



Initial Evaluation on Screening of Novel Influenza A (H1N1) at International Ports in Taiwan

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Abstract

In response to the outbreaks of novel influenza A(H1N1) in Mexico, USA, and Canada since late April, 2009, Taiwan scaled up a series of international quarantine measures on April 26 to effectively reduce and slow down the importation of novel influenza A(H1N1) cases and to mitigate its impact on domestic disease control. However, these quarantine measures were promptly adjusted in response to the evolution of the global epidemic so that limited resources could be used efficiently. The adjustment methods are in fact in line with the recommendations later made by WHO and domestic experts.

The statistics show that, during the study period, the efficiency in finding cases from contacts with the same travel history or residential history as index cases is higher than that from contacts on board the same aircrafts as the index cases. The percentages of cases identified by quarantine screening, diagnosis of community physicians, and contact

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follow-up are 35.6%, 27.1%, and 37.3% of all imported cases, respectively. Cases identified among passengers screened out by quarantine measures and transferred to hospitals by quarantine officers account for 20.3% (12 cases) of all imported cases. Cases identified through quarantine-related activities (including cases screened out and transferred, cases screened out but advised to seek medical service on their own, and cases identified from contact follow-up) account for 54.2% (32 cases) of all imported cases. The imported cases were mainly identified among passengers coming from Thailand (47.5%) and USA (40.7%).

Keywords: novel influenza A(H1N1), quarantine, fever screening, imported cases

Introduction

On April 12, 2009, Mexico reported to the World Health Organization (WHO) an outbreak of severe respiratory illness in a small community and, during April 15-17, several clusters of severe pneumonia cases were identified. During April 22-24, two children were also identified with novel influenza A(H1N1) infection in the United States. Since more than one thousand cases and several dozens of fatal cases were identified during a short period, the Mexican government has taken some emergency actions, such as closure of theaters and schools, to prevent the outbreak from further spread [1,2]. When news of the outbreaks was publicized, countries around the globe paid immediate attention to them and became alerted, trying to rapidly obtain detail information through every possible channel and taking various actions to enhance disease surveillance, quarantine, and disease control.

In the early stage of the outbreaks, almost all cases occurred in



countries in the Americas such as Mexico, United States, and Canada, and characteristics of the disease, such as infection rate, virulence, and fatality rate, were not clear. Therefore, other countries and territories were taking various quarantine procedures based on their own evaluations, such as distributing health education sheets, asking passengers to fill out health declaration forms, implementing fever screening or on-board quarantine, and even suspending international flights from affected areas, to prevent the importation of the disease.

On April 25, 2009, Taiwan Centers for Disease Control (Taiwan CDC) released information on swine influenza outbreaks in Mexico and Southwest USA, advising travelers to these areas to be on alert and to take self-protection measures. Later, when the level of travel alert for Mexico and USA was elevated, Taiwan CDC scaled up a series of disease control measures, such as implementing on-board quarantine for flights arriving from affected areas, laboratory screening of close contacts of confirmed imported cases on board, and restricting international travel of these contacts. As the epidemic of novel influenza A(H1N1) became stable, the mission in the interim stage of fighting the disease has completed. We, therefore, review all quarantine procedures taken so far and analyze their efficiency on preventing the importation of novel influenza A(H1N1) cases to provide a reference for establishing quarantine policy on fighting novel influenza A(H1N1) in case it comes back in coming fall and winter.

Background Information

1. Quarantine procedures before novel influenza A(H1N1) epidemic

Since the SARS epidemic devastated several countries in 2003,

Taiwan CDC has set up quarantine stations at international ports to conduct health screening and disease control for incoming passengers [3,4].

Some measures in detail are as follows:

- (1) Infrared thermal camera systems have been installed at entry points to perform fever screening; ill passengers are required to actively report sickness, and captains of airplanes and ships are required to actively report ill passengers on board; the symptoms, travel history, and contact history of any suspects screened out or reported based on the Communicable Disease Survey Form are investigated; suspects are given the necessary treatment, and specimens are taken or even transferred to the hospital for further treatment when necessary;
- (2) Information of these suspects is delivered to the local health bureaus through the Internet Information System for subsequent follow-up; specimens are taken or further control activities are implemented when necessary.

2. Quarantine procedures after novel influenza A(H1N1) epidemic

At the early stage of the novel influenza A(H1N1) epidemic, because of limited understanding of the disease, a large amount of resources was invested in the quarantine and control procedures to prevent the importation of the disease. For example, when WHO published H1N1 case definition on April 26, 2009, Taiwan CDC soon promulgated that H1N1 was added to the list of Category 1 communicable disease according to the Communicable Disease Control Act; when WHO raised the global pandemic alert level to Phase 4 on April 28, Taiwan CDC soon established the Central H1N1 Novel Influenza Epidemic Command Center based on



the prescription of the Communicable Disease Control Act to coordinate and direct the implementation of policies regarding quarantine and epidemic response.

According to the Communicable Disease Control Act, once the Central H1N1 Novel Influenza Epidemic Command Center has been established, airplane companies, travel agencies, and units working at international ports such as Customs, Immigrations, Quarantine, and Security (CIQS), shall follow the policy and instructions formulated by the Command Center and implement relevant quarantine and disease control measures. However, as the characteristics and risk of the novel disease become clearer, the Command Center also gradually modifies relevant policies on quarantine and epidemic response. As Figure 1 shows, major quarantine policies and time points of enforcement are described as follows:

(1) Before departing for Taiwan

Airline companies are required to follow relevant guidelines [5-7] and to persuade passengers with suspicious respiratory symptoms not to board unless they have obtained the certificate of being fit to do so.

(2) During the period of Flight

a. Airline companies shall provide passengers with respiratory symptoms with surgical masks and place them in seats far separated from others. Before arriving, captains shall inform the authorities at international ports for their preparedness of prompt response.

b. Airplanes shall be equipped with sufficient health protection

materials, such as masks and gloves.

- c. Airplanes are required to assist in broadcasting voice recording and distributing education sheets on novel influenza A(H1N1) prevention advice.

(3) After arriving

- a. On-board quarantine: Quarantine officers must implement on-board quarantine procedure to flights from epidemic affected areas, such as Mexico, USA, and Canada, before passengers can leave their seats. However, this procedure was soon adjusted for only airplanes reported with ill passengers on board.
- b. Passengers with suspicious novel influenza A(H1N1) symptoms will immediately be transferred to contract hospitals by quarantine officers for isolation treatment and specimen sampling. Only when negative results are presented, they can be discharged from isolation rooms.
- c. Leaders of the tour groups shall actively report to quarantine officers tour members ill with fever and cough symptoms onset before (or at) arrival and provide information on member list and tour schedule.
- d. Airline companies shall provide a whole name list of passengers once a novel influenza A(H1N1) case was confirmed in the passengers of the same flight. Then the National Immigration Agency of the Ministry of the Interior will retrieve detail individual information for each of the passengers for contact follow-up.

(4) Others



- a. The Meetings on Port Health and Security are held at each international port to coordinate CIQS units to assist the implementation of various quarantine procedures formulated according to the evolving epidemic.
- b. Branches of Taiwan CDC have strengthened the implementation of health education to ship companies or ship's agents and ask them to inform ship captains about their obligation to notify Taiwan CDC of the health conditions of crew members according to the regulations governing quarantine at ports.
- c. Taiwan CDC has coordinated with the Coastal Patrol Directorate General to report to local health authorities when fever or other suspect symptoms of infectious disease are detected among smugglers or crew members of domestic fishing ships according to the requirements of the Procedures of Notification and Management of Ill Crew Members in Returning Fishing Ships.

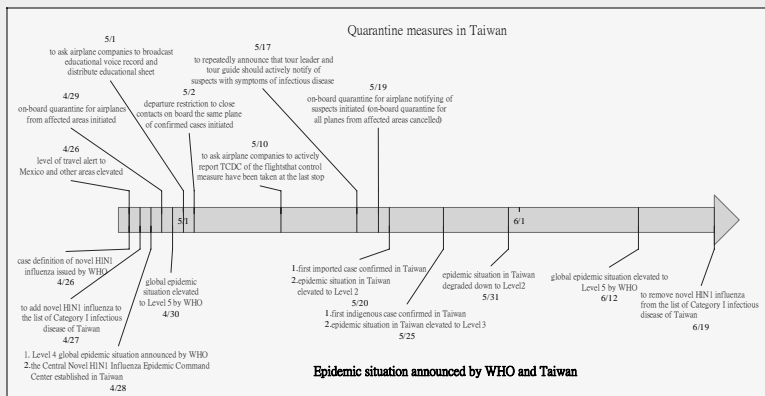


Figure 1. Development of quarantine measures on novel influenza A(H1N1) epidemic in Taiwan

3. Epidemic scale for novel influenza A(H1N1) in Taiwan

A six-level epidemic scale was developed in Taiwan in reference to the WHO classification system and in consideration of the domestic disease control capacity. This six-level classification scheme was officially promulgated on May 3, 2009, and each level is marked by a different color, with level 1 marked by green color, levels 2 to 4 marked by yellow color, level 5 marked by orange color, and level 6 marked by red color. A detail description for each level is shown in Table 1.

Table 1. Epidemic scale for novel influenza A(H1N1) in Taiwan

Levels	Descriptions
6	Nationwide epidemic and out of control
5	Nationwide epidemic but under control
4	Community epidemic but under control
3	Occurrence of secondary infection caused by imported case
2	Occurrence of confirmed imported cases
1	No confirmed cases

Data Sources and Statistical Analysis

- 1. Data periods:** April 27 to June 19, 2009, a total of 54 days
- 2. Data sources:** Data of confirmed novel influenza A(H1N1) cases were collected from epidemiologic investigation conducted by local health bureaus and Taiwan CDC. Data on the number of incoming passengers and the number of ill passengers were downloaded from both the Information System of Home Quarantine and Voluntary Quarantine Management System by Incoming Passengers and the BO System for Epidemiologic Investigation, maintained by TCDC.
- 3. Data analysis:** The Microsoft Excel 2000 Software was used for data input, data correction, and mapping.



Results

1. Statistics on international quarantine

From April 27 through June 19, a total of 1,732,455 international passengers received quarantine examination, of which 2,685 were detected to have suspicious symptoms, including 1,303 fever cases. Among these fever cases, 184 were sent to hospitals for further diagnosis and treatment after they were evaluated in terms of travel history and symptoms by quarantine physicians or quarantine officers, and, finally, 12 of them were laboratory-confirmed with novel influenza A(H1N1) virus infection. Table 2 shows the statistics of international quarantine on a daily basis from April 27 through June 19.

During the period, an average of 32,082.5 passengers per day entered through international ports; an average of 49.7 passengers were found to have suspicious symptoms with fever detected in 24.1 of them; and 3.4 suspect cases were transferred to hospitals per day. The average rate of passengers with fever symptoms per thousand passengers per day was 0.75.

2. A novel influenza A(H1N1) case from Canada identified through on-board quarantine

As part of the policy for novel influenza A(H1N1) epidemic, on-board quarantine for all airplanes from affected areas, such as Mexico, USA, and Canada, came into force on April 29, 2009 at zero o'clock. However, this policy was adjusted on May 19, 2009 at eight o'clock, and from then on, on-board quarantine was conducted for airplanes from affected areas only when they have reported sick passengers on board before arrival [7].

Table 2. Statistics of international quarantine on a daily basis from April 27 through June 19, Taiwan

Month	Date	No. of Airplanes with Quarantine Conducted On-board ¹	Inbound Passengers			No. of Confirmed H1N1 Cases among Referral Cases	
			No. Passengers	No. of Passengers with Suspicious Symptoms	No. of Passengers with Fever ² Symptoms		
April	27	-	36,623	57	46	0	
	28	-	37,594	44	28	0	
	29	11	40,497	67	41	0	
	30	10	40,967	77	44	0	
	1	13	44,226	79	42	0	
	2	7	37,918	75	31	0	
	3	14	41,705	85	45	3	
	4	11	56,875	70	28	2	
	5	11	27,359	45	28	1	
	6	11	29,019	45	22	2	
	7	10	26,021	29	13	3	
	8	13	32,509	41	22	1	
	9	7	29,523	45	20	0	
	10	14	31,400	54	25	0	
May	11	12	26,511	40	19	0	
	12	12	26,992	38	26	2	
	13	12	27,983	41	24	2	
	14	12	28,093	42	17	2	
	15	14	36,164	42	23	6	
	16	8	32,433	40	14	2	
	17	13	36,931	55	29	7	
	18	12	32,122	43	20	6	
	19	13	29,056	52	23	1	
	20	1	32,870	37	16	7	
	21	1	32,877	39	14	3	
	22	2	38,057	59	32	8	
	23	1	33,815	47	23	9	
	24	3	35,211	47	17	4	
	25	2	29,408	87	20	7	
	26	1	28,182	61	22	7	
	27	1	34,658	67	27	6	
	28	1	29,992	46	24	3	
	29	4	29,664	42	18	2	
	30	4	34,715	60	28	2	
	31	3	48,802	86	42	6	
	June	1	3	39,883	98	36	8
		2	2	29,756	59	24	4
		3	5	27,027	43	25	3
		4	1	24,354	43	23	3
		5	0	28,185	30	13	5
		6	0	26,521	36	22	6
		7	1	29,021	51	32	8
		8	0	25,104	34	12	6
		9	1	22,006	39	20	10
		10	0	26,132	30	10	3
11		1	24,876	31	19	5	
12		1	31,652	39	22	2	
13		2	27,206	32	18	4	
14		1	33,153	37	24	5	
15		1	27,393	49	22	2	
16		0	23,663	42	18	1	
17		0	29,446	44	20	3	
18		0	26,810	26	7	2	
19		0	33,495	38	23	0	
Total		282	1,732,455	2,685	1,303	184	12

Note: 1. On-board quarantine for all airplanes from H1N1 affected areas came into force on April 29, 2009 at zero o'clock, but it was adjusted to being applicable to only airplanes reporting ill passengers on May 19, 2009 at eight o'clock.

2. Symptoms are defined as fever, vomiting, diarrhea, skin rash, and jaundice.

3. Fever means ear temperature of 38°C or higher.



A total of 282 airplanes received on-board quarantine during the 52-day period from April 29 through June 19, 2009, including 236 airplanes from affected areas during the 20-day period from April 29 through May 19, 2009, with no novel influenza A(H1N1) case identified, and 46 airplanes reported with ill passengers during the 32-day period from May 19 through June 19. The first novel influenza A(H1N1) case was identified from passengers arriving from Canada on May 31, 2009.

3. No other cases identified from close contacts onboard the same airplane as the index case

The first novel influenza A(H1N1) case in Hong Kong was identified on May 2, 2009. Investigation found that 27 passengers in the same plane as the index case entered Taiwan on April 30. The Taiwan government, therefore, initiated a series of follow-ups and control measures for these contacts, including specimen sampling, giving prophylaxis, and departure restriction before exclusion of infection, based on the Communicable Disease Control Act.

Since the first round of contact follow-up was conducted on the 27 passengers on May 2, 993 contacts in the same plane of a confirmed novel influenza A(H1N1) case had been tracked. Among these contacts, restrictions were placed on 218 people for leaving for other countries and on 6 people for entering Taiwan. No other novel influenza A(H1N1) cases were identified from the follow-up of these close contacts in the same planes of confirmed cases. However, some novel influenza A(H1N1) cases identified from the follow-up were either having the same travel history or having the same residential history as the confirmed cases.

4. Novel influenza A(H1N1) cases mainly imported from Thailand and USA

From the establishment of the Central Novel Influenza A(H1N1) Epidemic Command Center on April 28, 2009 to the removal of novel influenza A(H1N1) from the list of Category I communicable diseases on June 19, 2009, 61 novel influenza A(H1N1) cases were confirmed nationwide, including 59 imported cases.

The first novel influenza A(H1N1) case in Taiwan was imported from USA on May 18, 2009, and several imported cases were identified subsequently, mainly infected in USA, too. After June 7, however, the trend changed, and cases of novel influenza A(H1N1) were detected in several tour groups of college students returning from Thailand and several other cases were also identified among other tour members through follow-up, epidemiological investigation, and specimen sampling. These events have led to a sharp increase in the number of cases in Taiwan after June 7. The date of entry and the speculated infection source of imported cases in Taiwan are shown in Figure 2.

The major infection sources of imported novel influenza A(H1N1) cases in Taiwan are Thailand and USA, accounting for 47.5% (28 cases) and 40.7% (24 cases), respectively. Although cases imported from Thailand did not occur until June 7, 2009, (Figure 2) sixteen cases of novel influenza A(H1N1) in three tour groups of college students returning from Thailand were identified during the short three-day period from June 7 to 9, 2009, accounting for 57.1% (16/28) of all Thailand-imported cases.

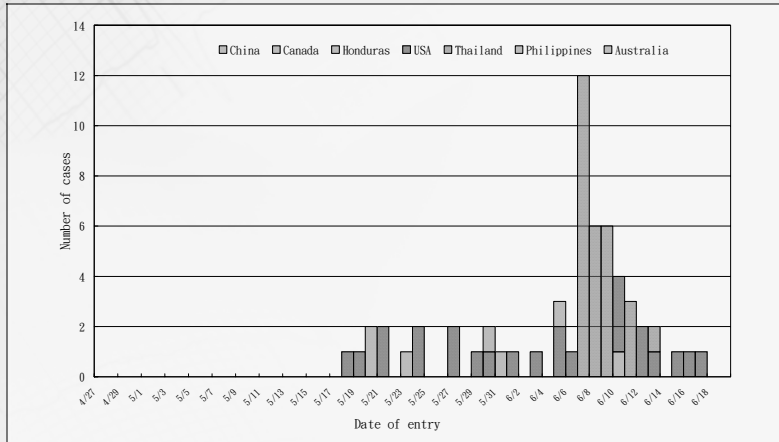


Figure 2. Number of imported novel influenza A(H1N1) cases in Taiwan by the date of entry and the speculated infection source

5. 54.2% of all imported novel influenza A(H1N1) cases were identified through quarantine procedure and subsequent follow-up

Among 59 imported cases of novel influenza A(H1N1), 21 cases (35.6%) were identified by quarantine screening and 22 cases (37.3%) were notified by community physicians, whereas another 11 cases (18.6%) and 5 cases (8.5%) were identified through the follow-up and epidemiological investigation of the contacts of the screened and notified cases, respectively. A total of 32 cases, accounting for 54.2% of all imported cases, were identified through quarantine procedures, including fever screening and contacts follow-up, as shown in Table 3.

Among the 21 imported cases identified by quarantine screening, 12 cases (20.3%) were directly transferred to hospital by quarantine officers or quarantine physicians based on the evaluation of patients' travel history

and symptoms, whereas 9 cases were reported by community physicians when they sought medical service in their community. These 9 cases were not directly transferred to hospitals from international airports because of travel history or atypical symptoms, but they were advised by quarantine officers to seek medical treatment immediately after returning home.

A total of two indigenous cases of novel influenza A(H1N1) were identified during the study period, and both cases were detected through the follow-up of contacts of reported cases.

Table 3. Number of imported and indigenous cases of novel influenza A(H1N1) identified through different routes

Data period: April 27–June 19

Routes of Case Identification	Imported		Indigenous		Total
	No. of cases	Percentage	No. of cases	Percentage	
Quarantine Fever Screening	21(12*)	35.6(20.3*)%	0	0%	21
Follow-up of Contacts of Cases Identified by Quarantine Fever Screening	11	18.6%	0	0%	11
Physician Notification	22	37.3%	0	0%	22
Follow-up of Contacts of Cases Notified by Physicians	5	8.5%	2	100%	7
Total	59	100%	2	100%	61

* : Twelve cases were directly transferred to designated hospitals for specimen sampling and isolation treatment when they were detected by quarantine fever screening.

Discussions

At the early stage of the novel influenza A(H1N1) epidemic, countries around the globe commonly did not have sufficient knowledge about the infection rate and fatality rate of the disease. Taiwan, therefore, initiated a series of intensified control measures within a short period of time after April 26 in addition to the routine international quarantine



procedures (as shown in Figure 1). However, these intensified measures were modified in parallel to the change and evolution of the international epidemic situation. For example, the policy of on-board quarantine, which was specifically designed for all airplanes arriving from affected areas and came into force on April 29, was modified to apply to only airplanes reporting ill passengers onboard on May 19. The reason for this modification is that the original policy exhausted a large amount of manpower and resources in countries following this policy, such as Japan, China, and Hong Kong, and that this policy could not efficiently prevent the cases from being imported, [8] a situation made worse by the increasing number of affected countries or areas as the epidemic spread internationally. Only one case reported by airplanes was confirmed to be novel influenza A(H1N1) through on-board quarantine after May 19. Another example of policy modification is the strategy of follow-up, specimen sampling, and prophylaxis for close contacts on the same flights where cases occurred was canceled, and contacts were instead advised to take self-protection measures and seek medical treatment and inform physicians of their travel history in case that flu-like symptoms, such as fever and cough, appeared after entry. The reason for this modification is that the risk of infection for close contacts in the same plane as confirmed cases is low, as compared with that for close contacts with the same travel history or residential history of the confirmed cases, and that WHO has announced that novel influenza A(H1N1) is more likely to be a mild epidemic [9]. These examples suggest that, for diseases caused by novel virus, the international quarantine procedures should be adjusted or modified in response to the evolving knowledge about the virus and the development of the epidemic

situation. This concept also fits with policy direction suggested by WHO and domestic experts.

Although getting an infection of novel influenza A(H1N1) among passengers on board the same plane of confirmed cases has been documented in several literatures, [10,11] in Taiwan, no cases have been identified among passengers merely taking the same plane but without similar travel history or residential history as confirmed cases. This suggests that the risk of getting infection of novel influenza A(H1N1) within a plane is limited. It is probably because most modern aircrafts have been equipped with high efficiency particulate air filter (HEPA) that can efficiently prevent virus from spreading [12].

During the period of this study, 12 novel influenza A(H1N1) cases were confirmed from 184 passengers transferred to hospitals based on the evaluation of symptoms and travel history by quarantine officers or quarantine physicians among 2,685 ill passengers screened out by international quarantine (Table 2) while entering Taiwan through Taoyang International Airport. This is probably because the Airport has the largest number of passengers, different flight routes, and resident disease control physicians, as compared with other international airports. Among more than two thousand ill passengers, only 184 passengers were transferred to hospitals by quarantine officers or quarantine physicians so the quarantine efficiency is remarkable in terms of the fact that travel schedules of more than two thousand passengers were not affected by the quarantine procedures.

Nine cases of novel influenza A(H1N1) were detected to be sick by infrared fever cameras at international entry points, but they were not



transferred for hospital treatment (Table 3) probably because either they appeared atypical or subclinical symptoms or their travel destinations were not among novel influenza A(H1N1) affected areas at that time. For example, Thailand was still not an affected area on June 7 when a tour group of infected college students returned from Thailand, and as a result, tour members detected with fever symptoms at entry points were not considered as suspects of novel influenza A(H1N1) and not transferred to the hospital. Instead, their blood specimens were collected for dengue fever tests given that Thailand has been a dengue endemic area for a long time. At the same time, they were also provided with surgical masks and health education and advised to seek medical treatment after returning to the community. Finally, they were notified of suspect of novel influenza A(H1N1) by community physicians and confirmed to be cases of novel influenza A(H1N1). A follow-up and epidemiological investigation conducted by the health authorities for other tour members confirmed another six cases of novel influenza A(H1N1).

During the period of this study, most confirmed cases were imported from Thailand (47.5%) and USA (40.7%), but the nature of the cases differs between these two groups. Cases from USA are mainly students studying in USA and returning for summer vacation, and they are evenly distributed over the period. In contrast, cases from Thailand are mainly students traveling for sightseeing, and most cases occurred within the three days from June 7 to 9. (Figure 2) Sixteen of twenty-four cases imported from Thailand are students in three tour groups. This finding suggests that students have different purposes traveling to Thailand and USA, and consequently, cases from Thailand are more likely to appear as a

space-time clustering phenomenon. Moreover, because Thailand was still not one of the designated novel influenza A(H1N1) affected areas at that time, passengers traveling to Thailand were not the focus for health education, resulting in passengers not taking the necessary health protection measures. However, after the news of cluster infections among Thailand tour groups were publicized by the media, no cluster infection occurred among tour groups from Southeast Asia during the period.

Previous research [13] shows that the more frequent the traffic with Mexico is, the more novel influenza A(H1N1) cases a country has. Therefore, USA and Canada that constitute the destinations for 80% of Mexican travelers has become the major novel influenza A(H1N1) epidemic areas except Mexico. However, although the traffic between countries in Southeast Asia and Mexico are less frequent and Thailand was not considered an affected area by the international community in early June, several cluster infections of novel influenza A(H1N1) occurred among tour groups from Taiwan. We speculated that the novel influenza A(H1N1) virus may have been imported by travelers from North America for summer vacation in Southeast Asian countries, and given that the disease surveillance systems in Southeast Asia are not well established, the real epidemic situations in Southeast Asia were not fully known to the international community.

Although 21 passengers have been screened out by infrared fever cameras at entry points and confirmed to be novel influenza A(H1N1) cases, only 12 of them were transferred to hospitals for treatment. Passengers who were not transferred were given health education, provided with surgical masks, and advised to seek medical treatment as



soon as possible after returning to the community. (Table 3) The statistical analysis of the average time intervals between the date of entry and the date of notification shows that it was 1.3 days (median: 1 day, mode: 1 day) for the nine cases screened out at international entry points but doubled to 2.6 days (median: 3 days, mode: 4 days) for the 22 cases notified by community physicians. Therefore, the international quarantine procedures are efficient in terms of reducing the average elapsed days, as screening at international entry points helps cut the average elapsed days for physician notification cases by half.

Conclusions and Recommendations

In response to the novel influenza A(H1N1) epidemic, the Taiwan government has invested a large amount of human and material resources to intensify international quarantine procedures, even extending its quarantine activities to the territories of foreign countries, right before passengers board an inbound airplane. However, only 54.2% of imported cases of novel influenza A(H1N1) were identified through quarantine screening because of limitations such as the incubation period or atypical symptoms. Therefore, except intensifying first-line international quarantine procedures at the early stages of international epidemics, surveillance systems in medical institutions and schools should also be more vigilant in case finding in order to construct a well structured network in disease control and to effectively decrease the impact of imported cases on the health of all citizens.

Although quarantine procedures cannot completely prevent a disease from international spread because of factors like incubation periods and

atypical symptoms, when a global epidemic of emerging disease occurs, quarantine measures such as fever screening or on-board quarantine can effectively delay the occurrence of a large-scale community outbreak resulting from imported cases, thus allowing governments and experts to utilize the time to seek the most effective control measures through the activities of global epidemic surveillance, epidemiological analysis, and pathogenesis study of the virus. However, when community outbreaks have occurred in a country or area, quarantine measures should be evaluated, and based on both the domestic and global epidemic situations, a decision should be made as to whether they should be continued or should be replaced by measures targeting outgoing passengers to reduce the possibilities of exporting cases. Taking the global epidemic of novel influenza A(H1N1) as an example, no severe community infection has occurred in Taiwan during the period of April 25 through June 19 because of the implementation of intensified quarantine procedures. Therefore, we have more time to understand the characteristics of the virus and gradually adjust our control strategy from containment of the disease to reduction of the occurrence of severe cases. Another example is the SARS (Severe Acute Respiratory Symptoms) epidemic in 2003. As the SARS epidemic developed, it became known that SARS patients are infectious only when they have experienced the onset of fever, and consequently, countries were able to take more correct and effective control measures.

Although Taiwan CDC has actively collected and analyzed information on the global epidemic situations at the beginning of the novel influenza A(H1N1) epidemic, such information did not show that countries in Southeast Asia were affected areas until early June. This has led to



cluster infections among members in several tour groups traveling to Thailand within a short period of time, and Thailand became the major source of imported novel influenza A(H1N1) cases for Taiwan. This development suggests that, except intensifying quarantine measures to screen passengers from epidemic-affected areas, passengers from countries or areas that are popular travel destinations for people from severely affected areas should also be the focus of quarantine and monitoring so that a similar situation with disease importation from Thailand will not happen again.

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