection control programmes in hospitals

- The Government to allocate sufficient resources, both in terms of manpower and finance, for the effective and timely implementation of infection control programmes in healthcare setting

8.2 Enhance infection control infrastructure in hospitals

- To ensure ward designs are according to latest international guidelines and recommendations in planning new hospitals

8.3 Promote hand hygiene in healthcare settings

- To strengthen hand hygiene programmes to improve compliance by healthcare workers
- To ensure hand hygiene audits accurately reflect the actual practice, so as to reveal areas for interventions and monitoring for objective improvement by regular auditing

8.4 Address transmission of MDRO between hospitals and residential care homes

- To expand the universal decolonisation programme to all RCHEs in the territory
- To implement admission screening and decolonisation therapy in public hospitals for residential care homes residents
- To monitor the MDRO carriage rates in RCHE residents admitted to public hospitals, as surrogate to evaluate the effectiveness of the programme
- To identify areas of improvement in the implementation of infection prevention and control measures in residential care homes

Objective 9 - Strengthen infection control training for healthcare workers

66. Infection control training is an important component of an infection control program. This helps healthcare workers to acquire up-to-date knowledge, recognise the importance of infection control and understand their responsibilities in infection prevention.
67. Infection control trainings are conducted regularly in DH and HA, involving more than 10,200 and 23,400 staff respectively in 2021. The Hong Kong Training Portal on Infection Control and Infectious Diseases, established by DH and HA, serves as an online resource of knowledge for healthcare workers, including important news in infection control and as a collection hub of training materials from previous forums and seminars³³.

Strategic Interventions

9.1 Strengthen infection control training among healthcare workers

- To continue to provide basic infection control training for newly recruited healthcare workers and refresher training every 24 months for current staff
- To continue patient engagement programme on reminding healthcare workers to perform hand hygiene
- To objectively measure the effectiveness of the training and intervention by regular KAP surveys

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

68. It is recognised that there is a need to enhance the biosecurity measures and husbandry practices as well as the management and control of food animal production farms with a view to ensuring the prudent usage of antimicrobials in these farms. In this regard, AFCD has been visiting local livestock and fish farms to educate farmers on the concept of minimising AMU through disease prevention by good farming practices, good aquaculture practices and enhanced biosecurity measures. Moreover, AFCD has facilitated and supported formulation of tailor-made farm-specific management plans to address local AMR issues in conjunction with external veterinary services.

Strategic Interventions

10.1 Develop infection prevention and control policies and strategies

- To facilitate and support formulation of tailor-made farm-specific disease management plan for the purpose of disease prevention, management of disease spread and minimise the use of antibiotics
- To consider relocation and consolidation of livestock farms if necessary

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

- To continue 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 through surveillance programmes
- To keep in view relevant studies to identify potential control points to contain AMR

10.3 Strengthen food safety and hygiene training for farm workers

- To provide regular education seminars on biosecurity, disease control and prevention and farm management to farmers and their workers
- To objectively measure the effectiveness of the training and intervention by regular KAP surveys

Objective 11 – Develop and strengthen surveillance and interventions to combat antimicrobial resistance in food

69. Foods can act as a potential vehicle for transmission of AMR bacteria. Apart from contamination at the farm, foods can also become contaminated at different points of post-harvest stage. They can be contaminated with AMR bacteria by infected food handlers particularly if the food handlers do not observe good hygienic practices when handling foods; or through improper food processing or unhygienic food preparation environment. To prevent foodborne illnesses and spread of AMR, food should be produced and handled in such a way as to minimise the introduction, presence and growth of bacteria.
70. CFS of FEHD has been conducting a routine surveillance programme on AMR in food since January 2022. A total of about 2,000 food samples including raw meat and ready-to-eat food would be collected and tested in two years. Food samples are collected from the retail level. They are tested for ESBL-producing *Enterobacteriaceae* (ESBL-E), Carbapenem-resistant organisms (CRO), Vancomycin-resistant *Enterococcus*, *E coli*, *Enterococcus*, *Salmonella* and *Campylobacter*, using selective and non-selective isolation. CFS will report data of the routine surveillance programme in the first quarter of 2023. CFS will continue to monitor the situation of ESBL-E especially in ready-to-eat food.
71. In view of the high prevalence of MDROs in raw meat and ready-to-eat foods in pilot survey by CFS in 2019-2020, a cornerstone to combat AMR is to enhance food and kitchen hygiene in an effective way, while effective control of foodborne AMR depends on the application of good hygienic practices at any point along the food chain to reduce the risk of contamination and spreading AMR bacteria to other foods.
72. CFS has worked closely with the food industry to promotes the Five Keys to Food Safety primarily developed by WHO, to explain the key areas to prevent foodborne diseases, regardless of whether the pathogens are AMR or non-AMR. The Five Keys to Food Safety include: (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 to prevent foodborne diseases and spread of AMR along the food chain and been promulgated through different channels such as training courses for Hygiene Managers and Hygiene Supervisors, Trade Consultation Forums and Food Safety Seminar. Such information will be continuously reinforced in food safety guidelines for food businesses on certain high-risk, ready-to-eat foods, e.g. sandwiches.

73. To further encourage and facilitate food businesses in informing consumers of the increased risk of consuming raw or undercooked foods and ingredients in ready-to-eat foods, the CFS has prepared and issued the “Guidelines for Food Businesses on Providing Consumer Advisory on High-risk Foods on Menus”³⁴. The Guidelines provide practical examples on what and how to provide such consumer advisory. In the future, the FEHD will explore the feasibility of including such advice in the licensing conditions of certain licensed food businesses that sell certain high-risk foods, e.g. oysters intended for raw consumption, through deliberations with internal and external stakeholders.
74. To target and help address specific needs in food safety for susceptible populations, the CFS has produced food safety advices for the elderly, pregnant women, infant and young children, and people with weakened immunity. The message that the risk of taking uncooked or undercooked food and the notion that people can be infected by AMR bacteria but might not lead to food poisoning or any symptoms has been stepped up. Further information could be accessed at the new thematic page on AMR and food safety in CFS website³⁵ which provides a one-stop area for public and trade to access relevant publicity materials and educational resources on AMR. Health educational resources would be distributed to healthcare centres for pregnant women and the elderly, schools and patient groups to promote food safety at different social settings to accommodate preference for sources, formats and message types. For instance, the CFS has produced a pamphlet ‘Know about “Superbugs” Hidden in Food’ in 2022, explaining how AMR organism can spread along the food chain in an easy-to-understand way. Refer to **Objective 13** for further details on measures to raise the awareness of AMR among general public.

Strategic Interventions

11.1 Continue AMR surveillance in food

- To continue AMR surveillance in food

11.2 Empower the food businesses on prevention of AMR during food process

- To advocate for food businesses to implement Good Hygiene Practices to address foodborne AMR and facilitate consumers to make informed food choices
- To explore the feasibility of including such advice in the licensing conditions of certain licensed food businesses that sell certain high-risk foods, e.g. oysters intended for raw consumption, through deliberations with internal and external stakeholders

11.3 Strengthen food safety and hygiene training for food businesses

- To provide regular education seminars on food hygiene and safety to food businesses
- To introduce the concept of foodborne AMR in training courses for Hygiene Managers, Hygiene Supervisors and food handlers alike
- To objectively measure the effectiveness of the training and interventions

Objective 12 – Enhance vaccination uptake

75. Vaccination has been proposed by the WHO as an important measure in prevention of infection and control of AMR. Influenza activity is a strong driver of antibiotic prescription patterns and seasonal influenza vaccinations can potentially reduce inappropriate antibiotic use. Similar effects have been reported for pneumococcal vaccines as well³⁶.
76. Likewise, COVID-19 was associated with increased risk of secondary bacterial infections and the resultant increase in the risk of AMR development due to antimicrobial use³⁷. Hence, the COVID-19 vaccine would have the secondary benefit in preventing the development of AMR.
77. Currently, the Government provides fully subsidised vaccinations for all children through the Hong Kong Childhood Immunisation Programme. Apart from that the Government 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 persons aged 65 and above. The COVID-19 Vaccination Programme, launched in February 2021, offered free COVID-19 vaccination to the whole population. Various publicity and promotion efforts have been implemented to promote the vaccine uptakes in the target populations.
78. In 2021/22 season, as at 1 July 2022, the coverage of seasonal influenza vaccination in children aged between 6 months and under 6, children aged between 6 and under 12, persons aged between 50 and 64 and persons aged 65 and above were 37.6%, 65.8%, 11.2% and 40.4% respectively, while 46.7% of the elderly population aged 65 or above had received pneumococcal vaccination³⁸. As of end-August 2022, 93.5%, 90.5% and 72.0% of the population in Hong Kong have received the 1st, 2nd and 3rd dose of COVID-19 vaccine respectively³⁹.

Strategic Interventions

12.1 Promote vaccinations contributing to prevention of antimicrobial resistant infections

- To continue promotion of the uptake rate of vaccination contributing to the prevention of AMR infections, including season influenza, pneumococcal and COVID-19 vaccination

Key Area 4

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

Objective 13

Raise awareness of AMR among general public, students and target population

Objective 14

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

Objective 15

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



79. 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. To address the needs of different population subgroups, health messages have to be tailored to the needs and gaps identified in different audience groups to drive greater ownership and actions. Furthermore, effectiveness of the actions need to be objectively ascertained.



Objective 13 - Raise awareness of antimicrobial resistance among general public, students and target population

80. Currently, various government departments and local organisations actively participate in raising public awareness of AMR. For example, DH launches mass media campaigns from time to time to promote hand hygiene and awareness of AMR. DH has also organised promotional activities on the annual Hand Hygiene Awareness Day (5 May) since 2011, and annual World Antibiotic Awareness Week (18-24 November) since 2012 and has engaged doctors, public hospitals and clinics, private hospitals and long-term care facilities.
81. DH, HA, AFCD and FEHD have jointly produced different health promotional materials to remind the public the significance of AMR and the importance of infection control measures like hand hygiene. These materials came in a variety of formats, including pamphlets, posters and videos and were available at various locations, including government websites, hospitals, clinics and government offices.
82. The Education Bureau (EDB) has incorporated the concept of AMR into the liberal studies curriculum in high schools. DH has been developing and disseminating health education materials on AMR to primary students, for example through Educational Television Programmes.
83. Since 2017, DH has conducted surveys targeting the general public, medical practitioners and nursing students to gauge their understanding of antibiotics and AMR, as well as their consumption and the prescription behaviour of antibiotics. These surveys revealed that while the majority of respondents had a good understanding of the problem of AMR and the importance of proper antimicrobial use, there was still a significant number of people who misunderstood the indicated use of antimicrobials. Results of the surveys⁴⁰ were used to inform planning and implementation of interventions under the Action Plan.

Strategic Interventions

13.1 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

- To continue to monitor KAP towards AMR and antimicrobial use among general public and target populations by regular survey. Findings of the survey will provide trend data to ascertain the cost-effectiveness of the health promotion programmes
- To develop and review key messages base on the KAP survey results to raise public awareness and call for action on AMR
- DH, AFCD and FEHD to continue to support and participate in the annual World Antibiotic Awareness Campaign and DH and HA to support the Hand Hygiene Day while the cost-effectiveness of these activities is objectively evaluated
- DH, HA, AFCD and FEHD to continue to 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 while the cost-effectiveness of these activities is objectively evaluated
- AFCD to continue to provide regular education and training to food animal farmers on topics related to antimicrobial use and AMR and will continue to keep in view of international practices and consensus related to antibiotic-free labelling

13.2 Include AMR and related topics to students

- To continue the inclusion of topics on AMR in high school curriculum
- To continue the development and dissemination of education materials on AMR to primary students
- To implement surveys on the target audience, to ascertain effectiveness of the intervention

Objective 14 - Engage patients in adopting infection control measures and proper use of antimicrobials

84. Effective engagement of patients for their support in adopting infection control measures and proper use of antimicrobials are essential to the success in combating AMR. As described above in para. 61, DH and HA have been organising different health promotion and awareness programmes for patients on infection control measures and AMR. Of note, dispensaries under DH and HA have started to provide health information on proper antimicrobial use on drug prescription bag of antimicrobials and proton pump inhibitors.
85. In recent years, WHO has advocated to promote hand hygiene through “patient empowerment” which means by giving relevant knowledge and skills to the patients, they may have greater control over decisions and actions affecting their health in an environment. By involving patients to remind health care workers the importance of hand hygiene, it is believed that the compliance of hand hygiene among health care professionals can be further enhanced^{25,41}. Health promotion materials will be provided based on latest scientific evidence and results of KAP surveys.
86. To this end, DH and HA have continued to provide accessible hand hygiene facilities and products in clinics and public hospitals to facilitate hand hygiene practices by patients. The provision of these facilities and products at the point-of-care are also crucial in ensuring hand hygiene compliance.

Strategic Interventions

14.1 Strengthen health information provision and better engaging patients

- To develop and provide evidence-based health promotion materials in hospital wards, clinics and pharmacies
- To provide, review and update health information on personal hygiene measures on antibiotic drug prescription bags
- To encourage provision of health information on personal hygiene measures on antimicrobial drug prescription bags from private medical practitioners and community pharmacies
- To continue patient education on appropriate use of antimicrobials through easily accessible channels including social media platforms

14.2 Provide supportive environment to facilitate hand hygiene practices by patients

- To provide accessible hand hygiene facilities and products at various points-of-care in healthcare settings

Objective 15 - Include AMR and related topics in school curricula and continuous training of human health and veterinary professionals

87. 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 on AMR. These trainings were delivered through forums, conferences, seminars, workshops and the Training Portal on Infection Control and Infectious Diseases. 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.
88. AFCD has been providing 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.
89. CFS has incorporated the topic of AMR as one of the components in the hygiene supervisor training courses organised by the FEHD under the Hygiene Manager and Hygiene Supervisor Scheme with effect since 2017. Concurrently, CFS has also informed other institutes under the above scheme to include the AMR topic in training materials for recognised Hygiene Manager and Hygiene Supervisor courses.

Strategic Interventions

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

- To continue to include AMR and related topics in undergraduate curricula for human health (medical, nursing, dental and pharmacy) and animal health professionals and encourage continuous professional development

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

- Refer to **Objectives 9, 10 and 11** for details

Key Area 5

Promote research on Antimicrobial Resistance

Objective 16

Promote research on innovative technology and medical science

Objective 17

Promote research on behavioural science and psychology

Objective 18

Promote research on health and economic burden

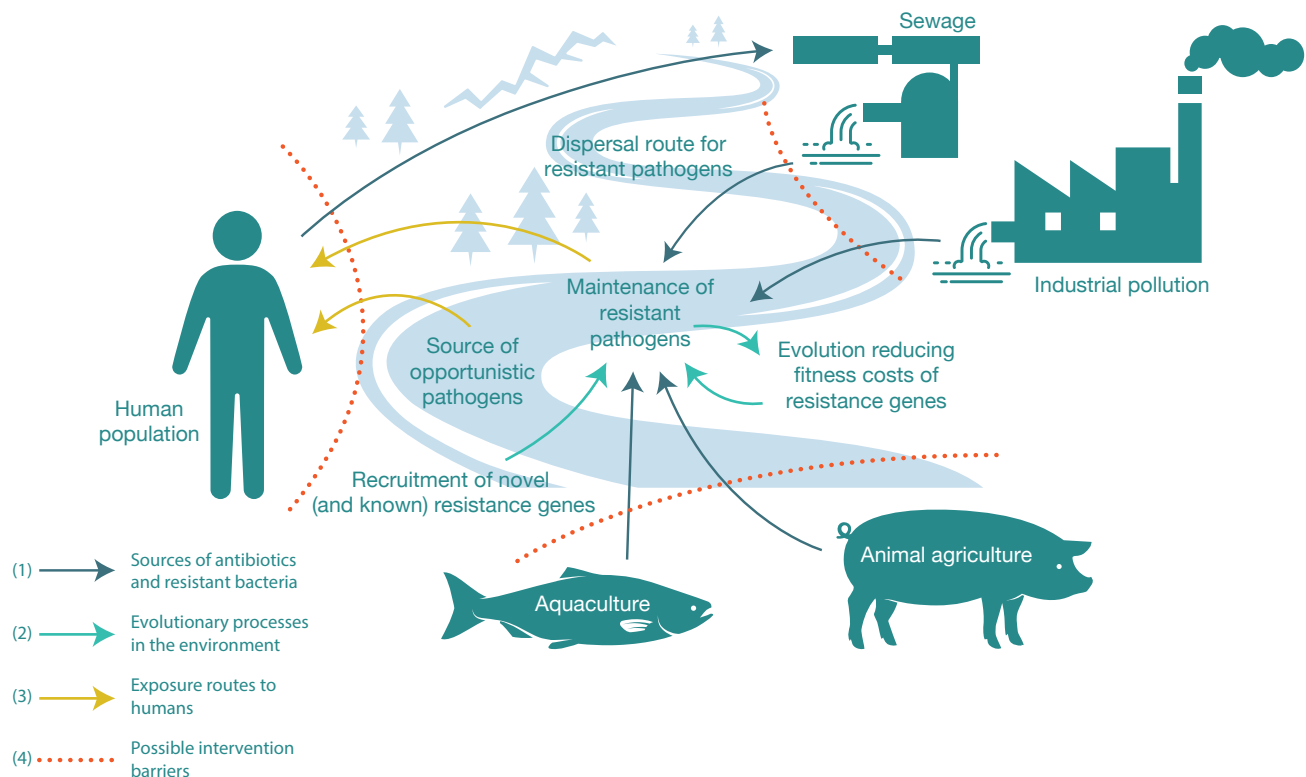
Objective 19

Promote research on the contribution of environment to the burden of AMR



90. 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)⁴² of the Health Bureau. AMR has been identified as one of the thematic priorities of the HMRF and researchers can submit applications for funding support through the HMRF's annual open call.
91. In recent years, the role of the environment in the development of AMR has been increasingly recognized and studied. The current understanding states that the environment acts as a repository for pathogens, antimicrobial resistance genes and antimicrobial waste resulting from sewage and industrial pollution. Over time, pathogens exposed to these environments will develop AMR and will be further dispensed to the human, animal and aquaculture sector (**Figure 7**)⁴³.
92. Nevertheless, relevant knowledge in the local context are in general lacking. Hence, in addition to supporting ongoing research on the different well-defined aspects of AMR, research on the role of the environment in the evolution of AMR will be encouraged in the next Action Plan. Findings from these research will inform the development of additional surveillance and control measures of AMR in the environment.

Figure 7: The role of environment in AMR



(adopted from Larsson et al.)

Objective 16 - Promote research on innovative technology and medical science

Strategic Interventions

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

- Promote research on the development of novel diagnostics tools, such as the feasibility of local adaptation of rapid point-of-care tests, which could reduce unnecessary prescription of antimicrobials

16.2 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 MDROs

16.3 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 17 - Promote research on behavioural science and psychology

Strategic Interventions

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

- Promote research on the effectiveness and cost-effectiveness of different interventions to reduce AMR in the local context
- Promote research on the KAP trend towards AMR and infection control would also be beneficial in assessing the effectiveness of interventions

17.2 Promote research on promoting behavioural changes regarding the use of antimicrobials in the public

- Promote research on the understandings and changing misconceptions and behaviours about the use of antimicrobials, including the use of antibiotics in viral infections and the purchase of antimicrobials in community pharmacies without prescription

Objective 18 - Promote research on health and economic burden

Strategic Interventions

18.1 Promote research on estimating local health burden of AMR

- Promote research on the local 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

Objective 19 - Promote research on the contribution of environment to the burden of AMR

Strategic Interventions

19.1 Promote research on role of environment in the evolution of AMR

- Promote research on the role of environment in the evolution of AMR, including those on AMR gene in the environment and various organisms and their transfer, can inform future development of surveillance and control strategies

19.2 Promote research on preventive measures on the spread of AMR through the environment

- Promote research on preventing the spread of AMR through the environment, for example, the use of probiotics in animal rearing and culture

Key Area 6

Strengthen partnerships and foster engagement of relevant stakeholders

Objective 20

Strengthen international partnerships and regional collaboration

Objective 21

Inform public policy and facilitate stakeholder engagement



93. AMR is a global issue that warrants international collaboration. Hong Kong is committed to adopting global directions regarding measures against AMR and will continue to support the WHO and its Western Pacific Regional Office (WPRO) in its work against AMR.
94. The first action plan had strengthened the inter-sectoral collaboration and communication between different government bureaux and departments, including DH, AFCD, FEHD and HA, representatives and experts from consumers, restaurants, farmers, pharmaceutical trade, food trade together with public and private human and animal health practitioners. Such collaboration will be continued and extend to include experts from environmental sectors to combat the everlasting threat of AMR in the future.



Objective 20 - Strengthen international partnerships and regional collaboration

Strategic Interventions

20.1 Enhance contribution to international, regional and country initiatives in implementing the Action Plan on AMR

- Hong Kong will continue to participate in and contribute to the global, regional and country-level actions against AMR, including the adoption of international guidance, submission of AMR-related figures and statistics and sharing of local experience related to AMR on regional and international platforms
- Hong Kong will officially contribute AMR and AMU data to the WHO global platform, and provide data compatible with the latest version of the software WHONET

Objective 21 - Inform public policy and facilitate stakeholder engagement

Strategic Interventions

21.1 Inform public policy and facilitate stakeholder engagement

- To organise information-sharing sessions on AMR for different stakeholders and target audience to garner their support to the inter-sectoral measures against AMR
- To disseminate information regarding the progress of the implementation of the Action Plan, in the form of objective indicators on trends, will be disseminated to the relevant stakeholders on a regular basis

Priority interventions

95. Apart from continuing and strengthening the existing objectives and detailed actions, this Action Plan also features a number of priority interventions and target indicators to enable the Government and stakeholders to focus resources and address the threat of AMR more effectively (**Table 2**). These priority interventions should be the focus of the action parties in the first 1 to 2 years after the launch of the Action Plan.

Table 2: List of Priority interventions under the Action Plan

Priority interventions	Related Strategic Intervention	Action Parties
Amending relevant Ordinance(s) to mandate recording of antimicrobial prescription and dispensing data systematically through electronic means	4.4	DH
Further enhancement of ASP in public hospitals	5.2	HA
Roll out territory-wide decolonisation programme in RCHEs	8.4	DH, HA
Surveillance and control of AMR in ready-to-eat food	11.1	FEHD
Regular survey with general public on AMR to inform strategies on health promotion	13.1	DH

Monitoring and evaluation

96. The implementation of the Action Plan will be achieved via the mid-term review of progress and interim outcome in 2025, as well as final review of the progress and outcome in 2027.
97. To facilitate the monitoring and evaluation of the Action Plan, the following indicators have been endorsed by the HLSC as showed in **Table 3**.

Table 3: Indicators of the Action Plan

Indicators	Key strategic intervention(s)	Target time
Human Health		
Year-on-year decrease in proportion of wholesale antimicrobial supply to community pharmacies	4.1-4.4	From 2023 onwards
Amendment of the Antibiotics Ordinance to mandate record keeping of antibiotics by community pharmacies or Less than 1% of wholesale antimicrobial supplied to community pharmacies	4.4	Before 2027, whichever could be achieved earlier
Collection of electronic AMU data in community pharmacies	3.2	By 2025
Collection of electronic AMU data in private clinics	3.2	By 2027
IT system enhancements to support ASP in HA as recommended by EC since 2021	5.2	By 2024
No year-on-year increase in proportion of <i>E. coli</i> non-susceptible to carbapenems from blood culture specimens collected > 48 hours after hospital admission	5.2	From 2023 onwards

Year-on-year decrease in proportion of MRSA and acinetobacter with reduced susceptibility to carbapenems in public hospitals participating in the universal decolonisation programme	8.4	By 2024
Year-on-year decrease in proportion of MRSA and acinetobacter with reduced susceptibility to carbapenems in RCHE residents admitted to public hospitals participating in the universal decolonisation programme	8.4	By 2024
Annual KAP surveys for general public	13.1	Commence by 2023
No year-on-year deterioration of any KAP survey item after commencement of annual surveys	13.1	By 2024
To take forward the regulation of medical laboratories	2.2	By 2025
Animal Health		
Antimicrobial use in local food animal farms are by veterinary prescription-only	7.3	By 2024
Decreasing trend of AMU in local food animal farms	7.1-7.3	By 2024
Interventions in place to gradually reduce levels of ESBL-producing <i>E. coli</i> in local food animal farms	7.1-7.3	By 2027
Food		
Annual promulgation of RTE food AMR data	11.1	By 2023
No year-on-year increase in proportion of ESBL-positive <i>Enterobacteriaceae</i> (ESBL-E) and carbapenemase-producing <i>Enterobacteriaceae</i>	7.1-7.3 10.1-10.3	By 2024
Year-on-year decrease in proportion of ESBL-E in target food types	7.1-7.3 10.1-10.3	By 2025

Summary Table of Actions

Key Area 1 - Strengthen knowledge through surveillance and research			
Objective 1 - Enhance the existing AMR surveillance system under One Health for Hong Kong			
Strategic Interventions		Activities	Lead action parties
1.1	Continue the current structure for One Health surveillance on AMR	1.1.1 The Working Group on AMR continue to deliberate on collection and dissemination of AMR / antimicrobial use data and provide recommendations to EC for consideration	DH AFCD FEHD
1.2	Continue to strengthen AMR surveillance in healthcare settings	1.2.1 Continue AMR surveillance based on WHO's GLASS reporting criteria, and update the surveillance activities according to latest development	DH HA
		1.2.2 Continue surveillance at laboratory level for in- and out-patient service providers	DH HA
1.3	Continue AMR surveillance programme on animals	1.3.1 Continue surveillance on AMR in food animal production farms	AFCD
		1.3.2 Review AMR surveillance in local food animal production farms, with enhancement when appropriate	AFCD
		1.3.3 Carry out supplementary studies, where necessary, related to AMR in local food animal production farms	AFCD
1.4	Continue AMR surveillance programme on food	1.4.1 Continue AMR surveillance in food	FEHD DH

Key Area 1 - Strengthen knowledge through surveillance and research			
Objective 2 - Maintain laboratory capacity to support surveillance activities in both human and animal sectors			
Strategic Interventions		Activities	Lead action parties
2.1	Maintain laboratory support in AMR surveillance	2.1.1 PHLSB under DH will continue to serve as the local reference laboratory to advise and support local medical laboratories in AMR surveillance	DH
2.2	Standardise laboratory antimicrobial susceptibility testing method for AMR surveillance	2.2.1 Continue adoption of latest international standards and guidelines for AST by DH and HA laboratories	DH HA
		2.2.2 Explore the registration of medical laboratories in Hong Kong to enhance quality assurance of laboratory performance, including those on antimicrobial susceptibility	HHB
2.3	Continue quality assurance programme and promote introduction in medical laboratories	2.3.1 Continue on-going quality assessment programme for continuous improvement of standards of laboratories in Hong Kong	DH
Objective 3 - Monitor antimicrobial use in humans and animals			
3.1	Continue antimicrobial use surveillance	3.1.1 The CHP website will continue to serve as the centralised platform dissemination of antimicrobial use data from different sectors	DH AFCD FEHD

		3.1.2 Continue the collection of supply data on antibiotics from different sectors using standardised reporting formats	DH AFCD
3.2	Monitor antimicrobial use in humans	3.2.1 Continue the collection of antibiotic dispensing data from HA and monitor antibiotic use in public hospitals and clinics	DH HA
		3.2.2 Refer to Strategic intervention 4.4 on collection of prescription and dispensing data from private human sector	DH
3.3	Monitor antimicrobial use in animals	3.3.1 Continue monitoring antimicrobial use in local food animal production farms	AFCD
		3.3.2 Review monitoring on antimicrobial use in local food animal production farms, with enhancement when appropriate	AFCD
		3.3.3 Carry out supplementary studies, where necessary, related to antimicrobial use in local food animal production farms	AFCD

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 parties
4.1	Enhance inspection against authorised sellers of poisons	4.1.1 Initiate special inspection against authorised sellers based on risk assessment (e.g. purchaser of large volume of antimicrobials, past irregularities, intelligence)	DH
4.2	Continue to enhance test purchase of antimicrobials against authorised sellers of poisons	4.2.1 Enhance test purchase and initiate prosecutions as necessary	DH
4.3	Continue engagement with licensed drug retailers	4.3.1 Refer to Strategic Intervention 14.1 on ways to strengthen health information provision on antimicrobial use	DH
4.4	Review and consider amending relevant ordinances	4.4.1 Review and consider amending relevant Ordinance(s) to mandate recording of antimicrobial prescription and dispensing data systematically through electronic means and ensure proper record keeping of antimicrobials along the supply chain, from wholesale to supply to end users	DH

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 Commit resources for sustaining ASP in different healthcare settings	DH HA
5.2	Promote antibiotic prescription according to evidence-based guidelines for doctors	5.2.1 Continue to review and update the IMPACT guideline for in-patient antibiotic stewardship and promulgate its use	DH HA
		5.2.2 Continue to strengthen ASP in public hospitals based on objective assessment criteria, including the enhancement of IT systems	DH HA
		5.2.3 Continue to strengthen ASP in private hospitals based on evaluation against objective assessment criteria	DH Private Hospitals
		5.2.4 Continue to review, update and promulgate evidence-based guidelines in primary care settings, to ensure consistency with IMPACT	DH HA Professional Bodies

Objective 6 - Monitor compliance with antimicrobial prescription guidelines of human health practitioners			
6.1	Monitor compliance with antimicrobial prescription guidelines of human health practitioners	6.1.1 Evaluation and audit of ASP and establish feedback loop to reflect performance and implement target measures to address any identified inappropriate use of antibiotics	DH HA
		6.1.2 Conduct regular surveys to monitor knowledge, understanding and prescription behaviour of human health practitioner and to determine effectiveness of interventions	DH
		6.1.3 Ensure monitoring of antibiotic use is comprehensive to provide a complete unbiased picture, to reveal areas requiring attention	HA

Key Area 2 - Optimise use of antimicrobials in humans and animals

Objective 7 - Ensure proper use of antimicrobials in animals

Strategic Interventions		Activities	Lead action parties
7.1	Strengthen support to food animal production and veterinary sectors	7.1.1 Continue to facilitate and support development of projects for the provision of veterinary services to food animal production farms by non-government veterinary sector, including formulation of tailor-made farm-specific disease management plans	AFCD
		7.1.2 Facilitate and support farmers in sourcing vaccines and veterinary medications for disease prevention and management by both government and non-government veterinary sectors	AFCD
		7.1.3 Continue to support non-government veterinarians to build up their capacity for providing veterinary services to local food animal production farms	AFCD

7.2	Promote proper antimicrobial use according to evidence and local epidemiology	7.2.1 Review and update 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
		7.2.2 Organise education and publicity programmes for food animal farmers and veterinarians on the proper use of antimicrobials	AFCD
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
		7.3.2 Review relevant legislation on exemption of using antimicrobials in animal feeds	AFCD DH

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 parties
8.1	Secure resources for implementing infection control programmes in hospitals	8.1.1 Allocate sufficient resources for implementation of the infection control programmes	DH HA
8.2	Enhance infection control infrastructure in hospitals	8.2.1 Ensure ward designs are according to international guidelines and recommendations in planning new hospitals	DH HA
8.3	Promote hand hygiene in healthcare settings	8.3.1 Strengthen hand hygiene programmes to improve compliance by healthcare workers	DH HA
		8.3.2 Ensure hand hygiene audits accurately reflect the actual practice	DH HA
8.4	Address transmission of MDRO between hospitals and residential care homes	8.4.1 Implement and evaluate universal decolonisation programme for residents of residential care homes	DH
		8.4.2 Implement admission screening and decolonisation therapy in public hospitals for residents of residential care homes	HA

		8.4.3 Monitor the MDRO carriage rate in residential care home residents admitted to public hospitals	DH
		8.4.4 Identify areas of improvement in the implementation of infection prevention and control measures in residential care homes	DH
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
		9.1.2 Continue patient engagement programme on reminding healthcare workers to perform hand hygiene	DH HA
		9.1.3 Evaluate the effectiveness of the training and intervention by regular KAP surveys	DH HA

Key Area 3 - Reduce incidence of infection through effective sanitation, hygiene and preventive measures

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

Strategic Interventions		Activities	Lead action parties
10.1	Develop infection prevention and control policies and strategies	10.1.1 Facilitate and support formulation of tailor-made farm-specific disease management plan for the purpose of disease prevention, management of disease spread and minimise the use of antibiotics	AFCD
		10.1.2 Consider relocation and consolidation of livestock farms if necessary	AFCD
10.2	Identify risk and potential control points for AMR containment along food supply chains	10.2.1 Continue 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 through surveillance programmes	AFCD
		10.2.2 Review overseas studies to identify potential control points to contain AMR	AFCD FEHD

10.3	Strengthen food safety and hygiene training for farm workers	10.3.1 Provide regular education seminars on biosecurity, disease control and prevention and farm management to farmers and their workers	AFCD
		10.3.2 Evaluate the effectiveness of training and intervention by regular KAP surveys	FEHD
Objective 11 – Develop and strengthen surveillance and interventions to combat AMR in food			
11.1	Continue AMR surveillance in food	11.1.1 Continue AMR surveillance in food	FEHD
11.2	Empower the food businesses on prevention of AMR during food process	11.2.1 Advocate for food businesses to implement Good Hygiene Practices to address foodborne AMR and facilitate consumers to make informed food choices	FEHD
		11.2.2 Explore the feasibility of including such advice in the licensing conditions of certain licensed food businesses that sell certain high-risk foods, e.g. oysters intended for raw consumption, through deliberations with internal and external stakeholders	FEHD

11.3	Strengthen food safety and hygiene training	11.3.1 Provide regular education seminars on food hygiene and safety to food businesses	FEHD
		11.3.2 Introduce the concept of foodborne AMR in training courses for Hygiene Managers, Hygiene Supervisors and food handler alike	FEHD
		11.3.3 Objectively measure the effectiveness of the training and interventions	FEHD
Objective 12 - Enhance vaccination uptake			
12.1	Promote vaccinations contributing to prevention of antimicrobial resistant infections	12.1.1 Promote uptake of seasonal influenza, pneumococcal and COVID-19 vaccines	DH HA

Key Area 4 - Improve awareness and understanding of antimicrobial resistance through effective communication, education and training
Objective 13 - Raise awareness of AMR among general public, students and target population

Strategic Interventions		Activities	Lead action parties
13.1	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	13.1.1 Monitor KAP towards AMR and antimicrobial use among general public and target population by regular survey	DH AFCD FEHD
		13.1.2 Develop and review key messages to raise public awareness and call for action based on KAP results	DH AFCD FEHD
		13.1.3 Support and participate in annual World Antibiotic Awareness Campaign and Hand Hygiene Day	DH HA AFCD FEHD
		13.1.4 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 FEHD
		13.1.5 Provide regular education and training to food animal farmers on topics related to antimicrobial use and AMR	AFCD

		13.1.6 Continue to keep in view of international practices and consensus related to antibiotic-free labelling	AFCD
13.2	Include AMR and related topics to students	13.2.1 Continue the inclusion of topics on AMR in high school curriculum	DH
		13.2.2 Continue the development and dissemination of education materials on AMR to primary students	DH
		13.2.3 Implement surveys on the target audience to ascertain effectiveness of the intervention	DH
Objective 14 - Engage patients in adopting infection control measures and proper use of antimicrobials			
14.1	Strengthen health information provision and better engaging patients	14.1.1 Develop and provide health education materials in hospital wards, clinics and pharmacies	DH HA
		14.1.2 Provide, review and update health information on personal hygiene measures on antimicrobial drug prescription bags	DH HA
		14.1.3 Encourage provision of health information on personal hygiene measures on antimicrobial drug prescription bags from private medical practitioners and community pharmacies	DH Professional bodies

		14.1.4 Continue patient education on appropriate use of antimicrobials through easily accessible channels including social media platforms	DH HA
14.2	Provide supportive environment to facilitate hand hygiene practices by patients	14.2.1 Provide accessible hand hygiene facilities and products at various points of care in healthcare settings	DH HA
Objective 15 - Include AMR and related topics in school curricula and continuous training of human health and veterinary professionals			
15.1	Include prescribing competencies and infection control practices as core component of professional education and continuous development	15.1.1 Continue to include AMR and related topics in undergraduate curricula for human health (medical, nursing and pharmacy) and animal health professionals and encourage continuous professional development	DH AFCD Academia
15.2	Strengthen infection control and food safety training for healthcare workers, veterinarians and workers along food supply chain	15.2.1 Refer to Objectives 9, 10 and 11	DH HA AFCD FEHD

Key Area 5 - Promote research on AMR		
Objective 16 - Promote research on innovative technology and medical science		
Strategic Interventions		Lead action parties
16.1	Promote development of novel diagnostics tools to aid diagnosis and treatment of infections and AMR	DH Academia
16.2	Promote development of novel preventive measures on AMR	DH Academia
16.3	Promote development of novel antimicrobials or other alternative agents	DH Academia
Objective 17 - Promote research on behavioural science and psychology		
17.1	Promote research on awareness and education regarding AMR, infection prevention and control, and antibiotic stewardship	DH Academia
17.2	Promote research on promoting behavioural changes regarding the use of antimicrobials in the public	DH Academia
Objective 18 - Promote research on health and economic burden		
18.1	Promote research on estimating local health burden of AMR	DH Academia
Objective 19 - Promote research on the contribution of environment to the burden of AMR		
19.1	Promote research on role of environment in the evolution of AMR	DH EEB Academia
19.2	Promote research on preventive measures on the spread of AMR through the environment	DH EEB Academia

Key Area 6 - Strengthen partnerships and foster engagement of relevant stakeholders

Objective 20 - Strengthen international partnerships and regional collaboration

Strategic Interventions		Activities	Lead action parties
20.1	Enhance contribution to international, regional and country initiatives in implementing the Action Plan on AMR	20.1.1 Participate and contribute to WPRO's actions for AMR	DH HA AFCD FEHD
		20.1.2 Contribute AMR and AMU data to the WHO global platform and provide data compatible with the latest version of the software WHONET	DH HA

Objective 21 - Inform public policy and facilitate stakeholder engagement

21.1	Inform public policy and facilitate stakeholder engagement	21.1.1 Organise information sharing session(s) for different stakeholders and target audience	DH HA AFCD FEHD
		21.1.2 Disseminate information regarding the progress of the Action Plan to stakeholders in the form of objective indicators on trend	DH HA AFCD FEHD

References

1. World Health Organization (WHO). Factsheet: Antimicrobial resistance. July 2020. Available from: <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance>
2. WHO. Ten threats to global health in 2019. Available from: <https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>
3. Jim O'Neill. Tackling drug-resistant infections globally: final report and recommendations – the review on antimicrobial resistance. May 2016. Available from: https://amr-review.org/sites/default/files/160518_Final%20paper_with%20cover.pdf. (accessed 10 August 2022)
4. Centers for Disease Control and Prevention (CDC), US. Management of Multidrug-Resistant Organisms in Healthcare Settings (2006). Available from: <https://www.cdc.gov/infectioncontrol/guidelines/mdro/background.html> (accessed 4 August 2022)
5. WHO, FAO, OIE, UNEP. Strategic framework for collaboration on antimicrobial resistance – together for One Health. Geneva: World Health Organization, Food and Agriculture Organization of the United Nations and World Organisation for Animal Health; 2022.
6. Midterm Review of the Hong Kong Strategy and Action Plan on Antimicrobial Resistance 2017-2022. (May 2021). Available from: https://www.chp.gov.hk/files/pdf/midterm_amr_action_plan_eng2017_2022.pdf.
7. Centre for Health Protection, Department of Health, Hong Kong SAR Government. Antimicrobial Resistance (AMR) Surveillance in Public Hospitals and Clinics. Available from: <https://www.chp.gov.hk/en/static/105093.html> (accessed 7 September 2022)
8. Data source: CDARS - MRSA statistics from MRSA Surveillance System (Hospital Authority)
9. Ma SK Edmond, Kung KH, Chen H. Combating antimicrobial resistance during the COVID-19 pandemic. *Hong Kong Med J* 2021 Dec;27(6):396–8
10. Bramer CA, Kimmins LM, Swanson R, et al. Decline in child vaccination coverage during the COVID-19 pandemic—Michigan Care Improvement Registry, May 2016-May 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:630-1
11. Saxena S, Skirrow H, Bedford H. Routine vaccination during covid-19 pandemic response. *BMJ* 2020;369:m2392. Erratum in: *BMJ* 2020;369:m2435.
12. Cheng VCC, Wong SC, So SYC, et al. Decreased Antibiotic Consumption Coincided with Reduction in Bacteremia Caused by Bacterial Species with Respiratory Transmission Potential during the COVID-19 Pandemic. *Antibiotics*. 2022; 11(6):746
13. WHO. Global Action Plan on Antimicrobial Resistance. Available from: <https://www.who.int/publications/i/item/9789241509763> (accessed 12 August 2022)
14. WHO. Global Antimicrobial Resistance and Use Surveillance System (GLASS). Available from: <https://www.who.int/initiatives/glass>. (accessed 4 August 2022)
15. Centre for Health Protection, Department of Health, Hong Kong SAR Government. Data on antimicrobial resistance. Available from: <https://www.chp.gov.hk/en/static/101600.html> (accessed 6 September 2022)
16. Cheng VC, Wong SC, Ho PL, et al. Strategic measures for the control of surging antimicrobial resistance in Hong Kong and mainland of China. *Emerg Microbes Infect.* 2015 Feb;4(2):e8.

17. Ho PL, Wang Y, Liu MC, et al. IncX3 Epidemic Plasmid Carrying blaNDM-5 in *Escherichia coli* from Swine in Multiple Geographic Areas in China. *Antimicrob Agents Chemother*. 2018 Feb 23;62(3):e02295-17.
18. Nuangmek, A., Rojanasthien S, Chotinun S, et al. Antimicrobial Resistance in ESBL-Producing *Escherichia coli* Isolated from Layer and Pig Farms in Thailand. *Acta Scientiae Veterinariae*, 2018. 46: 1538
19. Agriculture, Fisheries and Conservation Department. Hong Kong SAR Government. Antimicrobial Resistance Surveillance in Food Animals. Available from: https://www.afcd.gov.hk/english/quarantine/qua_live/qua_live_amr/files/2019-2020amr.pdf (accessed 22 August 2022)
20. Centre for Health Protection, Department of Health, Hong Kong SAR Government. Data on antimicrobial supply. Available from: <https://www.chp.gov.hk/en/statistics/data/10/100044/6960.html>
21. WHO Collaborating Centre for Drug Statistics Methodology, Guidelines for ATC classification and DDD assignment 2022.
22. Cheng, VC, Wong, SC. So, SY et al. Decreased Antibiotic Consumption Coincided with Reduction in Bacteremia Caused by Bacterial Species with Respiratory Transmission Potential during the COVID-19 Pandemic. *Antibiotics* 2022, 11, 746.
23. Centre for Health Protection, Department of Health, Hong Kong SAR Government. Antibiotic Stewardship Programme in Primary Care. Available from: <https://www.chp.gov.hk/en/features/49811.html>
24. Centre for Health Protection, Department of Health, Hong Kong SAR Government. Knowledge, Attitude and Practice Survey of Medical Practitioners on Antimicrobial Resistance 2019. Available from: <https://www.chp.gov.hk/en/static/103680.html>.
25. WHO. WHO Guidelines on Hand Hygiene in Health Care. 2009. Available from: http://apps.who.int/iris/bitstream/10665/44102/1/9789241597906_eng.pdf. (accessed 5 August 2022)
26. Ho PL, Wang TK, Ching P, et al. Epidemiology and Genetic Diversity of Methicillin-Resistant *Staphylococcus aureus* Strains in Residential Care Homes for Elderly Persons in Hong Kong. *Infection Control & Hospital Epidemiology*, 28(6), 671-678.
27. Cheng, V.C., Tai, J.W., Wong, Z.S. et al. Transmission of methicillin-resistant *staphylococcus aureus* in the long term care facilities in Hong Kong. *BMC Infect Dis* 13, 205 (2013).
28. Chen H, Au KM, Hsu KE, et al. Multidrug-resistant organism carriage among residents from residential care homes for the elderly in Hong Kong: a prevalence survey with stratified cluster sampling. *Hong Kong Med J*. 2018 Aug 1; 24(4):350-60
29. Cheng VC, Chen H, Wong S, et al. Role of Hand Hygiene Ambassador and Implementation of Directly Observed Hand Hygiene Among Residents in Residential Care Homes for the Elderly in Hong Kong. *Infection Control & Hospital Epidemiology*, 39(5), 571-577.
30. Qureshi, S., Maria, N., Zeeshan, M. et al. Prevalence and risk factors associated with multi-drug resistant organisms (MDRO) carriage among pediatric patients at the time of admission in a tertiary care hospital of a developing country. A cross-sectional study. *BMC Infect Dis* 21, 547 (2021).

31. Chen H, Au KM, Hsu KE, et. al, Multidrug-resistant organism carriage among residents from residential care homes for the elderly in Hong Kong: a prevalence survey with stratified cluster sampling. *Hong Kong Med J* 2018;24:350–60
32. Loren G Miller, James A McKinnell, Raveena Singh, et al. Universal Decolonization in Nursing Homes: Effect of Chlorhexidine and Nasal Povidone–Iodine on Prevalence of Multi-Drug-Resistant Organisms (MDROs) in the PROTECT Trial, *Open Forum Infectious Diseases*, Volume 6, Issue Supplement_2, October 2019, Page S24.
33. Hong Kong Training Portal on Infection Control and Infectious Disease. Available from: <https://icidportal.ha.org.hk/>
34. Centre for Food Safety. Guidelines for Food Businesses on Providing Consumer Advisory on High-risk Foods on Menus available from: https://www.cfs.gov.hk/english/food_leg/files/HighRiskFoodonMenus_lft.pdf (accessed 16 August 2022)
35. Centre for Food Safety. Thematic webpage on AMR. Available from: https://www.cfs.gov.hk/english/whatsnew/whatsnew_fstr/whatsnew_fstr_antimicrobial_resistance_AMR.html
36. WHO. Leveraging Vaccines to Reduce Antibiotic Use and Prevent Antimicrobial Resistance: An Action Framework. 2020.
37. CDC, US. 2022 Special Report COVID-19: U.S. Impact on antimicrobial resistance
38. Centre for Health Protection, Department of Health, Hong Kong SAR Government. Statistics on Vaccination programmes in the past 3 years. Available from: <https://www.chp.gov.hk/en/features/102226.html> (accessed 5 August 2022)
39. Hong Kong SAR Government thematic webpage of COVID-19 vaccination programme. Available from <https://www.covidvaccine.gov.hk/en/> (accessed 1 September 2022)
40. Survey results available from the CHP webpage at <https://www.chp.gov.hk/en/features/104145.html#0>
41. Ahmed Awaji, M, Al-Surimi, K. Promoting the role of patients in improving hand hygiene compliance amongst healthcare workers. *BMJ Qual Improv Rep* 2016;5.
42. Research projects related to antimicrobial resistance control, supported by the Health and Medical Research Fund (HMRF). Available from: <https://www.chp.gov.hk/en/statistics/data/10/100044/6892.html>
43. Larsson DGJ, Andremont A, Bengtsson-Palme J, et al. Critical knowledge gaps and research needs related to the environmental dimensions of antibiotic resistance. *Environ Int.* 2018 Aug; 117:132-138.

Annex I

Membership of High Level Steering Committee on Antimicrobial Resistance

(Terms of Office: 1 June 2022 – 31 May 2024)

Chairman

Secretary for Health

Non-official members

Ms CHAN So Kuen, Sabrina

Prof. Benjamin COWLING

Prof. HUI Shu Cheong, David, B.B.S.

Mr SUNG Ming Tat, Dick

Dr TSANG Ho Fai, Thomas, J.P.

Prof. YUEN Kwok Yung, G.B.S., S.B.S., J.P.

Institutional members

Representative of Consumer Council

Representative of Hong Kong Academy of Medicine

Representative of Hong Kong Dental Association Ltd

Representative of Hong Kong Medical Association

Representative of Hong Kong Private Hospitals Association

Representative of Hong Kong Veterinary Association

Representative of Hospital Authority

Ex-officio members

Permanent Secretary for Environment and Ecology (Food)

Permanent Secretary for Health

Permanent Secretary for Environment and Ecology (Environment) / Director of Environmental Protection

Director of Agriculture, Fisheries and Conservation

Director of Food and Environmental Hygiene

Director of Health

Controller, Centre for Food Safety

Controller, Centre for Health Protection

Secretary

Consultant (AMR), Infection Control Branch, Centre for Health Protection

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.

