ISSN 0915-5813

IASR

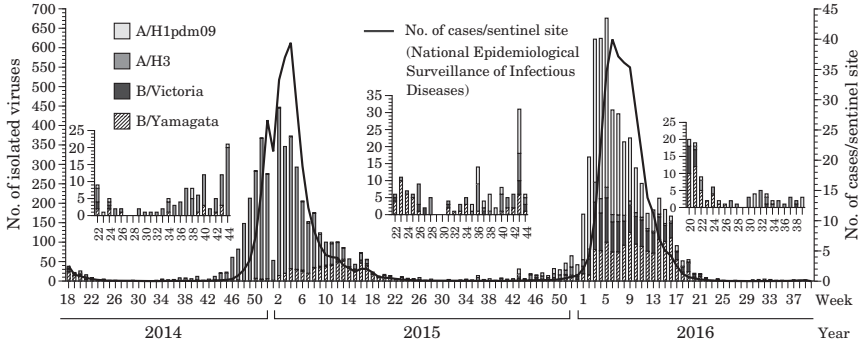
Vol. 37 No. 11 (No. 441) November 2016
Infectious Agents Surveillance Report
http://www.nih.go.jp/niid/en/iasr-e.html

National Institute of Infectious Diseases and Tuberculosis and Infectious Diseases Control Division, Ministry of Health, Labour and Welfare



## <THE TOPIC OF THIS MONTH>
## Influenza 2015/16 season, Japan

Figure 1. Weekly number of reported influenza cases/sentinel site and isolated influenza viruses from week 18, 2014 to week 40, 2016, Japan
(Infectious Agents Surveillance Report: as of October 11, 2016)




The 2015/16 influenza season (from week 36 in September 2015 to week 35 in August 2016) was characterized by the return of A/H1pdm09 as the predominant strain after being relatively absent in the previous season. Influenza virus B, consisting of both Yamagata and Victoria lineages, started increasing from week 2 of 2016.

**Epidemiology of the 2015/16 Influenza season**: Under the National Epidemiological Surveillance of Infectious Diseases (NESID), approximately 5,000 influenza sentinel sites (approximately 3,000 pediatric and 2,000 internal medicine healthcare facility sites) report patients diagnosed as influenza on a weekly basis (see http://www.nih.go.jp/niid/images/iasr/34/405/de4051.pdf for the notification criteria). In the 2015/16 season, the number of patients reported per sentinel in Japan exceeded 1.0 (indicator of the nationwide start of influenza season) in week 1 of 2016 and it remained at or above that level until week 18 of 2016 with the peak occurring at week 6 of 2016 (40.0 patients/sentinel) (Fig. 1) (http://www.nih.go.jp/niid/en/10/2096-weeklygraph/2572-trend-week-e.html). The prefectures that first attained the level of 10.0 patients/sentinel/week were Okinawa and Niigata in week 2 of 2016. In week 5 of 2016, all 47 prefectures were above the level. For the 2015/16 season, cumulatively there was a total of 324.4 influenza patients/sentinel (289.8 in the 2014/15 season).

Based on the reported sentinel surveillance data, the estimated number of influenza patients who attended medical facilities from week 36 of 2015 to week 20 of 2016 (from September 1, 2015 to May 22, 2016) was 16,130,000. According to hospitalized influenza patient surveillance, which collects data from 500 designated sentinel hospitals with ≥300 beds (initiated in September 2011), the number of hospitalized influenza patients during the same period was 12,275, which was similar to the 2014/15 season (12,459 patients). The number of influenza encephalopathy cases (among acute encephalitis, category V notifiable infectious disease) was 224 as of July 8, 2016, which was almost twice as high as that in the previous season (105 in the 2014/15 season) (see p. 221 of this issue). None of the twenty-one large cities in Japan reported a mortality rate exceeding the upper 95% confidence limit of the expected mortality rate in the absence of influenza (http://www.nih.go.jp/niid/images/idsc/disease/influ/fludoco1516.pdf).

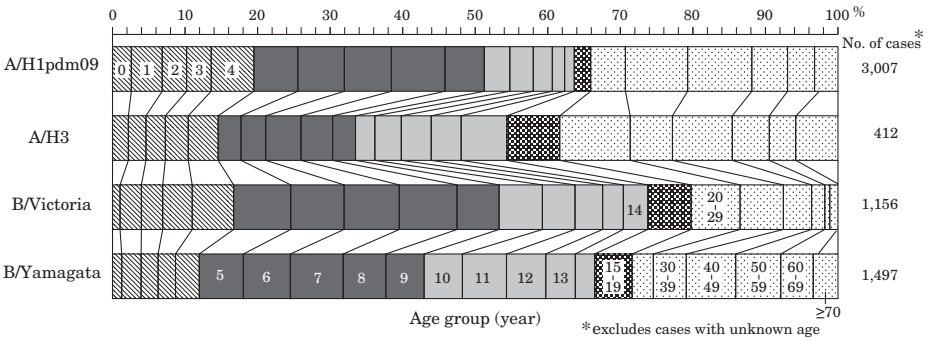
**Isolation/detection of influenza virus**: In the 2015/16 season, prefectural and municipal public health institutes (PHIs) reported a total of 7,567 isolations/detections of influenza viruses (6,141 isolations and 1,426 detections without isolation) (Table 1 in p. 213). Among them, 6,365 were reported from the influenza sentinel sites, and 1,202 from non-sentinel sites (Table 2 in p. 213). A/H1pdm09 occupied 49%, influenza B 44% (Yamagata lineage 56%, Victoria lineage 44%) and A/H3 7% of the total isolations/detections (Table 2 in p. 213). A/H1pdm09 began increasing from week 1 of 2016 and peaked in week 5 of 2016. Influenza B increased from week 2 of 2016. In week 9, the level of influenza B surpassed that of influenza A thereafter (Fig. 1 and Fig. 2 in p. 213). Among the A/H1pdm09 isolations/detections, 32% were from patients 5-9 years of age, 19% from those 0-4 years of age, and 12% from those 10-14 years of age (Fig. 3 in p. 212 and http://www.nih.go.jp/niid/images/iasr/rapid/inf3/2016_19w/innen5e_1516.gif). Among the type B isolations/detections, those 5-9 years of age occupied 31% of the Yamagata lineage and 37% of the Victoria lineage.

(Continued on page 212′)

(THE TOPIC OF THIS MONTH-Continued)

Figure 3. Distribution of influenza cases by age and influenza type in the 2015/16 influenza season, Japan

(Infectious Agents Surveillance Report: as of October 11, 2016)




**Genetic and antigenic characteristics of 2015/16 isolates**: The National Institute of Infectious Diseases (NIID) conducts genetic and antigenic analysis of isolates from Japan and other Asian countries. All the 287 A/H1pdm09 isolates belonged to clade 6B, and almost all 364 isolates examined for antigenicity was A/California/7/2009 (2015/16 season vaccine strain). Majority of the 189 A/H3 isolates belonged to clade 3C.2a. Among the 191 A/H3 isolates, while 50-60% of them had antigenicity resembling A/Switzerland/9715293/2013 (clade 3C.3a) (2015/16 season vaccine strain), more than 70% resembled A/Hong Kong/4801/2014, the representative strain of clade 3C.2a. All 173 isolates of the B/Yamagata lineage belonged to clade 3, and among the 182 isolates examined for antigenicity, 98% or more had antigenicity similar to that of B/Phuket/3073/2013 (2015/16 season vaccine strain). All 148 isolates of the B/Victoria lineage belonged to clade 1A, and more than 99% of the 170 isolates examined for antigenicity were similar to that of B/Texas/2/2013 (2015/16 season vaccine strain) (see p. 214 of this issue).

**Antiviral resistance of 2015/16 isolates**: Among 2,565 Japanese A/H1pdm09 isolates, resistance to both oseltamivir and peramivir was found sporadically in 48 isolates. The 224 A/H3 isolates from Japan and other Asian countries were all sensitive to oseltamivir, peramivir, zanamivir and laninamivir. Influenza B isolates from Japan and abroad were also sensitive to these antivirals (see p. 214 of this issue).

**Immunological status of the Japanese population**: Under the Preventive Vaccination Law, since April 1, 2013, seroprevalence surveys have been conducted to monitor immunity levels acquired through routine vaccinations (see p. 223 of this issue). According to data obtained from 6,584 serum samples collected before the 2015/16 season (i.e. from July to September 2015), seroprevalence (measured as HI antibody positive, titer ≥1:40) for A/California/7/2009 [A(H1N1)pdm09] was highest among 5-20 year olds (68-84%). For A/Switzerland/9715293/2013 [A(H3N2)], it was highest among 5-14 year olds (61-64%), for B/Phuket/3073/2013 (B/Yamagata lineage), it was highest among 20-29 year olds (60%), and for B/Texas/2/2013 (B/Victoria lineage), it was highest among 35-44 year olds (32-33%).

**Influenza vaccine**: In the 2015/16 season, the trivalent vaccine, which had been used till the 2014/15 season, was replaced by a tetravalent vaccine, which contained antigens from two type A and two type B strains. The antigen that was newly added was that of the B/Victoria lineage. Approximately 30,720,000 vial-equivalent doses (estimated on the assumption that 1 vial contained 1 m*l*) were produced in the 2015/16 season, of which an estimated 25,650,000 vials were used. For the 2016/17 season, the A/H1 strain selected was A/California/7/2009 (X-179A) and the A/H3 strain selected was A/Hong Kong/4801/2014 (X-263). The B/Yamagata strain selected was B/Phuket/3073/2013 as in the previous season and for B/Victoria, B/Texas/2/2013 was selected (see p. 225 of this issue).

Concerning the effectiveness of influenza vaccines, results from the multicenter test-negative design case-control study for the 2013/14 to 2014/15 seasons is found in this issue (see p. 230 of this issue).

**Human infection with avian or swine influenza virus**: Human infections of the highly pathogenic avian influenza A(H5N1) virus has been reported since 2003 from 16 countries; 856 cases have been confirmed, including 452 fatal cases (as of October 3, 2016). Sporadic human infections of avian influenza A(H5N6) virus has also been reported. In China, A(H7N9) virus has become endemic in the poultry population, and 803 human cases including 316 fatal cases have been reported (as of October 20, 2016). Human infections with avian influenza A(H9N2) virus has been reported from China and Egypt. As for swine influenzas, sporadic transmission of swine influenza virus from pigs to humans has been reported from agricultural fairs in the United States [e.g. A(H3N2) variant(v), A(H1N1)v, and A(H1N2)v viruses], or as sporadic cases of swine A(H1N1)v virus in China (see p. 220 of this issue).

**Conclusion**: Trends in influenza activity should be monitored continuously by sentinel surveillance, school closure surveillance, hospitalized influenza patient surveillance and other systems. Isolation of influenza virus throughout the year, based on the revised Infectious Diseases Control Law, should be conducted (see p. 227 of this issue). Analysis of the antigenic and genetic properties of circulating strains is crucial for selecting vaccine candidate strains. Antiviral resistance of isolates and influenza seroprevalence levels in the Japanese population should be monitored. The epidemiology of the 2015/16 influenza season is described in detail in the "Annual influenza season report" (http://www.nih.go.jp/niid/images/idsc/disease/influ/fludoco1516.pdf)", and isolation and detection of influenza viruses in the 2016/17 season are described in pp. 231 & 233 of this issue and http://www.nih.go.jp/niid/en/iasr-inf-e.html.

**Note**: For IASR reporting, influenza nomenclature is based on the virus information available. Influenza viruses are classified by type, subtype and strains, based on the hemagglutinin (HA), neuraminidase (NA) and other information:

- When both HA and NA typing have been performed, names are listed fully [e.g. A(H1N1)pdm09, A(H3N2), A(H5N1)].
- When NA typing has not been performed, only HA information is listed (e.g. A/H1pdm09, A/H3).

*The statistics in this report are based on 1) the data concerning patients and laboratory findings obtained by the National Epidemiological Surveillance of Infectious Diseases undertaken in compliance with the Law Concerning the Prevention of Infectious Diseases and Medical Care for Patients of Infections, and 2) other data covering various aspects of infectious diseases. The prefectural and municipal health centers and public health institutes (PHIs), the Department of Food Safety, the Ministry of Health, Labour and Welfare, and quarantine stations, have provided the above data.*

**Infectious Disease Surveillance Center, National Institute of Infectious Diseases**
Toyama 1-23-1, Shinjuku-ku, Tokyo 162-8640, JAPAN Tel (+81-3)5285-1111

（特集つづき）（THE TOPIC OF THIS MONTH-Continued）

表1．インフルエンザウイルス分離・検出報告数，2012/13～2015/16シーズン
Table 1. Isolation/detection of influenza viruses during the 2012/13-2015/16 influenza seasons

| 型 Type | シーズン* Season* 2012/13 | 2013/14 | 2014/15 | 2015/16 |
|---|---|---|---|---|
| A/H1pdm09 | 109 ( 54) | 2,847 ( 649) | 41 ( 22) | 3,027 ( 606) |
| A/H3 | 3,668 ( 1,379) | 1,204 ( 535) | 3,701 ( 1,530) | 412 ( 214) |
| A NT | - ( 15) | - ( 4) | - ( 12) | 1 ( 6) |
| B/Victoria | 357 ( 28) | 627 ( 116) | 57 ( 8) | 1,165 ( 197) |
| B/Yamagata | 806 ( 31) | 1,656 ( 278) | 653 ( 104) | 1,512 ( 228) |
| B NT | 49 ( 195) | 20 ( 272) | 11 ( 39) | 2 ( 132) |
| C | - ( 2) | 21 ( 9) | 2 ( 1) | 22 ( 43) |
| 合計 Total | 4,989 ( 1,704) | 6,375 ( 1,863) | 4,465 ( 1,716) | 6,141 ( 1,426) |

A NT: A亜型未同定, B NT: B系統未同定
A NT: A not subtyped, B NT: B lineage not determined
*各シーズン(当年9月～翌年8月)に採取された検体から各地方衛生研究所で分離されたウイルス報告数, －：報告なし, ( )内はウイルスは分離されていないが, 遺伝子検出または抗原検出による報告数を別掲
（病原微生物検出情報：2016年10月12日現在報告数）
* Sampling season during September through August in the following year.
( ): Nos. in parentheses denote gene or antigen detection without isolation, not included in the total.
[Infectious Agents Surveillance Report: as of October 12, 2016 from prefectural and municipal public health institutes (PHIs)]

表2．インフルエンザウイルス分離・検出報告数，2015/16シーズン
Table 2. Isolation/detection of influenza viruses during the 2015/16 influenza season

| 型 Type | Total (A+B) | (A) | (B) |
|---|---|---|---|
| A/H1pdm09 | 3,633 | 3,030 | 603 |
| A/H3 | 626 | 501 | 125 |
| A NT | 7 | 5 | 2 |
| B/Victoria | 1,362 | 1,120 | 242 |
| B/Yamagata | 1,740 | 1,537 | 203 |
| B NT | 134 | 116 | 18 |
| C | 65 | 56 | 9 |
| 合計 Total | 7,567 | 6,365 | 1,202 |

(A) インフルエンザ定点（小児科+内科）Reports from influenza sentinels (pediatric & internal medicine)
(B)インフルエンザ定点以外（基幹定点+その他）Reports from sites other than influenza sentinels
A NT: A亜型未同定, B NT: B系統未同定
A NT: A not subtyped,
B NT: B lineage not determined
2015年9月～2016年8月に採取された検体より各地方衛生研究所で分離・検出されたウイルス報告数
（病原微生物検出情報：2016年10月12日現在報告数）
Based on samples collected from September 2015-August 2016.
(Infectious Agents Surveillance Report: as of October 12, 2016 from PHIs)

図2．都道府県別インフルエンザウイルス分離報告状況，2015/16シーズン
（病原微生物検出情報：2016年10月11日現在報告数）
Figure 2. Isolation of influenza viruses by prefecture during the 2015/16 influenza season
(Infectious Agents Surveillance Report: As of October 11, 2016 from PHIs)