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FEATURE IN FOCUS

An update on the latest situation of human cases infected with avian influenza A(H5N1) virus

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Introduction

Avian influenza is caused by influenza A viruses that mainly affect birds and poultry, such as chickens or ducks. Among avian influenza A viruses, highly pathogenic avian influenza (HPAI) A(H5N1) virus (clade 2.3.4.4b) has been in the spotlight in recent years as this subtype has led to unprecedented numbers of deaths in wild birds and poultry since 2020 and has evolved to infect a wide range of mammalian hosts since 2022[1]. Humans mainly become infected with avian influenza virus through direct contact with infected animals or contaminated environments. This year the number of human cases infected with avian influenza A(H5N1) virus has an obvious increase attributed to new cases associated with exposure to infected dairy cattle and poultry in the United States of America (USA). This article updates the global and local situation of the human infections of avian influenza A(H5N1) virus.

Global situation of human avian influenza A(H5N1) virus infections

According to the World Health Organization (WHO) and health authorities outside Hong Kong, as of December 18, 2024, at least 919 human cases of avian influenza A(H5N1) virus infections, including 464 deaths, have been reported from 24 countries worldwide[2,3]. In the recent five years, from January 2020 to December 18, 2024, there were 58 cases with about 82% of them reported from the USA (41%, 24), Cambodia (28%, 16), the United Kingdom (9%, 5), and China (5%, 3) (Figure 1). The number of cases began to increase since 2022, which was doubled in 2023, and the figure in 2024 (up to December 18) was tripled of that reported in 2023.

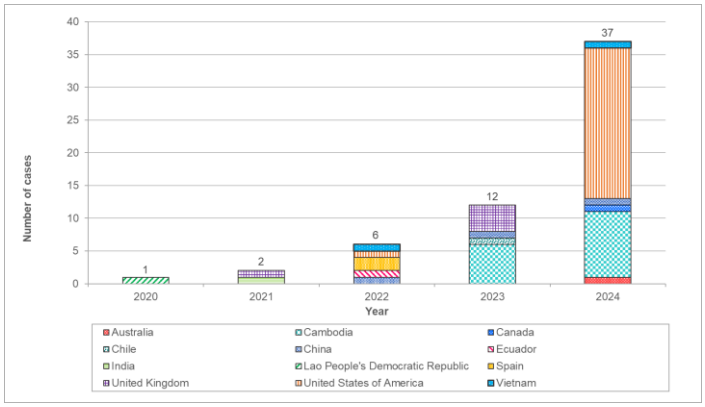

Figure 1 – Confirmed human cases of avian influenza A(H5N1) virus infection reported to WHO and by overseas health authorities between January 2020 and December18, 2024.

For the USA, the first human case of avian influenza A(H5N1) virus infection was reported in April 2022, in a person in Colorado, who was involved in culling poultry with presumptive H5N1 avian influenza. Since January 2022, HPAI A(H5) viruses have been detected in US wild aquatic birds, commercial and backyard or hobbyist flocks with 50 states affected so far[4]. Sporadic detections of HPAI A(H5N1) viruses in mammals have also been reported since then. The US Centers for Disease Control and Prevention (CDC) reported the world's first human infection following exposure to infected dairy cattle on April 1, 2024 and the second person reported to have tested positive for avian influenza A(H5N1) viruses in the country since 2022[5]. Since 2022 until December 18, 2024, according to the reporting date, 62 people in eight states of the USA have been tested positive for avian influenza A(H5) virus (Figure 2)[4]. About 90% of them were reported in California (55%, 34), followed by Washington (18%, 11) and Colorado (18%, 11).

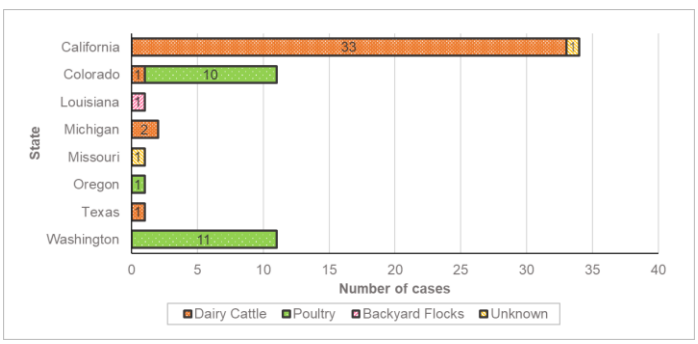

Figure 2 – Confirmed human cases of avian influenza A(H5) virus infection in the USA since 2022, by state and exposure source.

All human cases of avian influenza A(H5) virus infection were adults except for one case in California. These individuals mostly exhibited

mild symptoms, including many with conjunctivitis and some with upper respiratory tract infections. Majority of them were not hospitalised except for two cases reported in Missouri and Louisiana. Among these cases, 37 (60%) were associated with exposure to infected dairy cattle whereas 22 (35%) were linked to exposure to infected poultry. There was one case reported in Louisiana with exposure to sick and dead birds in backyard flocks. The remaining two cases had unknown exposure source, including a child in California and an adult in Missouri.

For cases with genome sequencing information available, the viruses causing the human infections were H5N1 viruses from clade 2.3.4.4b with two different genotypes identified. The H5 viruses from patients with exposure to infected dairy cattle and those with exposure to infected poultry in Colorado belonged to the B3.13 genotype. For those H5 viruses from patients with exposure to infected poultry in Washington, and sick and dead birds in backyard flocks in Louisiana, they belonged to the D1.1 genotype, which is known to circulate in wild birds and poultry in the country.

Risk assessment

Avian influenza A(H5N1) viruses might spread from cows to people in several ways. Studies have shown that high concentration of viable virus is shed in the milk and the virus can persist and remain infectious on milking equipment surface for a period of time[6,7]. The US CDC speculates that dairy farm workers might be infected if raw milk contaminated with H5N1 virus splashes into their eyes when milking cows or working in a milking parlour[8]. Besides, dairy farm workers could be infected if they touch something contaminated with live virus (e.g. milking equipment) and then touch their eyes, nose or mouth.

When mammals, including humans, are infected with avian influenza A(H5N1) virus, the virus may undergo intra-host evolution resulting in genetic changes that allow more efficient replication in the host cells. Some genetic changes have been detected in a few human cases reported in the USA. Despite that, there is no evidence showing that these changes are associated with enhanced transmissibility of the virus to humans, and are associated with reduced susceptibility to available antiviral treatments (such as oseltamivir) in clinical settings[9-13].

With continuous circulation of avian influenza A(H5N1) viruses among wild birds, poultry and mammals, both WHO and US CDC commented that additional sporadic human infections after direct exposure to infected animals and contaminated environment are anticipated. However, the latest WHO's assessment reveals that the H5 viruses detected in mammals, including in human cases, largely retain the genomic and biological characteristics of avian influenza viruses and have not acquired the capacity for sustained transmission between humans. Based on available information, the global public health risk of avian influenza A(H5N1) infection is considered to be low[14,15].

Locally, novel influenza A infection (including avian influenza) is one of the statutorily notifiable infectious diseases in Hong Kong. A total of 22 human cases, including seven death cases (case-fatality rate of 32%), have been recorded in Hong Kong since 1997. The last case in Hong Kong was reported on June 2, 2012. With local surveillance, prevention and control measures in place, the Centre for Health Protection (CHP) of the Department of Health (DH) will remain vigilant and work closely with WHO and relevant health authorities to monitor the latest development. To minimise the risk of contracting avian influenza, members of the public should maintain strict personal and environmental hygiene, and may visit the CHP's thematic page for more information on avian influenza: https://www.chp.gov.hk/en/features/24244.html.

Health advice for prevention of avian influenza

- Avoid touching poultry, birds, animals or their excrement, or contaminated environment;
- When buying live chickens, do not touch them and their droppings. Do not blow at their bottoms. Wash eggs with detergent if soiled with faecal matter and cook and consume the eggs immediately. Always wash hands thoroughly with soap and water after handling chickens and eggs;
- Eggs should be cooked well until the white and yolk become firm. Do not eat raw eggs or dip cooked food into any sauce with raw eggs. Poultry should be cooked thoroughly. If there is pinkish juice running from the cooked poultry or the middle part of its bone is still red, the poultry should be cooked again until fully done;
- Do not consume unpasteurized milk and raw milk products as they can be contaminated with pathogens that can cause serious illness;
- Perform hand hygiene frequently, especially before touching the mouth, nose or eyes, before handling food or eating, and after going to the toilet, touching public installations or equipment such as escalator handrails, elevator control panels or door knobs, or when hands are dirtied by respiratory secretions after coughing or sneezing; and
- When having respiratory symptoms, wear a surgical mask, refrain from work or attending class at school, avoid going to crowded places and seek medical advice promptly.

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Update on local epidemiology of chickenpox

Reported by Dr Ilima YS POON, Medical and Health Officer; Dr SK MAK, Senior Medical and Health Officer, Vaccine Preventable Disease Section, Surveillance Division, Communicable Disease Branch, CHP

Background

Chickenpox (varicella) is an acute, highly contagious infectious disease caused by the varicella-zoster virus (VZV), which can be transmitted via droplets, aerosols, direct or indirect contact with discharges from vesicles and respiratory secretions. Affected persons usually have fever and itchy skin rashes, evolving from flat spots to vesicles which eventually dry out and form scabs. Chickenpox is usually a mild childhood disease, but it can be severe and fatal in neonates, adults and immunocompromised individuals. Besides, VZV may remain dormant in the nervous system and reactivate many years later causing herpes zoster (shingles). Before the availability of chickenpox vaccination, the majority of people were infected during childhood.

Chickenpox (varicella) vaccine and coverage in local population

Chickenpox vaccine is safe and highly effective in preventing varicella infection. A local study published in 2020 demonstrated that the vaccine effectiveness of a two-dose chickenpox vaccination was 93.4% (95% confidence interval: 91.7 – 94.7%)[1]. However, individuals who have received chickenpox vaccination may still develop breakthrough infection, which presents with milder or atypical symptoms and lasts for a shorter duration compared with those who are unvaccinated.

Chickenpox vaccine has been incorporated into the Hong Kong Childhood Immunisation Programme (HKCIP) for children born on or after January 1, 2013. The vaccination schedule comprises of two-dose chickenpox vaccine, with the first dose given at 12 months of age. The programme started in 2014 when the first cohort of eligible children reached 12–month old. Children born between January 1, 2013 and June 30, 2018 were offered the second dose of chickenpox vaccine at primary one. For those born on or after July 1, 2018, the second dose has been advanced to 18 months of age since 20202.

According to the immunisation coverage surveys conducted by the Centre for Health Protection (CHP) of the Department of Health, the vaccination coverage of the first dose of chickenpox vaccine in pre-school children has maintained at above 95% since its introduction into the HKCIP.

Changing local epidemiology

In the decade before the incorporation of chickenpox vaccine into the HKCIP (2004 to 2013), the annual number of reported chickenpox cases ranged from about 6 800 to 17 900, showing a cyclical pattern of increased activity every few years (Figure 1).

The annual number of chickenpox cases remained relatively stable between 2014 and 2017, ranging from about 7 800 to 9 300 cases, and started to decrease from 2017 onwards. During the COVID-19 pandemic from 2020 to 2022, the number of chickenpox cases dropped significantly to around 1 000 to 2 000 cases per year due to masking, enhanced personal hygiene and social distancing measures. In the post-COVID-19 period in 2023 and 2024, unlike other common respiratory diseases, no obvious resurgence of chickenpox cases was observed. The number of reported cases has remained at a low level in 2024 (1 529 cases as of November 30).

In the pre-COVID-19 era, higher numbers of chickenpox cases were observed during winter with a smaller peak in summer, a pattern usually seen in places with subtropical climate[3,4,5]. However, such seasonality has not been observed since 2020 (Figure 2).

Following the implementation of universal chickenpox vaccination for children born in 2013 and afterwards, a shift in age distribution of chickenpox cases among children has been observed (Figure 3). Before 2014, young children aged one to five years had the highest incidence, followed by those aged six to 11 years. Starting from 2014 when universal chickenpox vaccination for children at 12 months was launched, there was substantial and continuous decrease in the incidence among young children aged one to five years, reaching a low level by 2019. However, the incidence among children aged six to 11 years remained stable between 2014 and 2019, surpassing that among young children aged one to five years since 2015, and then started to decrease gradually to a low level since 2020. The incidence rates of both age groups remained at a very low level in recent years and surpassed by that among infants aged less than one year from 2021 onwards.

On the other hand, the incidence among adolescents aged 12 to 17 years increased from 58.3 per 100 000 in 2022 to 141.8 per 100 000 in 2024, which surpassed the incidence rates of younger age groups. In 2024, 30.5% of cases affected adolescents aged 12-17 years as compared to 2.8%, 10.2% and 11.1% among children aged less than one year, one to five years and six to 11 years respectively.

The observed increase in the incidence rate of chickenpox among adolescents in the recent two years is likely due to the fact that most were born before 2013 when universal chickenpox vaccination was not yet available under the HKCIP. Besides, these adolescents were less likely to have acquired natural infection over the past decade when there was a decreasing incidence of chickenpox, in particular during the COVID-19 pandemic period.

The incidence rate of chickenpox among adults has remained at a very low level from 2004 to 2024, ranging from 8.9 to 29.7 per 100 000 for adults aged 18 to 64 years and from 0.4 to 1.7 per 100 000 for those aged 65 years and above (Figure 4).

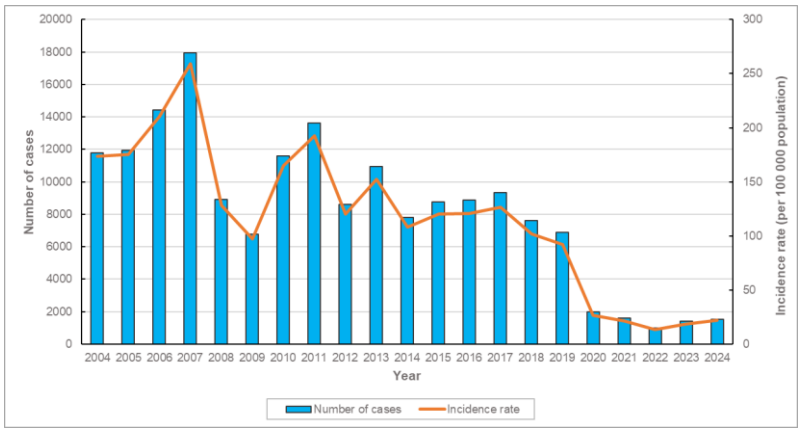

Figure 1 – Number of cases and incidence rate of chickenpox by year from 2004 to 2024 (As of November 30, 2024).

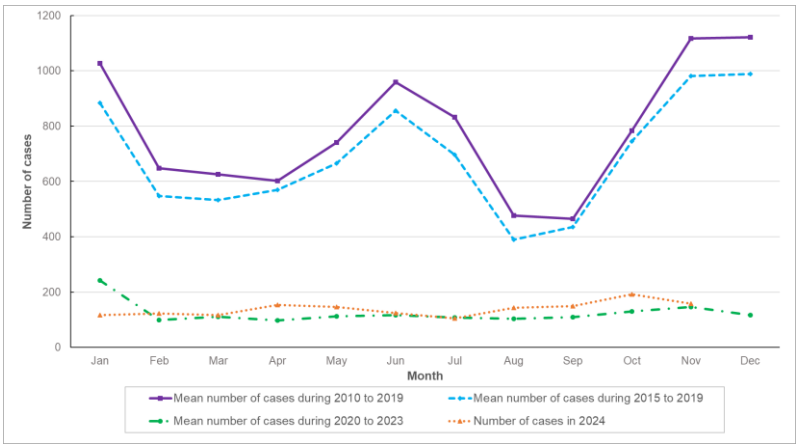

Figure 2 – Number of chickenpox cases by month, in 2010-2019, 2015-2019, 2020-2023, 2024 (As of November 30).

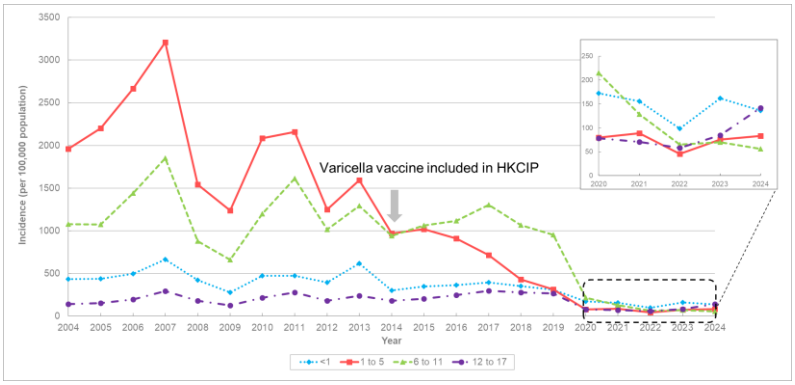

Figure 3 – Age-specific incidence of chickenpox among children in Hong Kong, 2004 to 2024 (As of November 30).

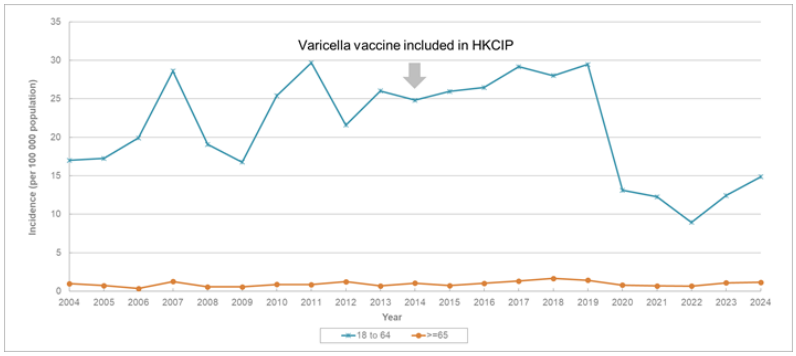

Figure 4 – Age-specific incidence of chickenpox among adults in Hong Kong, 2004 to 2024 (As of November 30).

Chickenpox Outbreak

The CHP monitors chickenpox outbreaks in institutions and schools. Before the inclusion of chickenpox vaccine in the HKCIP, the annual number of reported institutional outbreaks in Hong Kong between 2007 and 2013 ranged from 487 to 1 072 (Figure 5). The annual number of institutional outbreaks remained stable between 2014 and 2017, ranging between 466 and 557, and then dropped to 446 in 2018 and 342 in 2019. Following the emergence of COVID-19 and class suspension during the COVID-19 pandemic, the number of institutional outbreaks further decreased to less than 40 per year. The number has remained at a low level in 2023 and 2024 (as of November 30) with 34 and 35 institutional outbreaks recorded respectively.

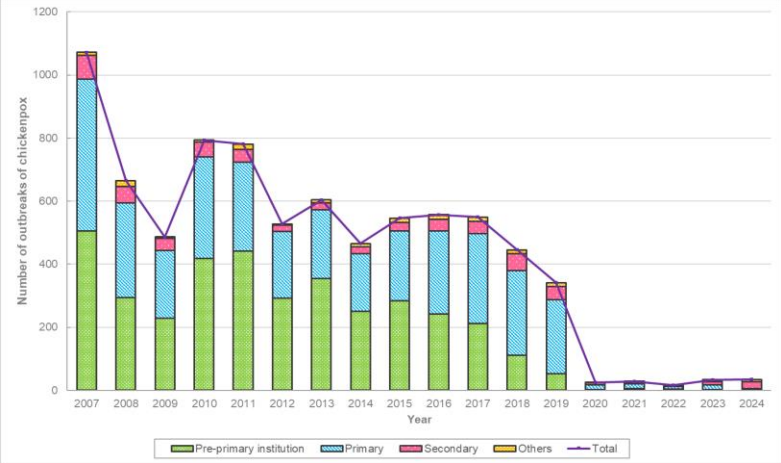

Figure 5 – Number of institutional outbreaks of chickenpox from 2007 to 2024 (As of November 29, 2024).

This decrease was mainly due to reduced outbreaks in kindergartens and child care centres (KG/CCC) which constituted 47.0% of the chickenpox institutional outbreaks during 2007 to 2019. Between 2007 and 2015, the majority (51.6%) of chickenpox outbreaks occurred in KG/CCC. Since 2015 when the first cohort of vaccinated children started to enter KG/CCC, the number of outbreaks in KG/CCC has been decreasing gradually, and was surpassed by the number of outbreaks occurring in primary schools from 2016 onwards. In 2024, secondary schools have constituted the highest proportion of institutional outbreaks, accounted for 62.9% of all reported outbreaks. This observation aligned with the higher incidence recorded among adolescents aged 12 to 17 years in the recent two years. The shift in the relative proportion of KG/CCC and primary schools amongst all outbreaks reported is attributable to the protection conferred by chickenpox vaccination for eligible birth cohorts under the HKCIP.

Prevention

Eligible children should follow the vaccination schedule recommended in the HKCIP. Parents are reminded to maintain their children's immunisation up-to-date according to the HKCIP for timely and comprehensive protection.

To prevent chickenpox infection, it is important to maintain good personal, hand, and environmental hygiene. Parents are encouraged to take their children to seek medical advice if their children develop skin rash and to report any sickness to the school promptly. Sick children should stay at home and be excluded from schools until all vesicles have dried up, usually about one week after appearance of rash to prevent spreading the disease to others.

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NEWS IN BRIEF

The 21st Tripartite Meeting on Prevention and Control of Communicable Diseases

The 21st Tripartite Meeting on Prevention and Control of Communicable Diseases was held in Dongguan on December 13, 2024. Around 60 representatives from the three places attended the meeting, including representatives from the Centre for Health Protection (CHP) of the Department of Health (DH) led by the Director of Health as well as those from the Hospital Authority (HA). The meeting discussed three major agenda items, namely prevention and control of major communicable diseases and dengue fever; prevention and management of communicable diseases in healthcare institutions; and prevention and control of viral hepatitis and HIV infection. Following in-depth exchange, a meeting minutes was signed with consensus reached in eight areas. It is hoped that the three places, following the establishment of the Guangdong Provincial Disease Control and Prevention Administration, will further strengthen collaboration in the future, especially reinforcing areas such as communicable disease surveillance and forecasting, and risk assessment and notification mechanisms in order to attain higher efficiency in disease prevention and control for the three places.

Photo 1 – Photo shows the Deputy Director-General of the Guangdong Provincial Health Commission and Director of the Guangdong Provincial Disease Control and Prevention Administration, Dr Song Tie (centre); the Director of Health of Hong Kong, Dr Ronald Lam (left); and the Director of the Health Bureau of Macao, Dr Lo Iek-long (right), after signing the meeting minutes.

Photo 2 – Delegates of Hong Kong participated in the 21st Tripartite Meeting on Prevention and Control of Communicable Diseases.

Exercise "Amazonite" enhances Government's response to human case of avian influenza

The CHP, in collaboration with relevant government departments and the HA, conducted a public health exercise, code-named "Amazonite" (天河石) in November 2024, to enhance its response capabilities in dealing with human case of avian influenza infection.

The first part of the exercise was a table-top exercise in which four relevant government departments (including DH) and the HA discussed and co-ordinated the response measures required in a simulated scenario in which a chicken stallholder in Hong Kong was infected with avian influenza A (H5N1) virus.

The second part of the exercise was a ground movement exercise held at the Cheung Sha Wan Temporary Wholesale Poultry Market. The CHP co-ordinated with relevant departments to carry out investigation and control measures, which included contact tracing and prescription of prophylactic antiviral therapy; chicken, environmental and sewage sampling; culling of chickens and environmental disinfection.

Photo – An officer of the relevant government department explaining the procedure of sewage sample collection to the Director of Health, Dr Ronald Lam (right), the Controller of the CHP of the DH, Dr Edwin Tsui (centre), and expert observers from the Mainland, Macao and Singapore health authorities.

Approximately 30 personnel from four government departments participated in the ground movement exercise, along with over 30 experts from the Mainland, Macao and Singapore health authorities, who were invited to attend as observers.

Seminar on Application of Artificial Intelligence (AI) on Infectious Diseases and Infection Control

Recognising the increasingly important role played by artificial intelligence (AI) in healthcare, Infection Control Branch (ICB) of the CHP and Infectious Diseases Control Training Centre (IDCTC) of the HA jointly organised a seminar on "Application of AI on Infectious Diseases and Infection Control" on November 13, 2024.

The seminar aimed at addressing potential application on the use of AI in the field of infectious diseases and infection control, covering topics on overview of AI applications in healthcare; use of AI for infection surveillance; harnessing AI to optimize antibiotic use and discover novel antibiotics; as well as to predict emerging infections and aid laboratory diagnostics. The target group of the seminar includes healthcare professionals in HA, DH and private settings.

Photo – Seminar on "Application of AI on Infectious Diseases and Infection Control" on November 13, 2024.

The seminar was well received with an attendance of over 370 healthcare professionals across public and private sectors. Details of the seminar and available training materials were posted on the IDCTC training portal at https://icidportal.ha.org.hk/Trainings/View/191.

DH launches inaugural HIV Testing Month in December 2024

The World Health Organization has designated December 1 as the World AIDS Day, a reminder for people worldwide to unite in the fight against HIV/AIDS and to support those affected by the disease. In alignment with this initiative, the DH has launched the inaugural HIV Testing Month in December 2024 to promote the normalisation of HIV testing. Normalising HIV testing is crucial for enabling individuals who are unaware of their infection status to receive timely diagnosis and treatment, and at the same time, reducing the stigma associated with HIV and testing.

The HIV Testing Month is a new initiative by the Red Ribbon Centre of the DH, in partnership with 12 collaborating and 10 supporting organisations including non-governmental organisations and professional bodies. In addition to enhancing public's awareness of HIV testing through a variety of publicity campaigns, this initiative will provide various testing options at multiple locations, making it easier and more convenient for the public to access HIV testing services in Hong Kong. For details about the Testing Month, please visit the thematic webpage at https://www.hivtest.gov.hk/en/hiv_testing/testingmonth.html.

Three sporadic cases of Creutzfeldt-Jakob disease

The CHP recorded three sporadic cases of Creutzfeldt-Jakob disease (CJD) on November 25, December 13 and December 18, 2024 respectively.

The first case affected a 68-year-old male with underlying illnesses residing in Kowloon City. He presented with cognitive impairment, auditory hallucination, myoclonus and right hand involuntary movement since May 2024, and was admitted to a public hospital on November 14. Findings of electroencephalogram were compatible with CJD. His condition was stable. He was classified as a probable case of sporadic CJD.

The second case affected a 76-year-old male with underlying illness residing in Shatin. He presented with progressive impaired memory in April 2024 and emotional change, visual disturbance and clumsiness in November 2024. He was admitted to a public hospital on December 9. Findings of magnetic resonance imaging of the brain were compatible with CJD. His condition was stable. He was classified as a possible case of sporadic CJD.

The third case affected a 64-year-old female with underlying illness residing in Yuen Long. She presented with rapidly progressive dementia, myoclonus, akinetic mutism and unsteady gait since October 15. She was admitted to a private hospital on December 6. Findings of electroencephalogram and magnetic resonance imaging of the brain were compatible with CJD. Her condition was stable. She was classified as a probable case of sporadic CJD.

The three cases had no known family history of CJD. No risk factors for iatrogenic or variant CJD were identified.

A local sporadic case of psittacosis

On December 5, 2024, the CHP record a local sporadic case of psittacosis affecting a 58-year-old bus driver with underlying illnesses residing in Aberdeen. He presented with fever, runny nose, headache and myalgia on November 19, and was admitted to a public hospital on November 23. His sputum collected on November 26 was tested positive for *Chlamydia psittaci* DNA. His condition improved with antibiotic treatment. His wife bought a parrot from Yuen Bo Street Bird Garden in Hong Kong on October 19 and kept it as a pet. The bird appeared to be healthy throughout this time, and all home contacts showed no symptoms. The case was referred to Agriculture, Fisheries and Conservation Department (AFCD) and Food and Environmental Hygiene Department for follow-up. Site visits were performed on December 6 and 9 to the patient's home and to the bird shop respectively. The pet parrot was surrendered to AFCD. The patient's family members and the worker at the bird shop were put under medical surveillance.