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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

Summary of 2017 Summer Influenza Season in Hong Kong

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Overview

While the winter influenza season this year was relatively mild, Hong Kong experienced a major summer influenza season. The summer influenza season arrived in Hong Kong in mid-May 2017. It arrived earlier than the traditional summer influenza seasons that usually occurred between July and September in the past. The influenza activity continued to increase steadily in June and exceeded the peak level recorded during the winter season this year. It further increased sharply from late June to mid-July and reached a very high level with some of the surveillance parameters exceeding the highest levels recorded in recent years. The influenza activity started to decrease in late July and subsequently returned to a baseline level in late August. This summer season lasted for about 16 weeks, which was similar to the two winter influenza seasons in 2015 and 2016 (about 17 weeks in both seasons).

Similar to Hong Kong, sharp increase in influenza activity was also recorded in June and July 2017 in Guangdong and Macau. The seasonal influenza activity in Guangdong and Macau has returned to a low level in September.

Laboratory surveillance

The weekly percentage tested positive for seasonal influenza viruses among respiratory specimens received by the Public Health Laboratory Services Branch (PHLSB) of the Centre for Health Protection (CHP) of the Department of Health rose from 12.10% in the week ending May 13 to the peak of 40.86% in the week ending July 15 (Figure 1). This peak exceeded the previous maximum level recorded since 2014 (38.71% during the 2015 winter season). It then decreased to 8.92% in the week ending August 26.

Influenza A(H3N2) virus predominated in this summer season. From May 7 to August 26, majority of influenza viruses detected by PHLSB was influenza A(H3N2) (89.1%), whereas the proportions of influenza A(H1N1)pdm09, influenza B and influenza C were 6.2%, 3.7% and 0.9% respectively. The influenza A(H3N2) viruses remained antigenically similar to the strain contained in the seasonal influenza vaccine (SIV) recommended for the 2016/17 Northern Hemisphere season.

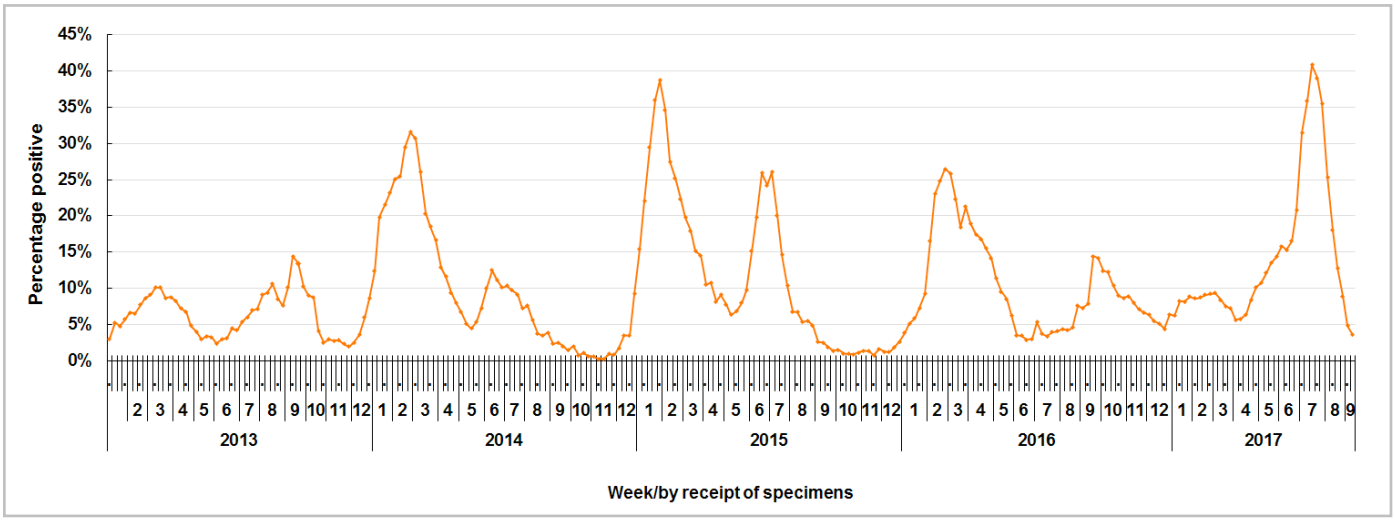

Figure 1 - Percentage of respiratory specimens tested positive for influenza viruses, 2013-2017.

Influenza-like illness (ILI) surveillance among sentinel general out-patient clinics (GOPC) and private doctors

The average weekly ILI consultation rate among sentinel GOPC reached the peak level of 14.2 (per 1 000 consultations) in the week ending July 15, which was the highest level recorded after the 2009 pandemic (higher than 12.7 and 11.7 recorded in the 2015 and 2016 winter seasons respectively) (Figure 2). The rate among sentinel private doctors reached the peak of 76.4 (per 1 000 consultations) in the week ending July 22, which was similar to the peak of 71.0 and 82.3 recorded in the 2015 and 2016 winter seasons respectively (Figure 3).

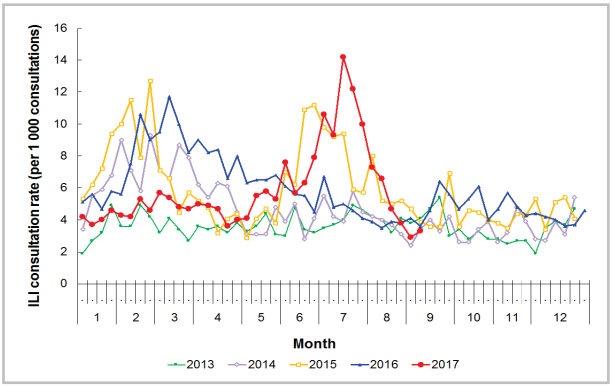

Figure 2 - Average weekly ILI consultation rate among sentinel GOPC, 2013-2017.

ILI outbreaks in schools and institutions

The weekly number of institutional ILI outbreaks reported to CHP reached a high level in July, ranging between 40 and 44 during the four-week period from June 25 to July 22 (Figure 4). The number of reported outbreaks decreased markedly in August. During the period between May 7 and August 26, a total of 400 ILI outbreaks were recorded. Majority of the outbreaks occurred in residential care homes for the elderly (RCHE) (50.0%), followed by primary schools (PS) (18.3%), kindergartens/child care centres (KG/CCC) (15.0%), residential care homes for the disabled (RCHD) (5.5%), secondary schools (SS) (4.5%) and other institutions (6.8%). This was similar to the situation in the 2015 winter season predominated by influenza A(H3N2). In that season, 46.3% of ILI outbreaks occurred in RCHE. In contrast, 87.0% of ILI outbreaks occurred in schools (KG/CCC, PS and SS) in the 2016 winter season predominated by influenza A(H1N1)pdm09.

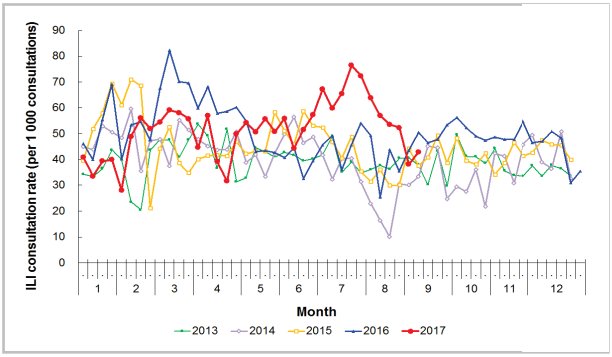

Figure 3 - Average weekly ILI consultation rate among sentinel private doctors, 2013-2017.

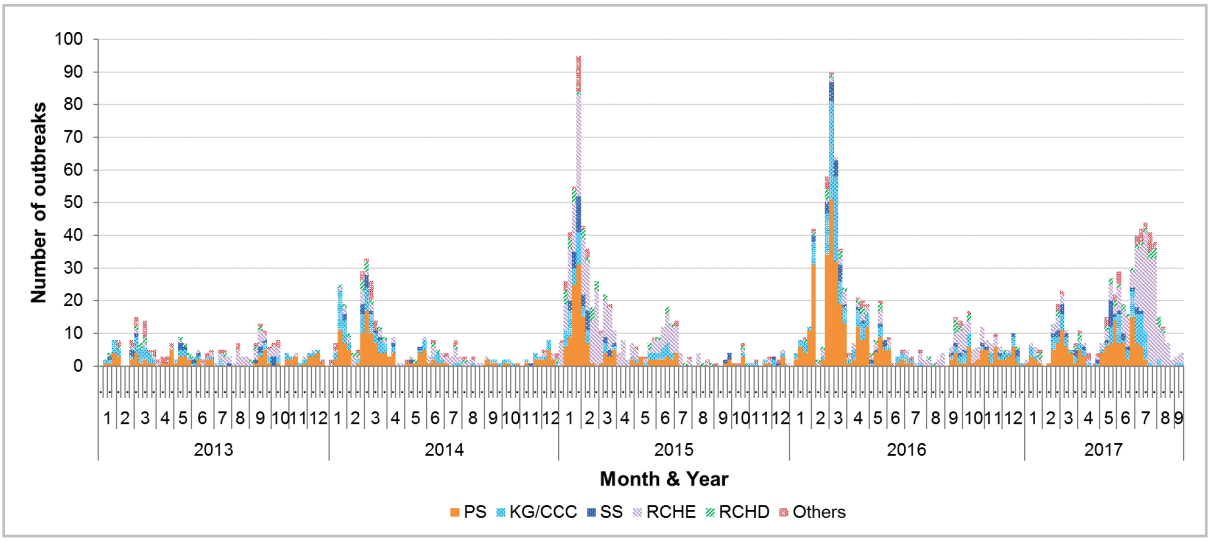

Figure 4 - Weekly number of ILI outbreaks in schools and institutions, 2013-2017.

Influenza-associated hospital admissions

In public hospitals, the weekly admission rates with principal diagnosis of influenza had reached very high levels in mid-July (Figure 5). In this season, the peak admission rate was highest among children aged below five years (10.13 admitted cases per 10 000 population in the week ending July 15), followed by elderly aged 65 years or above (6.65 in the week ending July 15) and children aged five to nine years (2.43 in the week ending July 1). The peak rates among children aged below five years and elderly aged 65 years or above exceeded the previous highest rates recorded after the 2009 pandemic (6.73 among children aged below five years in the 2016 winter season and 5.34 among elderly aged 65 years or above in the 2015 winter season). The rates among all age groups returned to baseline levels in late August.

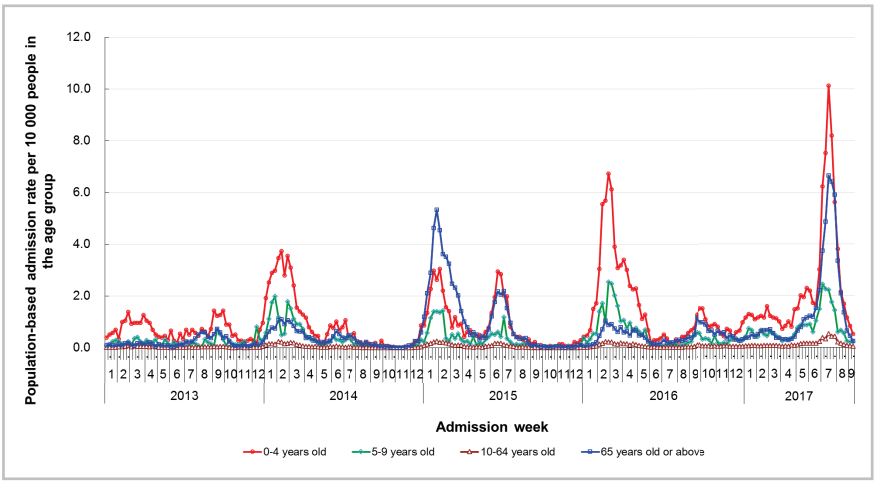

Figure 5 - Weekly admission rates with principal diagnosis of influenza in public hospitals by age groups, 2013-2017.

Enhanced surveillance of severe influenza cases

CHP collaborated with the Hospital Authority (HA) and private hospitals to reactivate the enhanced surveillance for influenza-associated admissions to intensive care unit (ICU) or deaths among patients aged 18 or above between May 5 to September 1. During this period, a total of 582 ICU admissions or deaths (including 430 deaths) with laboratory diagnosis of influenza had been recorded among adult patients. The male to female ratio was 1: 0.82. Their ages ranged from 18 to 105 years (median: 82 years). The majority (79.7%) of the severe cases were elderly aged 65 years or above. Four hundred and eighty-one (82.6%) of the severe cases were known to have pre-existing chronic diseases. Among the cases aged 18 to 64 years, 9.3% were known to have received SIV for the 2016/17 season, whereas among the elderly aged 65 years or above who lived in RCHE and in the community, 70.2% and 34.7% were known to have received SIV for the 2016/17 season respectively. The total number of severe cases recorded among adult patients in this season was lower than that in the 2015 winter season (predominated by H3N2) but higher than that in the 2016 winter season (predominated by H1N1pdm09) (Table 1).

Table 1 - Number of severe cases recorded during the enhanced surveillance periods in the 2015 winter season, 2016 winter season and 2017 summer season.

Season	2015 winter (17 weeks)*	2016 winter (17 weeks)#	2017 summer (18 weeks)^
Adult severe cases (including deaths)	647	409	582
Adult death cases	501	211	430
Paediatric cases of influenza-associated complication/death	18	27	19
Paediatric cases of influenza-associated death	1	3	3

**2015 winter season enhanced surveillance period: 2/1/2015 - 24/4/2015*
#2016 winter season enhanced surveillance period: 29/1/2016 - 20/5/2016
^The enhanced surveillance started two weeks before the influenza season.

Separately, 19 paediatric cases of influenza-associated complication/death (including three fatal cases) were reported to CHP among people aged below 18 years during the same period. They included 12 boys and seven girls. Their ages ranged from six months to 15 years (median: two years). Six cases (31.6%) had pre-existing chronic diseases. Seventeen cases (89.5%) had not received SIV for the 2016/17 season. In 2017, a total of 27 cases (including four deaths) have been recorded so far. The total number of severe cases recorded among paediatric patients in this season was less than that in the 2016 winter season but similar to that in the 2015 winter season (Table 1).

In total, 601 severe cases (including 433 deaths) with laboratory confirmation of influenza were recorded among all ages in this season. The average daily number of severe cases reported reached the peak of 11.3 cases per day between July 12 and July 18 and then decreased in August. Among patients with laboratory confirmation of influenza admitted to public hospitals under HA in this season, 2.6% of the admitted cases died during the same episode of admission, which was comparable to the percentages recorded in previous seasons (2.5% in the 2016 summer season, 1.9% in the 2016 winter season and 3.3% in the 2015 summer season).

Very old elderly aged 85 years or above constituted the majority of the disease burden of severe and fatal cases (Table 2). The cumulative incidence of severe cases in this season was the highest among elderly aged 85 years or above (143.7 cases per 100 000 population), followed by elderly aged 65 to 84 years (21.7), adults aged 50 to 64 years (5.1) and young children aged below six years (4.3). The rates among people aged six to 49 years were much lower than the above age groups. Similarly, the cumulative incidence of fatal cases in this season was the highest among elderly aged 85 years or above (135.6 cases per 100 000 population), followed by elderly aged 65 to 84 years (15.7), adults aged 50 to 64 years (1.8) and young children aged below six years (0.9) (Table 2).

Table 2 - Age distribution and cumulative incidences of severe influenza cases and deaths recorded from May 5 to September 1, 2017.

Age group (year)	Number of severe cases (including deaths)	Cumulative incidence of severe cases (per 100,000 population)	Number of deaths	Cumulative incidence of fatal cases (per 100 000 population)
0 - 5	15	4.3	3	0.9
6 - 11	2	0.6	0	0
12 - 17	2	0.6	0	0
18 - 49	29	0.9	9	0.3
50 - 64	89	5.1	31	1.8
65 - 85	215	21.7	155	15.7
85 or above	249	143.7	235	135.6
Total	601	8.2	433	5.9

Effectiveness of seasonal influenza vaccine in elderly in Resident Care Homes 2011/12 to 2016/17 influenza season

The vaccine effectiveness (VE) of SIV against laboratory-confirmed influenza infections with severe outcomes (ICU admission and/or deaths) among elderly aged 65 years or above who resided in residential care homes (RCH) was estimated for the 2011/12 to 2016/17 influenza seasons. Screening method proposed by Orenstein[1], was adopted for which VE was estimated by comparing the proportion of population vaccinated (PPV) with the proportion of case vaccinated (PCV), using the following formula:

$$VE=1-(PCV)(1-PPV)/ (1-PCV)(PPV)$$

PPV was estimated by dividing the number of SIV administered through Government Vaccination Programme (GVP) to elderly (i.e. aged 65 years or above) by the total number of elderly living in the RCH in the corresponding influenza seasons. PCV was obtained by the proportion of cases vaccinated for RCH elderly aged 65 years or above who were reported to the enhanced surveillance system during the influenza seasons. Vaccination status was ascertained by matching with vaccination records under GVP. We computed the 95% CI of PCV by using the exact confidence interval method with binomial distribution.

For the elderly aged ≥ 65 living in RCHs, the estimated overall vaccine effectiveness varied by influenza seasons and ranged from 37% (95% CI: 8 to 57) to 69% (95% CI: 38 to 84) (Table 3). VE estimates of 50% or higher were observed in 2012/13 and 2015/16 seasons. Albeit with small number of cases, the VE for 2016/17 winter season [68.5% (95%CI: -10.1 to 90.4)] was comparable to that of 2015/16 winter season [68.9% (95%CI: 38.4 to 84.1)] but higher than that in 2016/17 summer season [45.1% (95%CI: 20.6 to 61.5)].

Our estimation showed that the protection of SIV in elderly living in RCH was low to moderate in all influenza seasons studied. VE estimates varied with influenza seasons and this might be related to the degree of matching between vaccine and circulating strains, strains circulating in previous seasons and the timing of influenza seasons. In contrast to other seasons in which most influenza infection occurred during winter, the 2016/17 season in Hong Kong was atypical with most cases presented after May 2017. Cases in the 2016/17 summer season might have had their SIV received more than six months ago. Immunity may wane with duration between vaccination and arrival of influenza seasons and hence contributed to a lower vaccine effectiveness in this season[2]. This was evident by the higher VE estimates in the 2016/17 winter season (February to April 2017) when compared to the 2016/17 summer season (May to August 2017).

Table 3 - Vaccine effectiveness of seasonal influenza vaccine in elderly in Residential Care Homes in Hong Kong, 2011/12 to 2016/17 influenza seasons.

Influenza season	Proportion of population vaccinated (PPV)	Number of cases	Number of cases vaccinated	Proportion of cases vaccinated (PCV)	VE (%)	95% CI* of VE
2011/12 winter	0.79	103	70	0.68	43.6	11.9 to 63.2
2012/13 winter	0.80	21	14	0.67	50.0	-46.4 to 81.1
2013/14 winter	0.80	33	22	0.67	49.4	-15.6 to 76.5
2014/15 winter	0.76	133	88	0.66	37.2	8.0 to 56.7
2015/16 winter	0.80	40	22	0.55	68.9	38.4 to 84.1
2016/17 winter	0.81	14	8	0.57	68.5	-10.1 to 90.4
2016/17 summer	0.81	153	107	0.70	45.1	20.6 to 61.5

*confidence interval

The screening method enables a rapid estimation with existing data. It is applicable to VE estimation when accurate estimates of PPV and PCV are available. As SIV was delivered to elderly in RCH through visiting medical doctors under GVP, the vaccination uptake was well reflected in the administrative statistics. In addition, most RCH elderly would attend Accident & Emergency Departments of public hospitals under HA for medical consultation and subsequent management in acute respiratory illnesses. Thus the enhanced surveillance should capture most of the severe influenza infections in this population. Thus VE estimation by screening method is feasible on elderly living in RCH.

Discussion

The seasonal influenza activity in Hong Kong this year was different from the typical epidemiological patterns in the past few years. In Hong Kong, summer influenza seasons were usually milder than winter seasons. The influenza activity in this summer season was higher than previous summer seasons and also higher than that recorded in the winter season in 2017. This summer season was a severe season comparable to the 2015 and 2016 winter seasons. The attack rate among the population was high as reflected by very high ILI consultation rates in out-patients settings. Nonetheless, there was no evidence of increased virulence as the proportion of deaths among the influenza cases admitted to public hospitals was similar to previous few seasons. Besides, the number of severe cases was within the range recorded in the 2015 and 2016 winter seasons.

Several factors might account for the severity of this season. A mild winter season in early 2017 might lead to accumulation of susceptible persons in the population. Influenza A(H3N2) predominated in this summer influenza season, which is known to cause more severe disease in the elderly as compared with other influenza types. The aging population in Hong Kong has resulted in an increasing number of frail elderly who are more prone to influenza infection and its complications. Furthermore, the immunity induced by seasonal influenza vaccination in late 2016 has been waning in the elderly population, making them susceptible to influenza infection in the summer season.

CHP will continue to closely monitor the influenza situation in Hong Kong and overseas countries. All persons aged six months or above except those with known contraindications are recommended to receive SIV for personal protection. In the coming 2017/18 season, the Vaccination Subsidy Scheme will continue to provide subsidised vaccination to children aged six months to under 12 years, elderly aged 65 years or above, pregnant women, persons with intellectual disabilities and recipients of Disability Allowance. GVP will continue to provide free vaccination to the eligible groups. The various vaccination programmes will be launched in October 2017 and the details will be announced in due course.

References

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DOI: http://dx.doi.org/10.2807/1560-7917.ES.2016.21.16.30201

Review of Japanese Encephalitis in Hong Kong, 2007-2017 (as of August 31, 2017)

Reported by Dr Terence LAM, Scientific Officer, Enteric and Vector-borne Disease Office, Surveillance and Epidemiology Branch, CHP.

Japanese encephalitis (JE) has been made notifiable since July 16, 2004 and all medical practitioners are required to report probable or confirmed cases to the Centre for Health Protection (CHP) of the Department of Health (DH). This paper will provide an update on the JE cases recorded from 2007 till August 31, 2017.

From 2007 to 2016, CHP recorded 21 JE cases. The annual number of cases ranged from zero to six. In 2017 (as of August 31), four local cases were recorded, including the first local blood-borne case (Figure 1).

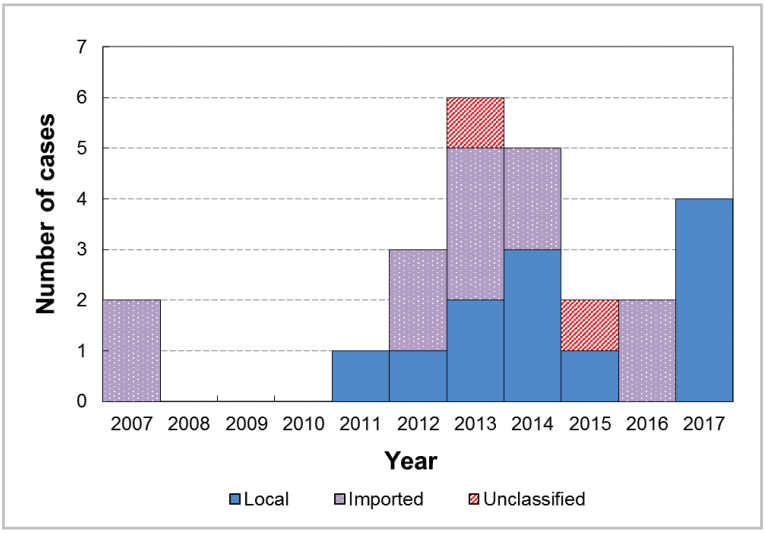

Figure 1 - JE cases recorded from 2007 to 2017 (as of August 31, 2017).

The ages of these 25 patients recorded from 2007 to 2017 ranged from four to 69 years (median: 38 years). More males (n=17, 68%) were affected than females (n=8, 32%). Among them, 12 (48%) were local cases, 11 (44%) contracted the disease overseas and the source of infection for the remaining two cases (8%) could not be determined. All cases were sporadic infection without epidemiological linkage. All 12 local cases had their symptoms onset from May to July (Figure 2). Eight (67%) patients resided in Yuen Long during the incubation period where pig farms were found within the two kilometres of their residences. The remaining four local cases (33%) lived in North, Sai Kung, Southern and Tuen Mun Districts, respectively, where no pig farms were located within two kilometres from their residences. Among the 11 imported cases, eight, two and one cases were imported from Mainland China, Myanmar and Thailand, respectively. The two unclassified cases were recorded in 2013 and 2015 respectively. The patient recorded in 2013 had stayed in both Tokyo and Hong Kong during the incubation period, while for the latter case recorded in 2015 had stayed in both Guangdong and Hong Kong.

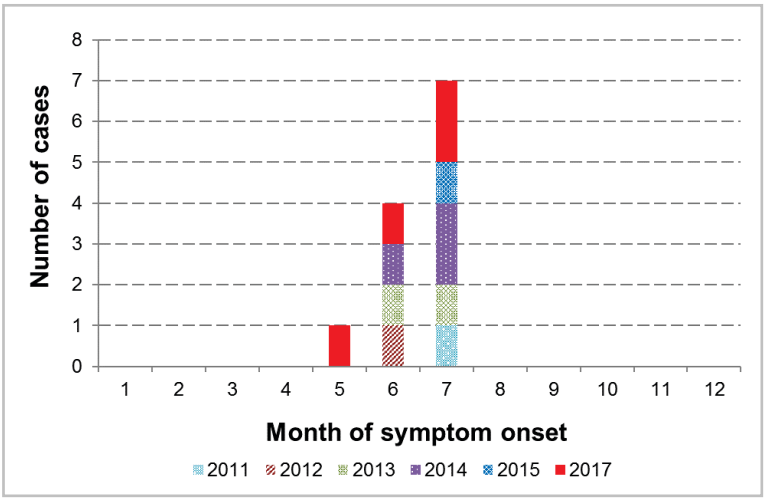

Figure 2 - Distribution of local JE cases by month of symptom onset from 2007 to 2017 (as of August 31, 2017).

Among the 25 cases, the five most common symptoms were fever (n=25, 100%), followed by headache (n=16, 64%), vomiting (n=11, 44%), drowsiness (n=6, 24%) and seizure (n=4, 16%). All were admitted to hospitals for management. Twelve patients (48%) required intensive care treatment. Three patients (12%) passed away due to JE. One patient was transferred back to the home country for further management and two were still in hospital at the time of reporting. For the remaining 19 patients have been discharged, neurological sequelae were documented in four (21%) of them.

Among these 25 cases, there was a blood-borne case recorded in July this year involving a 52-year-old man who stayed in Grantham Hospital (GH) in the entire incubation period. He was admitted to Queen Mary Hospital (QMH) on May 10 for organ transplant for his underlying illness. He had fever and decreased consciousness on July 6 after receiving blood transfusion in GH, followed by acute confusion and myoclonus on July 8. He developed seizures in unconscious condition on July 9. He was transferred to the Intensive Care Unit of QMH for further management on July 14. Both his cerebrospinal fluid and blood sample tested positive for IgM antibodies to JE virus. Investigations revealed that he had received a number of blood transfusions during hospitalisation. Residual samples of the blood transfused to the patient on June 22 were tested positive for JE virus. This was the first documented case of transfusion transmitted JE in literature. Source tracing identified the blood donor as a 46-year-old man who lived in Tin Shui Wai and had donated blood on May 29. He had no travel history to JE-endemic areas and has been asymptomatic all along.

In Hong Kong, the principal vector for JE, *Culex tritaeniorhynchus*, is widely distributed in both rural and urban areas. Currently, there are 43 registered pig farms in Hong Kong. Majority are located in Yuen Long (34 farms) and North District (8 farms) with the remaining one in Sai Kung. Besides, the wetlands in the territory provides favourable natural habitat for wading birds. With the presence of vectors, amplifying and reservoir hosts, there is always the risk of human infection of JE.

To prevent contracting the disease, one should take general measures to prevent mosquito bites. JE vaccine is recommended for travellers who plan to stay one month or longer in endemic areas in Asia and Western Pacific Region, particularly in rural areas; and for short-term (less than one month) travellers if they plan to have significant extensive outdoor or night-time exposure in rural areas during the transmission season of the disease. For further information on JE prevention, please visit the CHP website at: http://www.chp.gov.hk/en/content/9/24/28.html

Facts on Japanese encephalitis

JE is a mosquito-borne disease caused by the JE virus. The JE virus transmission cycle involves *Culex* mosquitoes that lay eggs in fields with wet cultivation, pools, ditches and other large water bodies. Pigs and wading birds act as principal vertebrate amplifying hosts and reservoir hosts respectively. Humans get infected when bitten by an infected mosquito. Since humans seldom develop enough viremia to infect feeding mosquitoes, they are considered a dead-end host for viral transmission. While JE is principally mosquito-borne, overseas scientific literature show that, based on nature of similar flaviviruses, blood transfusion and organ transplant are considered to be potential modes of transmission of JE virus.

Most JE infections are asymptomatic or present as a mild non-specific febrile illness, and only one in approximately 250 infections results in severe disease with rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis and death. Among clinical cases, the case-fatality rate can be as high as 30%. About 20% to 30% of survivors suffer permanent intellectual, behavioural or neurological problems such as paralysis, recurrent seizures or inability to speak.

NEWS IN BRIEF

A probable case of sporadic Creutzfeldt-Jakob disease

The Centre for Health Protection (CHP) recorded a probable case of sporadic Creutzfeldt-Jakob disease (CJD) on August 31, 2017, affecting a 53-year-old man with underlying medical illness. He presented with non-specific dizziness in July 2017. Subsequently, he developed progressive dementia, visual disturbance, abnormal speech, difficulty in walking and myoclonus. He was admitted to a public hospital on August 19 for further management. Findings from magnetic resonance imaging of the brain and electroencephalography were suggestive of CJD. His condition was stable. He had no known family history of CJD. No risk factors for either iatrogenic or variant CJD were identified.

A sporadic case of listeriosis

On September 6, 2017, CHP recorded a case of listeriosis affecting an 82-year-old man with pre-existing medical conditions. He presented with fever, chills, rigor and generalised malaise on September 2, and was admitted to a public hospital on September 3. His blood specimen collected on September 3 grew *Listeria monocytogenes*. The clinical diagnosis was sepsis and he was treated with antibiotics. He was stable and discharged on September 7. He had not travelled outside Hong Kong recently. He reported consumption of ice-cream during the incubation period. His household contacts and food collaterals were all asymptomatic.

A sporadic case of *Streptococcus suis* infection

On September 6, 2017, CHP recorded a sporadic case of *Streptococcus suis* infection affecting a 64-year-old man with good past health. He presented with fever and right wrist pain since August 30. He was admitted to a private hospital on September 4. His blood collected on September 4 grew *Streptococcus suis*. The clinical diagnosis was septic arthritis. He was treated with antibiotics and his condition remained stable. He was transferred to a public hospital on September 7 for further management. He denied any previous skin wounds or history of handling raw pork during incubation period. His home contact remained asymptomatic.