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Communicable Diseases WATCH

衞生防護中心 Centre for Health Protection 衞生署 Department of Health

FEATURE IN FOCUS

Update on situation of avian influenza A(H7N9)

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The activity of avian influenza A(H7N9) viruses has been increasing markedly since the end of 2016, indicating the start of a new wave of human infection this winter. There has been large increase in reports of human infections with avian influenza A(H7N9) in various parts of Mainland China recently. We reviewed the latest situation of H7N9 in this article.

Epidemiological situation

Human infections

The first two human H7N9 cases in the current wave reported by the National Health and Family Planning Commission (NHFPC) occurred in October 2016. The number of cases has been increasing markedly since November. The NHFPC has reported that six and 106 cases were detected in Mainland China in November and December 2016 respectively. This wave has been progressing much faster than that in the previous winter. In the fourth wave which occurred between late 2015 and mid-2016, only six cases were reported in the first three months since the first report in September 2015, as compared with 114 cases in the first three months in this wave.

Since October 2016, 143 human H7N9 cases have been reported by health authorities in 11 provinces/municipalities in the Mainland* (Figure 1), including 57 cases in Jiangsu (江蘇), 26 cases in Guangdong (廣東), 22 cases in Zhejiang (浙江), 14 cases in Anhui (安徽), 7 cases in Jiangxi (江西), 4 cases each in Hunan (湖南) and Shanghai (上海), 3 cases each in Fujian (福建) and Guizhou (貴州), 2 cases in Shandong (山東), and one case in Hubei (湖北). The reported cases in Guangdong occurred in various areas including Dongguan (東莞), Foshan (佛山), Guangzhou (廣州), Jiangmen (江門), Jieyang (揭陽), Meizhou (梅州), Qingyuan (清遠), Shenzhen (深圳), Zhaoqing (肇慶) and Zhongshan (中山). Among these 143 cases, their ages ranging from 23 to 91 (median=54). The male-to-female ratio was about 2:1. Most cases presented with severe conditions.

Figure 1 - Provinces/municipalities in Mainland China with human H7N9 cases reported since October 2016.

According to the information from the NHFPC, among the 114 cases detected from October to December 2016, at least 85 (75%) were known to have exposure to poultry or poultry markets before onset of symptoms while the sources of infection of most of the remaining cases were reported to be under investigation.

In Hong Kong, at time of writing four imported human H7N9 cases have been confirmed since December 2016. In comparison, 0, 10, three and three cases had been reported in the first, second, third and fourth wave respectively. All the four cases were imported from different areas in Guangdong. Three cases involved adult patients and the remaining case was a paediatric patient.

All the three adult cases had multiple pre-existing chronic diseases and presented with severe illnesses. Two of them passed away while the remaining case was in stable condition. The first case was a 75-year-old man who had history of chronic obstructive airway disease (COAD) and secondary polycythemia. He travelled to Dongguan before onset, and had visited a wet market and bought a slaughtered chicken there. He initially presented with chest discomfort, on and off cough with sputum, shortness of breath and runny nose on December 8. His condition deteriorated and he died on December 25.

The second case involved a 70-year-old man who had history of carcinoma of bladder, stroke and hyperlipidaemia. He had travelled to Zhongshan before onset. There were live poultry stalls and mobile stalls selling live poultry near his residence in Zhongshan. He developed fever, cough with sputum, shortness of breath, vomiting and diarrhoea before December 26 and was admitted to a public hospital on December 28 for management of pneumonia. His condition has been improving gradually after treatment.

*Some of the cases occurring in January 2017 have not been reported yet and hence not included.

The third case was 62-year-old male patient with history of hypertension, diabetes, hyperlipidemia, chronic heart failure, peptic ulcer and COAD. He travelled to Guangzhou before onset. It remained unknown whether he had history of contact with poultry while he was in Guangzhou. He developed fever, cough and shortness of breath on January 1 and returned to Hong Kong on January 3. He was admitted to a public hospital for treatment of pneumonia and heart failure on January 4. His condition deteriorated and he passed away on January 6.

The fourth case affected a 10-year-old boy who presented with mild influenza-like illness. He travelled to Foshan before onset and had visited a residence of his relatives in Foshan where there were live chickens. His condition remained stable all along and he had recovered. So far, tracing of the contacts and travel collaterals of the four imported cases did not identify any secondary cases.

Apart from Mainland China and Hong Kong, two human H7N9 cases have been detected in Macau since December 2016. The first case was reported on December 14, 2016, which was the first time human H7N9 case was detected in Macau. The case involved a 58-year-old poultry wholesaler who had contact with silky fowls with samples tested positive for avian influenza A(H7N9). He was asymptomatic but his respiratory specimen was tested positive for influenza A(H7N9) by PCR. The second case in Macau was an imported case from Zhongshan.

Since the emergence of human H7N9 infections in Mainland China in March 2013, at least 947 human H7N9 cases have cumulatively been reported globally. In the previous four waves, the majority of cases occurred between December and April (Figure 2). Apart from an asymptomatic case with exposure to infected poultry in Macau, all the remaining cases occurred in Mainland China with 28 cases exported to other areas outside Mainland China. The case fatality rate was about 40%. In Mainland China, the provinces with the greatest number of reported cases included Zhejiang (25%), Guangdong (23%) and Jiangsu (17%). In Hong Kong, since the detection of the first imported case in December 2013, 20 human H7N9 cases (including seven deaths) have been confirmed so far. Among them, 19 were imported from Guangdong and one was imported from Jiangsu.

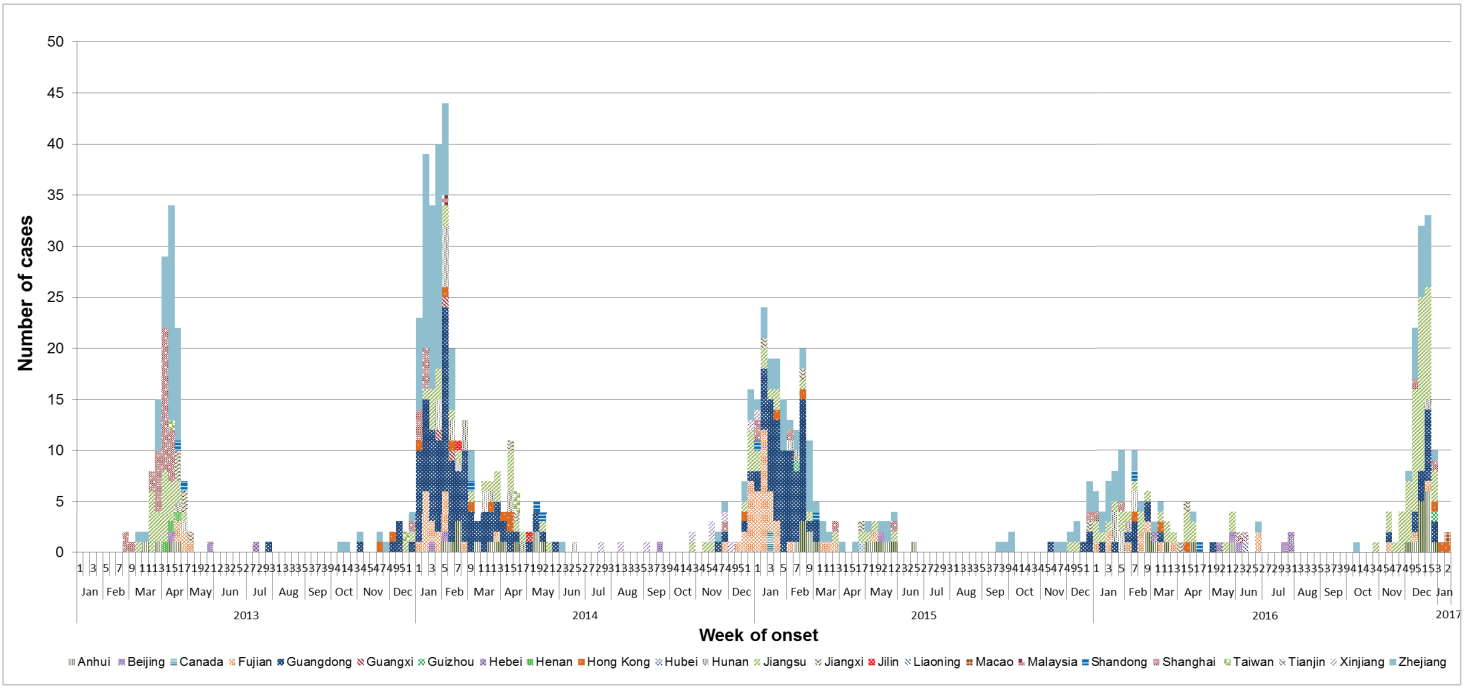

Figure 2 - Weekly number of human H7N9 cases by onset date, 2013-2017.

Poultry and environment

H7N9 has already become enzootic in poultry in Mainland China. Since 2015, under the national animal avian influenza H7N9 monitoring program of the Ministry of Agriculture, poultry and environmental samples taken from markets in Anhui, Fujian, Guangdong, Hubei, Hunan, Jiangsu, Jiangxi, Jilin (吉林), Shanghai and Zhejiang were tested positive for H7N9 virus by virological tests[1]. Of note, samples taken in Anhui, Guangdong and Zhejiang in December 2016 were tested positive for H7N9. The Health and Family Planning Commission of Guangdong Province reported that 60 out of 637 environmental samples collected from 21 live poultry markets in 15 cities in Guangdong in the first week of January 2017 were tested positive for H7 virus, with a positive rate of 9.4%[2]. In Jiangsu, the Provincial Health and Family Planning Commission reported that 15.8% of the environmental samples collected from live poultry markets in December 2016 were tested positive for H7[3].

According to reports received by the Food and Agriculture Organization on surveillance activities for H7N9 viruses in Mainland China, positive samples continue to be detected mainly from live bird markets, vendors and some commercial or breeding farms[4].

In Macau, samples taken from a consignment of silky fowls in a wholesale poultry market were tested positive for A(H7N9) on December 13, 2016. The affected silky fowls were imported from Mainland China.

Public health risk assessment

According to the World Health Organization, most human cases were exposed to avian influenza viruses through contact with infected poultry or contaminated environments, including live poultry markets. Since the viruses continue to be detected in animals and environments, further human cases are expected to occur from time to time. Locally, since the H7N9 virus continues to be

detected in poultry and environments in Mainland China especially Guangdong, further human cases are expected in affected and possibly neighbouring areas. In the past few years, most human H7N9 cases in the Hong Kong were detected in the first quarter of a year and were imported from Guangdong. In view of the heavy trade and travel between Mainland China and Hong Kong, further sporadic human cases and affected poultry imported to Hong Kong every now and then are expected, especially in the coming few months.

Even though small clusters of human H7N9 infections have been reported previously including those involving healthcare workers, current epidemiological and virological evidence suggests that H7N9 viruses have not acquired the ability of sustained transmission among humans, thus the likelihood of human-to-human transmission of avian influenza viruses is low. With oseltamivir prophylaxis and medical surveillance of the close contacts of any confirmed cases, the risk of secondary spread from cases imported into Hong Kong is considered to be low at the present moment provided that the avian influenza viruses still have not acquired the ability of efficient human-to-human transmission.

Important points to note

There is a likely risk that environments with live poultry in Mainland China are contaminated with avian influenza viruses. People travelling to the Mainland or other affected areas must avoid visiting wet markets, poultry markets or farms during travel. They should be alert to the presence of backyard poultry when visiting relatives and friends. They should also avoid purchase of live or freshly slaughtered poultry, avoid touching poultry/birds or their droppings. They should strictly observe personal and hand hygiene when visiting any places with the presence of live poultry. Adults and parents should look after children with extra care regarding personal, hand, food and environmental hygiene against infections during travel.

Travellers returning from affected areas should consult doctors promptly if symptoms develop, and actively inform the doctors of their travel history for prompt diagnosis and treatment. It is essential to tell the doctor if they have ever seen any live poultry during their travel, which may imply possible exposure to contaminated environments. This will enable doctors to assess the possibility of avian influenza infection and arrange necessary investigations and appropriate treatment in a timely manner.

Healthcare professionals are also reminded to seek travel and exposure history from returning travellers who present with fever, influenza-like illness or chest infection. If patients report seeing any live poultry during their travel in the Mainland, detailed information on possible exposure to environments contaminated by poultry should be solicited from them. Suspected cases fulfilling the reporting criteria should be reported to the Centre for Health Protection (CHP) for further investigation.

For updates on the latest situation of avian influenza, please refer to the designated website of the CHP (English: http://www.chp.gov.hk/en/view_content/24244.html; Chinese: http://www.chp.gov.hk/tc/view_content/24244.html).

References

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[2]Health and Family Planning Commission of Guangdong Province. http://www.gdwst.gov.cn/a/zwxw/20170111717051.html.
[3]Jiangsu Provincial Commission of Health and Family Planning. http://www.jswst.gov.cn/wsxx/nrgIIndex.action?catalogID=4028816b2ba99317012ba99950740003&type=2&messageID=ff80808159433fad015981a71c580427.
[4]Food and Agriculture Organization of the United Nations. http://www.fao.org/ag/againfo/programmes/en/empres/H7N9/situation_update.html.

Review of Legionnaires' Disease (LD) in 2016

Reported by Dr Francis WONG, Medical and Health Officer, Respiratory Disease Office, Surveillance and Epidemiology Branch, CHP.

Legionnaires' Disease (LD) is a type of bacterial pneumonia caused by legionella, most commonly *Legionella pneumophila* serogroup 1 (Lp1). Legionellae are ubiquitous in aqueous environments including fresh water environment as well as man-made water systems such as potable water supplies systems.

Since 2016, the Centre for Health Protection (CHP) of the Department of Health has adopted a revised risk-based strategy for environmental investigation and sampling for LD cases according to recommendations by CHP's Scientific Committee on Emerging and Zoonotic Diseases after reviewing the local epidemiology as well as prevention and control practices overseas. This article gave a review of the LD cases reported to CHP in the first year of implementation of the revised strategy.

Epidemiology of LD cases in 2016

CHP recorded a total of 75 LD cases in 2016 with an incidence rate of 1.02 per 100 000 population (Figure 1). There were 66 and 41 LD cases reported to CHP in 2015 and 2014 respectively. In comparison, the incidence rates of LD or legionellosis in 2014/2015 ranged from 0.57 to 1.89 per 100 000 population in overseas or neighbouring countries/areas including Australia, Canada, Europe, Japan, Taiwan, the United Kingdom and the United States.

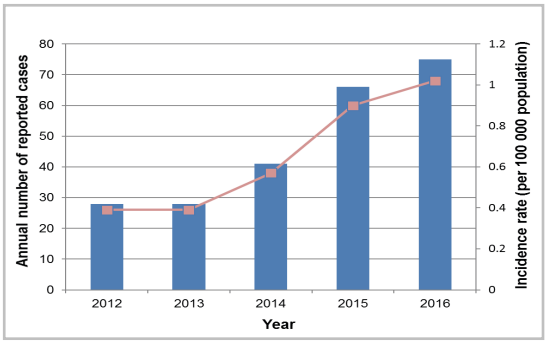

Figure 1 - Annual number and incidence rate of reported LD cases in Hong Kong, 2012-2016.

Among the 75 LD cases recorded in 2016, 74 were Chinese and one was an Indian man. Their ages ranged between 44 and 87 years (median=66 years). Males were predominately affected with a male-to-female ratio of 5.8:1.

The main presenting symptoms included fever (89.3%), cough (81.3%), shortness of breath (46.7%), chills/rigors (21.3%) and malaise (21.3%). All cases developed pneumonia requiring hospitalisation. Twenty-eight cases (37.3%)

required intensive care. Seven cases died within the same admission for LD (three cases were due to LD and the other four due to other concomitant diseases).

Regarding the positive test leading to the initial diagnosis of LD, 51 (68%) and 21 (28%) cases were initially diagnosed by urinary antigen test (UAT) and polymerase chain reaction (PCR) of respiratory specimens respectively, while only three cases (4%) were initially diagnosed by paired serology.

Sixty-five cases (86.7%) and six cases (8.0%) were classified as locally acquired and imported infections respectively, while the place of infection of the remaining four cases (5.3%) could not be determined because the patients had stayed both inside and outside Hong Kong during their incubation periods. The 65 locally acquired cases resided in various districts in Hong Kong (Figure 2). All the 75 cases were sporadic cases and epidemiological investigations did not reveal any outbreaks so far. Of note, two local cases were definite nosocomial cases while the remaining cases were community-acquired cases.

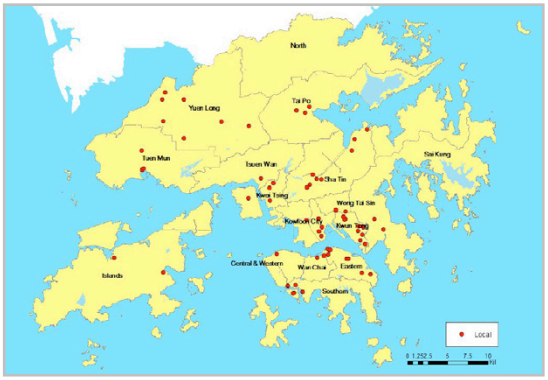

Figure 2 - Geographic distribution of the residential places of the 65 locally-acquired LD cases. (Source: Communicable Disease Information System.)

LD cases with environmental investigations undertaken and environmental samples collected

According to CHP's updated investigation strategy, environmental investigations were undertaken and environmental samples were collected for two nosocomial case and seven community-acquired cases. The details of the nine cases are as follows:

Two nosocomial cases

The first nosocomial case involved a patient with underlying medical conditions who was hospitalised in a private hospital during the whole incubation period. In the initial investigation, a total of eight water samples and two environmental swabs were collected from the ward where the patient had stayed before onset. Three water samples were tested positive for *Legionella* species ranging from 0.5-39.5 colony forming units per millilitre (cfu/ml) and one environmental swab was also cultured positive for non-pneumophila *Legionella*. Disinfection of the relevant water systems by superheat and flush was performed by the concerned hospital. Post-disinfection water samples were below the action level (i.e. 1 cfu/ml). Sequence-based typing found that *Legionella* bacteria from a tracheal aspirate specimen of the patient was closely related to those isolated from the three water samples.

The second nosocomial case involved a patient with underlying medical conditions who was hospitalised a public hospital during the whole incubation period. In the initial investigation, a total of 11 water samples and five environmental swabs were collected from the ward where the patient had stayed. Ten water samples were tested positive for *Legionella* species ranging from 3.0–72.4 cfu/ml and all the five environmental swabs were also cultured positive for *Legionella pneumophila*. Chemical disinfection of the relevant water tanks and water pipe systems was performed and all post-disinfection water samples were below the action level (i.e. 1 cfu/ml). No positive respiratory specimen was available from the patient for matching and the source of infection could not be established.

Three cases with exposure to high risk sources

Two patients reported use of respiratory equipment for pre-existing medical conditions during the incubation period. Water samples and swabs were collected from the concerned continuous positive airway pressure machine in one case, and swabs were collected from the concerned bi-level positive airway pressure machine in the other case. All specimens were tested negative for *Legionella* species.

One patient reported receiving dental treatment in a private dental clinic during the incubation period. Water samples were collected from the cup filler of the dental unit waterline and the probes of a scaler machine in the concerned dental clinic. The samples collected from the cup filler and one of the probes were both tested positive for *Legionella pneumophila* serogroup 2-14 at 0.3 cfu/ml while Lp1 DNA was detected in the patient's sputum. Disinfection of the dental unit waterline was carried out and post-disinfection water samples were below the action level (i.e. 0.1 cfu/ml). As *Legionella pneumophila* detected from the environmental samples and that from the patient's sputum were of different serogroups, the source of infection was unlikely to be related to the dental equipment.

Four cases with onset within six months and common exposure to the same potential sources during the incubation period

Two patients lived in the same housing estate in Sha Tin but in different blocks. The first patient had onset in February 2016 while the second patient had onset in May 2016. Epidemiological investigations revealed that there were fresh water cooling towers (FWCTs) in the estate. Water samples were taken from 10 FWCTs identified. Water samples from four of the FWCTs had Lp1 detected at levels ≥10 cfu/ml (range: 10–2 800 cfu/ml). Nuisance notice and advisory notice were issued by the Electrical and Mechanical Services Department to the owners of the concerned premises for decontamination and disinfection. Molecular studies showed that the isolate from the respiratory specimen of one patient and the isolates from the water samples were of different types and hence the source of infection of this patient was not related to the FWCTs. No positive respiratory specimen was available from the other case for matching and the source of infection could not be established.

Another two patients lived in the same building of a housing estate in Kwun Tong. The first patient had onset in November 2016 while the second patient had onset in December 2016. A water sample was taken from the water tank of the building where the two cases resided and was tested negative for *Legionella* species.

In summary, the number of LD cases recorded in 2016 was higher than that in 2015. The characteristics of the cases were similar to those recorded in previous years. Epidemiological investigations did not reveal any outbreaks. Environmental investigations

possibly related to increasing use of more sensitive laboratory diagnostic tests such as UAT and PCR in hospitals for detection of LD cases. The number of UAT and PCR performed by laboratories under the Hospital Authority had increased steadily from about 2 000 in 2010 to about 6 800 in 2015, and from about 140 in 2010 to about 1 700 in 2015 respectively. The increasing trend of LD or legionellois has also been observed in overseas countries in the past decade.

Persons with weakened immunity are at higher risk of having LD. It is very important for them to strictly observe the following health advice to prevent LD:

- Use sterile or boiled water for drinking, tooth brushing and mouth rinsing;
- Avoid using humidifiers, or other mist- or aerosol-generating devices. A shower may also generate small aerosols; and
- If using humidifiers, or other mist- or aerosol-generating devices, fill the water tank with only sterile or cooled freshly boiled water, and not water directly from the tap. In addition, clean and maintain humidifiers/devices regularly according to manufacturers' instructions. Never leave stagnant water in a humidifier/device. Empty the water tank, wipe all surfaces dry, and change the water daily.

NEWS IN BRIEF

Ad Hoc Clinical Infection & Public Health Forum: Avian Influenza A(H7N9) Infection: An Update

With the increased activity of avian influenza in the neighboring areas since the end of 2016, increasing numbers of human H7N9 cases have been reported in various areas in Mainland China including Guangdong. As of January 11, 2017, four imported cases have been confirmed in Hong Kong since December 2016. In view of rapid increase of cases this winter, a "Ad Hoc Clinical Infection & Public Health Forum: Avian Influenza A(H7N9) Infection: An Update" was conducted on January 11, 2017. A total of 179 participants had been enlightened on the presentation of epidemiological findings and clinical courses of the recent cases. There were also fruitful sharing of experience by doctors of different streams from public health officers to clinical physicians. Early identification of the cases via alertness on travel history and relevant exposure history during travel and early isolation are the mainstay of preventing transmission. All the information has been uploaded onto the training portal of Infectious Disease Control Training Centre (IDCTC) at http://icidportal.ha.org.hk/sites/en/Lists/Training Calendar/DispForm.aspx?ID=121.

Photo - Fruitful sharing of experiences between different streams of healthcare professionals.

CA-MRSA cases in December 2016

In December 2016, the Centre for Health Protection (CHP) recorded a total of 71 cases of community-associated methicillin resistant *Staphylococcus aureus* (CA-MRSA) infection, affecting 43 males and 28 females with ages ranging from eight months to 90 years (median=38 years). Among them, there were 49 Chinese, 9 Filipinos, 7 Caucasian, 3 Nepalese, 1 Indonesian, 1 mixed, and 1 Pakistani. Isolates of all the 71 cases exhibited the Panton-Valentine Leukocidin gene and were tested positive for either Staphylococcal Cassette Chromosome *mec* (SCC*mec*) type IV (44) or V (27).

Sixty-nine cases presented with uncomplicated skin and soft tissue infections while the remaining two cases had invasive CA-MRSA infections. The first case was a 65-year-old man who presented with cough with sputum and shortness of breath since November 22, 2016. He developed dizziness and loss of consciousness on November 23 and was admitted to intensive care unit of a public hospital. His chest x-ray showed right upper zone consolidation. His tracheal aspirate collected on November 23 was cultured positive for CA-MRSA. He was diagnosed to have pneumonia and treated with antibiotics. He required extracorporeal membrane oxygen therapy and weaned off subsequently. His current condition remained serious. The second case was a recurrent case affecting a 35-year-old man. He had history of CA-MRSA infection with right nostril abscess in August 2016. This time, he presented with fever, boils over chin and upper lip swelling since December 8, 2016. He was admitted to a public hospital on December 12 and was diagnosed to have facial abscess and sepsis. His blood samples collected on December 12 and 14 were cultured positive for CA-MRSA. He was treated with antibiotics and discharged on December 22. The close contacts of both cases were asymptomatic, and screening and decolonisation would be provided to them.

Besides, three household clusters, with each affecting two to three persons, were identified. Screening and decolonisation would be carried out for their close contacts. No cases involving healthcare worker were reported in December.

Scarlet fever update (December 1, 2016 – December 31, 2016)

Scarlet fever activity in December increased as compared with that in November. CHP recorded 224 cases of scarlet fever in December as compared with 182 cases in November. It included 118 males and 106 females aged between 21 months and 40 years (median=six years). There were five institutional clusters involving three kindergartens and two primary schools, affecting a total of 11 children. No fatal cases were reported during this reporting period.

A total of 1 468 cases have been recorded in 2016 (as of December 31, 2016), as compared with 1 210 cases in 2015.