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The Epidemic and Interventions in Imported Typhoid among Indonesian Labors in 2009

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Abstract

Typhoid fever is a gastrointestinal infectious disease that mostly happens in developing countries. The incidence has substantially decreased in developed countries. There were about 33~34 confirmed typhoid cases per year in Taiwan from 2006 to 2008, among which Indonesian labors accounted for about 8~19 imported typhoid cases each year. From January to May in 2009, 17 imported typhoid cases were confirmed, which was 3 times the number of the same period in 2008. Therefore Taiwan Centers for Disease Control (Taiwan CDC) carried out some preventive measures, such as reinforcing publicity and adding typhoid screening test to Indonesian labors' health examination. The case numbers of imported typhoid among Indonesian labors reached its peak in April and May 2009, and gradually decreased after CDC's intervention measures. In the end, a total of 60 cases were confirmed in 2009. From January to June in 2010, there were only four imported typhoid cases from Indonesian labors, which was fewer than 35 cases in the same period in 2009 and 11 cases in 2008. This article documented the epidemic situation, related measures and prevention efficacy of imported typhoid fever among Indonesian labors in 2009.

Keywords: typhoid fever, imported typhoid, Indonesian labors.

Introduction

Typhoid fever is listed as Category 2 communicable disease in Taiwan [1] and is caused by pathogen *Salmonella enterica* serotype Typhi. The symptoms include: persistent fever, headache, malaise, anorexia, relative bradycardia, splenomegaly, skin rash on the trunk and cough. Constipation or diarrhea, and lymphadenopathy are more commonly seen in adults. Typhoid is transmitted by ingestion of food or water contaminated by feces or urine from ill persons and disease carriers. The incubation period is 1 to 3 weeks in general (about 3 to 60

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days) [2]. Typhoid is a worldwide illness that mostly happens in developing countries. The incidence in developed countries has substantially decreased because of hygiene improvement. Recently, excepting imported typhoid, there were still some sporadic indigenous cases in Taiwan every year. According to the surveillance data compiled by Taiwan CDC, there were 43, 34, 33, and 80 confirmed typhoid cases in each year respectively from 2006 to 2009. Furthermore, 25, 15, 12, and 16 typhoid cases were indigenous. Imported cases from Indonesian labors were 8, 16, 19, and 60; other imported cases accounted for 10, 3, 2, and 4 (as figure 1). From January to May in 2009, there were 17 imported typhoid cases from Indonesian labors, which was 3 times the number of the same period in 2008. Therefore Taiwan CDC adopted numbers of preventive measures immediately. The epidemic development and related intervention measures were documented in this article.

Background

A. The situation of Indonesian labors in Taiwan

According to statistic data from Bureau of Employment and Vocational training, Council of Labor Affairs (CLA), the Executive Yuan, the amount of foreign labors in Taiwan from 2006 to 2010 (till June) was

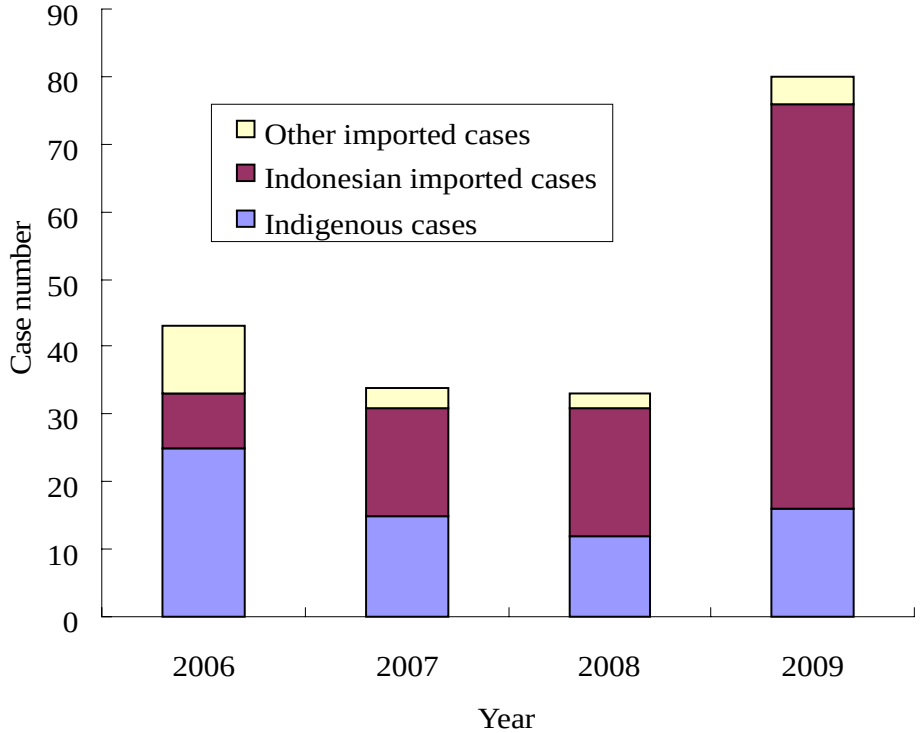

Figure 1. Distribution of numbers of confirmed typhoid cases in Taiwan from 2006 to 2009

between 338,000 and 367,000. Besides, annual amount of Indonesian labors were 85,000, 115,000, 128,000, 139,000, and 149,000 respectively, which were increasing progressively. In 2009, there were approximately 120 thousands Indonesian labors worked as personal care attendants or household workers. As a major foreign workforce in Taiwan, they accounted for 69% of total foreign personal attendants and household workers.

According to the data from Bureau of Employment and Vocational Training, CLA, there were about 61,030 newly-immigrated Indonesian workers in 2009. Numbers of new immigrated Indonesian workers per month were between 3,861 and 6,665, with 5,085 in average.

B. Typhoid epidemic situation and risk factors in Indonesia

The investigation report of WHO in 2000 estimated that 21,650,974 people worldwide were infected with typhoid fever, with 216,510 related deaths, and about 90% of cases occurred in Asia [3]. However, there is still no national surveillance system established for the incidence rate of typhoid fever in Indonesia. Back in 1980s, a study concerning typhoid vaccine efficiency was performed in Sumatra, Indonesia. In the study, blood cultures were taken among people who had persistent fever more than 3 days or with antibiotic treatment. The results of control group revealed the incidence of typhoid fever was 810 per 100,000 person-years [4]. A following research by WHO carried out in five Asian countries during 2001 to 2004, blood cultures were obtained from people with persistent fever over 3 days, revealed the incidence rate of typhoid fever in Jakarta, Indonesia was 82 per 100,000 person-years. The majority of cases were children and teenagers between 5 to 15 years old, with 180 per 100,000 person-years in incidence rate [5]. However, the incidence could be underestimated because the sensitivity of blood culture was not high [6], and meanwhile, people in Indonesia could get antibiotics without doctor's prescription so that some patients might not be diagnosed or the results of blood culture could be affected.

In comparison with healthy people living in communities, risk factors of typhoid infection were: no use of soap for hand-washing, sharing food from the same plate, no toilet in the household, recent typhoid infection in the household, crowded living conditions, drinking cold beverages or consuming ice cubes, flooding, younger age, and female gender [7].

Intervention Measures

There were 17 imported typhoid cases among Indonesian labors from January to May in 2009, which was 3 times the number of the same period in 2008. Thus the CDC implemented some preventive measures as follows:

A. Appeal to Indonesian government for disease control reinforcement: Inform Indonesian government about the increase of Indonesian imported typhoid cases. Also, ask them to intensify typhoid disease control as well as labors' hygiene education, and enhance typhoid symptoms screening on pre-departure health examination.

B. Domestic publicity reinforcement: Publish press releases on typhoid fever; notify the recruitment agencies and foreign worker health examination hospitals about the epidemic of typhoid fever; provide newly-immigrated labors health care cards; broadcast the information via the radio station for foreign workers; remind employers the risk of imported typhoid and dengue fever among foreign labors on the recruitment permit.

C. Send medical officers to Indonesia for field investigation: On August 5th, 3 doctors were sent to Indonesia to investigate and understand local typhoid epidemic situation and hygiene condition in personal care attendant training centers.

D. Source control reinforcement: Since September 1st 2009, if there were 2 new imported typhoid cases detected in 4 weeks that belonged to the same Indonesian agency, Bureau of Consular Affairs, Ministry of Foreign Affairs would temporarily suspend immigrant visa issuance to the company for 2 weeks.

E. Adding typhoid screening test to health examination for Indonesian labors: On September 1st 2009, the Department of Health announced that from October 15th 2009 to October 14th 2010, typhoid screening test (stool culture) would be added to the health examination for Indonesian labors within three days after arrival in Taiwan; from April 15th 2009 to October 14th 2010, health examination for Indonesian labors after six-month working in Taiwan would also include typhoid screening test (stool culture) as well. Later, the above measures were amended after evaluation. For the health examination of Indonesian labors within three days after arrival in Taiwan, stool culture was kept used as typhoid screening test from October 15th 2010 to October 14th 2011, but no more typhoid screening was performed in health examination after six-month working.

F. Feedback to Indonesian related organization with investigation data: Regarding Indonesian imported typhoid cases and those typhoid, shigellosis, and paratyphoid cases detected by health examination (stool culture), these foreign workers' affidavits for wage would be reviewed to obtain their recruitment agencies. Furthermore, Indonesian government would be informed of the involved agencies to improve the disease control.

Efficacy

A. Epidemic resolving

The distribution of case number of imported typhoid fever among Indonesian labors from 2008 to June 2010 was illustrated in figure 2. Imported typhoid cases from Indonesian labors reached a high peak in April and May 2009, with 9~10 cases per month. After disease control measures intervened, case number has decreased to 0~1 case per month since January 2010. Since typhoid screening for Indonesian labors was performed in October 15th 2009, there were 4 cases in total detected by screening till June 2010. In addition, four imported typhoid cases from Indonesian labors were found till June 30th in 2010, which were fewer than 35 cases at the same period in 2009 and 11 cases in 2008.

Besides, incidence of typhoid cases among Indonesian labors who went to hospital with symptoms was calculated before and after implementing typhoid screening, October 15th 2009, respectively. The results revealed the incidence has decreased from 106 per 100,000 to 16 per 100,000, as showed in Table 1.

B. Other detected infectious disease

Since October 15th 2009, typhoid screening test was added to health examination within three days after Indonesian labors arrival, and also added in health examination after six-month working in Taiwan since April 15th 2010. The initial results were showed in table 2. Until June

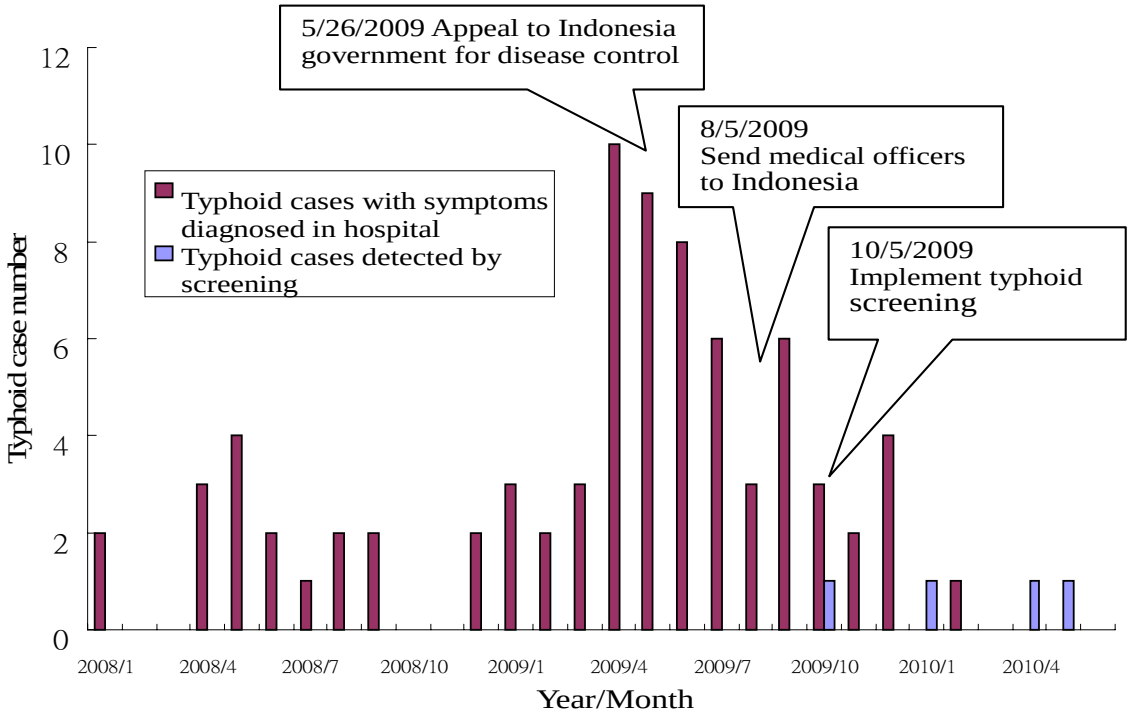

Figure 2. Distribution of case numbers of imported typhoid fever among Indonesian labors from 2008 to June 2010

Table 1. Comparison of case numbers of imported typhoid among Indonesian labors before and after implementing typhoid screening

Typhoid screening	Time period	Numbers of newly-immigrated Indonesian labors	Numbers of typhoid cases going to hospital with symptoms	Incidence (per 100,000)
Before	2009/1/1~2009/10/14	49,251	52	106
After	2009/10/15~2010/6/30	49,869	8	16

Table 2. Initial results of typhoid stool test among Indonesian labors (2009/10/15~2010/6/30)

Health examination schedule	Implementation date	Person-time of typhoid screening test	Cases detected	Positive rate for typhoid fever (per 100,000)	Positive rate for GI disease (per 100,000)
Within three days after arrival	2009/10/15	49,869	3 typhoid cases 10 shigellosis cases 1 paratyphoid case	6	28
After Six-month stay	2010/4/15	11,243	1 typhoid case 1 shigellosis case	9	18
Total		61,112	16	7	26

30th 2010, there were 49,869 person-time of typhoid stool test within three days after arrival, with three typhoid cases, ten shigellosis cases and one paratyphoid case detected; there were 11,243 person-time of typhoid stool test after six-month working in Taiwan, with one typhoid case and one shigellosis case detected. Accordingly, the positive rate was 7 per 100,000 for typhoid fever, and 26 per 100,000 for all three gastrointestinal infectious diseases.

Discussions

Imported typhoid cases among Indonesian labors reached a high peak in April and May 2009, with 9~10 cases each month. As the result, Taiwan CDC took several interventions, including notifying Indonesian government to enhance disease control, hygiene education improvement, enhancing disease alertness of employers and hospitals, strengthening the source control, and feedback to the Indonesian related organizations with epidemic investigation data. On September 1st 2009, the CDC announced that typhoid screening test would be implemented on October 15th 2009. The case numbers of typhoid fever has already slightly decreased before typhoid screening started, which suggests previous intervention measures might have taken effect. Moreover, the announcement of typhoid screening and determination of source control could urge Indonesian authority to make improvement. Typhoid screening test was also proven as an effective measure as the imported typhoid cases among Indonesian labors has significantly decreased to 0~1 per month after starting screening. This article was just a preliminarily report about the epidemic situation and intervention measures on imported typhoid among Indonesian labors. Further studies are warranted for cost-benefit analysis of each intervention.

In April 2009, case numbers of imported typhoid among Indonesian labors suddenly increased in Taiwan. The same situation also happened in Hong Kong. With regard to numerous typhoid infections coming from Indonesia, the press released on July 7th 2009 by Hong Kong government advised that passengers heading to Indonesia should pay more attention to personal hygiene to prevent typhoid infection. Hong Kong reported 27 typhoid cases during April to July 7th 2009. Investigation indicated 21 of them once lived in Indonesia, and 15 of them have stayed in Surabaya before going to Hong Kong. No secondary transmission from these 27 cases was noted [8]. As for Taiwan, investigation results of imported typhoid from Indonesian labors were similar to Hong Kong. Most cases were from Surabaya, Java, but were not confined in Java. One employer was infected typhoid fever from his Indonesian labor, but no local epidemic occurred.

Indonesian personal care attendant would attend training school for about three months in average before their came to Taiwan. Estimated by the incubation period of typhoid fever, it is possible that imported Indonesian typhoid cases were infected in the training school before coming to Taiwan. Based on current statistics data, the incidence of typhoid fever was higher in children and teenagers in Indonesia. Although the age of imported Indonesian labors in Taiwan was older, they could still contract typhoid fever in

the training school because of its dense population and poor hygiene conditions. At present, Indonesian labors accounted for 70% of foreign personal care attendants and household workers in Taiwan, helping take care of elders and children. Hence, promoting Indonesian labors' health is also a protection for the people in our country. For the reason, Taiwan CDC has requested Indonesian government to notify every training school of improving hand-washing facilities, providing soap for hand-washing, intensifying labors' hygiene education, paying attention to food and water hygiene, and cultivating hand-washing habits. Moreover, Taiwan CDC would scrutinize the foreign recruitment agency whose Indonesian labor was diagnosed of typhoid, paratyphoid or shigellosis and request Indonesia government to improve the company and affiliated training school sanitary management.

Conclusions

Typhoid fever is a gastrointestinal infectious disease and can be prevented by improving toilet facilities, hand-washing equipments, food and water hygiene as well as hand-washing habit. In order to handle the sudden increase of imported typhoid from Indonesian labors, Taiwan CDC carried out some intervention measures that included: reinforcing the health education publicity, enhancing the alertness of employers and hospitals, adding typhoid screening test (stool culture) to Indonesian labors' health examination, and informing foreign recruitment agencies, which imported typhoid, paratyphoid and shigellosis cases to Taiwan, of improving sanitary facilities and labors' hygiene education in affiliated training school. With these interventions, there were only four imported typhoid cases from Indonesian labors until June 30th in 2010, which were fewer than 35 cases of the same period in 2009 and 11 cases in 2008. Afterwards, a revised typhoid screening strategy among Indonesian labors was performed from October 15th 2010 to October 14th 2011. In this new strategy, stool culture was kept used as typhoid screening in health examination within three days after Indonesian labors arrival, but no more typhoid screening needed in the health examination after six-month working.

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An Influenza Outbreak in a College in Taoyuan County, 2010

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Abstract

Although World Health Organization (WHO) announced that the world has entered the post-pandemic phase of 2009 pandemic H1N1 in August 2010, the virus continued to circulate and resulted in several outbreaks in Taiwan. One of the outbreak occurred in a class of a college in Taoyuan County, which spread to another class despite some control measures undertaken by the school. Taiwan Centers for Diseases Control (Taiwan CDC) intervened, isolated the patients, educated the school, gave chemoprophylaxis to the class, and vaccinated the students. The outbreak stopped gradually. Specimens taken from the patients were positive for 2009 pandemic H1N1 influenza virus. There was no severe drug-related adverse event found in questionnaires administered to students receiving anti-viral agents. In post-pandemic phase, small-scale influenza outbreaks occurred from time to time, especially in young adults and adults whose vaccine coverage rates were relatively low. In addition to cough etiquette and health education, timely chemoprophylaxis and improvement of vaccine coverage are top priorities in dealing with influenza outbreaks.

Keywords: 2009 pandemic H1N1 influenza, influenza outbreak, chemo-prophylaxis, vaccine

Background

In March 2009, pandemic H1N1 emerged in Mexico and the United States and rapidly spread to the whole world. On August 10, 2010 WHO announced the end of the pandemic phase. In its announcement, WHO emphasized that this new influenza virus would not go away, but would behave like a seasonal influenza virus and continue to circulate for some more years. Localized outbreaks of different magnitudes may continue to occur [1].

According to the influenza surveillance systems of Taiwan CDC, 1.16% of the outpatients at clinics had influenza-like illness in August 2010, and the isolation rate of influenza virus was 21%, mainly seasonal

influenza A/H3N2 and 2009 pandemic H1N1. The overall influenza activity in the community was low to moderate. Although the intensity was not as severe as in pandemic phase, it was still more active than the same time last year. In addition, a total number of 61 influenza outbreaks occurred in some populous institutions between July and September 2010, including nursing homes for elderly people, correction facilities, and schools [2]. Influenza activity should not be neglected even in the summer time.

In August 2010, Second Branch of Taiwan CDC received the reporting of an influenza outbreak in a college in Taoyuan County from the local health bureau. The outbreak did not stop despite some control measures undertook by the school. The outbreak was under control after Second Branch and Field Epidemiological Training Program (FETP) of Taiwan CDC conducted an investigation and participated in subsequent management. In this article, we described the outbreak and the preventive control measures.

Methods

A field investigation was conducted by Second Branch and FETP of Taiwan CDC and the Health Bureau of Taoyuan County. In order to understand the actual practice of the school in facing this outbreak, the chief of infirmary, the director of the office of student affairs, the leaders and students of the involved classes were interviewed. The medical records of students were collected. Self-administered questionnaires were given to students who had taken anti-viral agents (oseltamivir) to collect information on demographics, drug history, and adverse events one month after the outbreak.

Case definition

Case was defined as an ill student of the two classes undergoing orientation who had fever, respiratory illness and any one of the following symptoms, including myalgia, headache, and malaise, in August 2010.

Specimen collection and laboratory examinations

Rapid influenza antigen tests were performed in all case-patients in the infirmary. Nasal swabs and sera from 10 case-patients were collected and sent to the Research and Diagnostic Center of Taiwan CDC for testing. Sera samples were used to detect antibodies against influenza virus and nasal swabs were used to detect virus by real-time reverse transcription- polymerase chain reaction (RT-PCR) assay.

Results

Description of the outbreak

There were more than 2,000 students and 200 faculty members in this college. All students were in summer vacation except the two new classes (Classes A and B) undergoing orientation courses. The number of students in Class A and Class B were 299 and 205 respectively. The orientation courses, most were outdoor activities, started at 6 am and ended at 9 pm. There were no close contacts between Class A and Class B except dining in the same restaurant. Classrooms and dormitories were separated.

Seven students in Class A started to present fever, cough, and influenza-like illness since August 13, 2010. All had positive rapid

influenza antigen tests for influenza A and received oseltamivir for treatment. As shown in Figure, the number of patients increased gradually. The patients initially scattered in different bedrooms. In addition to monitoring the students' health status and body temperature, the school authorities also isolated the symptomatic patients. Oseltamivir was prescribed for treatment and parents were informed. Sick students were asked to go home and closely observed. On August 17, the local health bureau and Second Branch of Taiwan CDC received the reporting of the outbreak. Because the number of patients increased drastically on August 18, an on-site investigation was conducted on next day. An influenza outbreak in Class A was highly suspected and the class was immediately suspended for 5 days. All students in Class A were taken home by their parents and their health status was follow-up by phone every day. For those who developed influenza-like illness, medical consultation was recommended. Intensive education to other students and faculty members was also arranged.

On August 20, influenza rapid antigen tests of 5 students with influenza-like illness in Class B were positive for influenza A. Because the outbreak has spread out to the second class, the director of Communicable Disease Control Medical Network, Taiwan CDC, the local health bureau and the school authorities had a thorough discussion and recommended chemoprophylaxis to all students in Class B with oseltamivir. Class B was not suspended but closely monitored. Among the students and faculties who did not receive H1N1 influenza vaccine, catch-up immunization was given with consent. On the day prophylactic oseltamivir was given, the medical officers of Taiwan CDC and the chief of school infirmary comprehensively explained the indication and safety issues of the drug to Class B. The number of patients in Class B stopped increasing one day after initiation of chemoprophylaxis. On the contrary, students without chemoprophylaxis in Class A kept developing influenza-like illness, one student was hospitalized and notified because of severe complicated influenza infection and pneumonia. There was no new case found after August 25. All patients were followed up until recovery. In summary, there were 53 patients in Class A (attack rate = 18%) and 10 patients in Class B (attack rate = 5%).

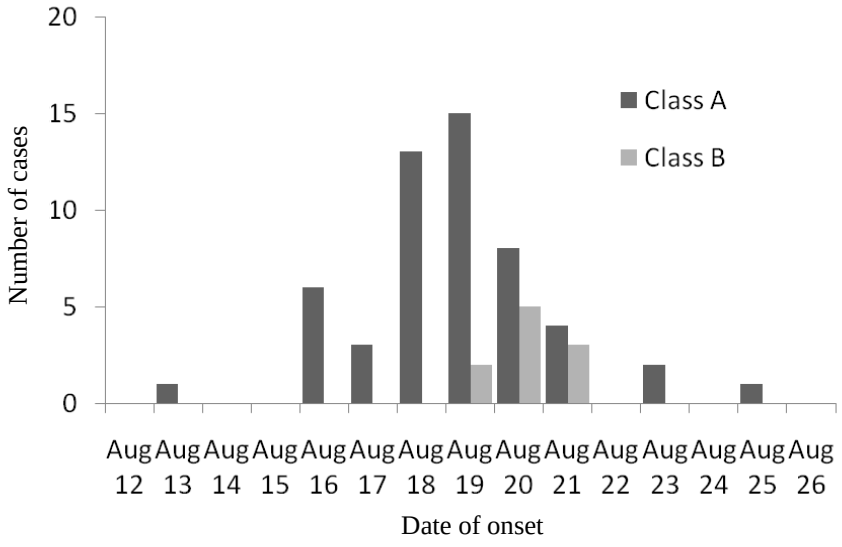

Figure. Daily number of patients with influenza-like illness in Class A and Class B

Laboratory examinations

Specimens were collected from 13 patients and 2009 pandemic influenza virus was detected in 11 nasal swabs using RT-PCR.

Control and preventive measures

Because the summer vacation was about to finish at the end of this outbreak, Taiwan CDC provided free H1N1 influenza vaccines to the returning students and faculties who were willing to be immunized. Routine influenza vaccination annually was recommended considering the intensive orientation courses in this college. The school authority would discuss the feasibility and affordability.

Follow-up questionnaires

Results of the questionnaire administered to students in both Class A and Class B who had taken oseltamivir in this influenza outbreak were listed in Table. The response rate in Class A (43%) was lower than that in Class B (99%) because some students in Class A quitted after the orientation courses. The mean age was higher in Class B while the vaccine coverage rate was higher in Class A. Eight patients in Class A had received H1N1 influenza vaccines in 2009. The proportion of students who had completed the course of oseltamivir was 87% in Class A (treatment for 5 days) and 42% in Class B (prophylaxis for 10 days). Minor discomforts have been found in 5 students; there was no severe adverse event following oseltamivir treatment.

Discussion

In August 2010, WHO announced that the world has entered the post-pandemic phase of 2009 pandemic H1N1, and reminded that the virus would take on the behavior of a seasonal influenza virus and continue to circulate in the communities. According to the viral surveillance system in Taiwan, the influenza epidemic in 2010 was different from that in the past years, which usually started in November at the beginning of winter. The viral isolation positive rate in 2010 did not decrease in the summer and remained at about 20% despite the warm weather, which indicated an unusual low-to-moderate activity. Most of the isolated viruses were seasonal influenza A/H3N2 and 2009 pandemic H1N1. The weekly number of reported patients with severe complicated influenza infection was about 60 persons [3]. Since the coverage rate of 2009 pandemic H1N1 influenza vaccine

Table. Results of the questionnaire administered to students who had taken oseltamivir in this influenza outbreak

	Class A	Class B
Number of respondents	23	203
Mean age (range)	19（18-24）	30（24-41）
Number of students who had received H1N1 vaccines in 2009 (%)	8 （35）	5 （2）
Number of students who had completed the course of oseltamivir (%)	20 （87）	85（42）
Number of students who had adverse events following treatment	1 （chest discomfort）	4 （nausea, vomiting）

*: The response rate was 43% in Class A and 99% in Class B.

is relatively low in young and middle-aged adults, herd immunity might not be sufficient and influenza outbreaks could occur more easily.

In response to the pandemic influenza, Taiwan CDC launched a vaccination campaign targeting populations at higher risks, including health care providers, pregnant women, infants and toddlers, and students. Because students in elementary schools, junior high schools and senior high schools were gathered to receive the 2009 pandemic H1N1 vaccines, the coverage rate was higher than that in college. Several outbreaks in the troops and colleges in 2010 also strongly suggested that the immunity was not sufficient in young adults. Since the students in Class A were younger and most were senior high school students in 2009 that were at high priority on the vaccination list, the vaccine coverage rate in Class A was higher than that in Class B. However, some students who had received H1N1 vaccines in 2009 were still infected again in 2010; the protection provided by the vaccine might not be 100% and could be waned over time. Because rapid transmission could occur once an influenza virus is introduced in a closed community, routine annual vaccination program should be arranged in populous institutions to avoid outbreaks and to decrease the risk of complications.

In response to the outbreak in Class A, the school authorities initially had a daily fever screening program and isolated sick students, and finally suspended the whole class from coming to school. The number of patients kept increasing and the health status of students became more difficult to know after class suspension. The aforementioned control measures were not effective enough to curb outbreaks. Many countries worldwide had taken the similar measures to contain the pandemic influenza in earlier time, including fever screening, isolation, quarantine at borders, school closure. But most of these measures were found to be able to delay rather than stop the virus transmission [4]. In populous institutions and closed communities, such as schools, long-term care facilities, or troops, containment should be part of the routine rather than emergency response.

In terms of chemoprophylaxis in influenza outbreaks, oseltamivir was proved to be effective in stop viral transmission in households [5]. Oseltamivir was effective in decreasing the absenteeism of health care workers and maintaining the normal operation of hospitals in mathematical models [6]. In a systematic review, Jackson, R.J., et al., concluded that oseltamivir was able to prevent influenza outbreaks in some populations [7]. But use of chemoprophylaxis on time was somehow difficult in reality because of some misunderstanding and anxiety. To use anti-viral agents to control an outbreak, it is important to have good communication and education prior to administration. In this article, the school authorities used isolation and class suspension to control the outbreak in Class A but not effective; one student was hospitalized because of complicated pneumonia. In contrary, chemoprophylaxis with anti-viral agents was prescribed to all students and teachers in Class B immediately after the first few sick students were identified. Some of them initially hesitated about taking oseltamivir, but could cooperate after a

comprehensive explanation. The number of patients ceased increasing and the orientation course could be continued. Therefore, chemoprophylaxis could be effective in control influenza outbreaks in boarding schools as in this college.

Safety is always an important issue in using oseltamivir to control influenza outbreaks. Common adverse events of oseltamivir included nausea, vomiting, diarrhea, and other gastrointestinal symptoms. But since several abnormal behaviors and deaths following use of oseltamivir in teenagers have been reported in Japan in 2007, there was growing concern about the drug safety especially when large amount of medication was used [8]. Although the causal relationship could not be proved in the subsequent studies performed by the Food and Drug Administration of the United States, physicians were recommended to be cautious about the neuropsychological adverse effects in teenagers [9]. In an influenza outbreak in a school of the United Kingdom, 7-20% of students who took oseltamivir for prophylaxis developed gastrointestinal symptoms. Few students had affective lability and blurred vision, but all recovered soon after the drug was discontinued [10]. We did not found any similar adverse events in the outbreaks described in this article, but close monitoring of side effects is still necessary when large amount of drug would be used for chemoprophylaxis.

In post-pandemic phase, small-scale influenza outbreaks occurred from time to time. In addition to cough etiquette and personal hygiene, surveillance system in a populous institute is also of great importance. Once a suspected outbreak occurs, timely chemoprophylaxis and routine annual vaccination program are the most effective control measures in addition to isolation the sick person and immediate medical consultation.

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