

## Original Article

### Monographs of Tuberculosis

#### Message from the Editor-in-Chief

Tuberculosis (TB) has long been one of Taiwan's most important notifiable communicable diseases, and also an important indicator disease which is the government's great endeavors. In recent years, while TB has been actively controlled, the laboratory test techniques and the ability of epidemic investigation are enhanced, prompting the early detection of emerged cluster events. Sensational media coverage sometimes exacerbating and causing public panic, therefore the editors of Epidemiology Bulletin invited related professionals writing about TB outbreaks analysis and media communication cases studies upon campus TB clusters in Taiwan, and will publish the Tuberculosis monographs in September this year to share the information with readers. In addition, as control for multiple drug resistant tuberculosis (MDR-TB) and laboratory test quality are also important issues on disease control, the monographs will also include the articles of "Evolution of MDR-TB Control Strategy in Taiwan" and "Quality Management of Mycobacteriology Laboratory in Taiwan: Current Status and Future Perspectives" for relevant workers and the interested readers for reference, whereby readers can understand clearly and are able to enhance their knowledge as well.

### The Analysis of Tuberculosis Outbreaks in Taiwan, 2007 - 2011

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#### Abstract

In response to Tuberculosis (TB) outbreaks, lots of manpower and resources of public health are often needed in tracing contacts to interrupt transmission and reduce incident cases. This study offers the investigation notes of TB outbreaks for health authorities' staff as the reference of TB outbreak control for the front-line staff.

#### Background

Tuberculosis (TB) is a disease spread through the air. An untreated infectious patient can transmit average 10 to 15 people each year. Infected with *Mycobacterium tuberculosis* does not

necessarily develop the disease. The lifetime risk of active TB is about 5-10%. The incidence is highest in the first two years after exposure. Asymptomatic infection is regarded as latent TB infections. When the hosts have immunodeficiency, *M. tuberculosis* may reactivate and cause clinical symptoms [1]. Due to long and variant incubation periods, cases infected at the same time not necessarily synchronize onset; while cases with simultaneous onset were not necessarily from the same source of infection. Thus, TB is different from other acute infectious diseases with difficulty in investigation of outbreaks.

### **The factors and investigation purposes of TB outbreaks**

The main determining factors of TB transmission are: (a) contagion of the index cases; (b) environmental factors; and (c) the susceptibility of the contacts. The index cases with acid-fast smear positive or pulmonary cavities have more bacterial load of *M. tuberculosis* in sputum. Such circumstances often mean that patients might delay seeking medical diagnosis and treatment, making longer infectious period, even up to six months or a year. When patients have symptoms of coughing and singing which cause a large amount of infectious droplets, they have more probability to make TB transmission. Contacts coexist with the infectious index cases in the same air-conditioned space have to be assessed in outbreak investigations of environmental factors, if exposed to crowding and poor ventilation environment without diluting the concentration of indoor infectious droplet nuclei by gas exchange with outdoor air. Immunodeficiency contacts, i.e. HIV-infected persons and immunosuppressive agent users, are high-risk populations to develop TB disease when infected by *M. tuberculosis*. The purpose of outbreak investigation is to identify the high-risk environments for TB spread. Therefore we need to enhance surveillance, increase education of TB, raise awareness, and strengthen infection control in order to reduce the spread of TB caused by the delay in diagnosis. It is also needed to detect potential and undiagnosed cases with active TB in the investigation of outbreaks, and offer TB screening for high risk contacts and diagnosis and treatment for cases of latent infections. There are opportunities to review policies and prevention measures in every investigation of outbreaks.

### **The epidemiological data of TB outbreaks in Taiwan**

After the government promoted the plan of “halving TB incidence in decade” since 2006, the Taiwan Centers for Disease Control (Taiwan CDC) also adopted the surveillance of outbreaks in “Manual of Tuberculosis Prevention and control”. A suspected outbreak (met the epidemiological link of people, time, and places conditions) is defined as: (a) people – It includes two or more confirmed TB cases, and the index case is sputum smear positive or sputum culture positive; (b) time – Case reporting interval is within one year (365 days), while the interval above one year will not be classified as a suspected outbreak; (c) places -- It includes close contacts with cases in life, works and the schools, while the

spread within families will not be classified as a suspected outbreak [2]. Taiwan CDC's Communicable Disease Surveillance System will screen suspected outbreaks with correlation of people, time, and places, based on the above conditions, and then remind health authorities to implement outbreak investigations.

Strains from at least two cases need to be consistent by molecular typing to determine an outbreak. A probable outbreak is failing in molecular typing, but can not be excluded with epidemiological association determined by the experts meeting. The Kunyang laboratory of Taiwan CDC currently uses the typing methods of restriction fragment length polymorphisms (RFLP), spoligotyping and MIRU-VNTR. RFLP is the standard method. However, this method is time-consuming which needs to cultivate a sufficient amount of bacteria. So that spoligotyping and MIRU-VNTR can be chosen first. RFLP identification can be used when spoligotyping and MIRU-VNTR still can not differentiate.

### **Principles in investigation of suspected outbreaks**

First, the index case should be interviewed to understand the onset and symptoms of TB, in order to clarify the infectious period. And find out meaningful contacts in patients' extent of activities during the infectious period. Further environmental assessment of the index case and contacts co-exposed should contain ventilation and density (i.e. room size, windows, and air circulation), and the number of people exposed. Health authorities should explain the TB disease and transmission to persons in charge of the possible locations of TB transmission (such as the workplaces or campus) before implement the outbreak investigation and environmental assessment. The most important purpose of the investigation is to ensure the health of contacts. Health authorities need to explain the follow-up process including frequency, time-schedule, medical evaluation and referral for contacts, and the importance of confidentiality of the index case. The index case's right of employment, education should be protected when they have taken anti-TB drugs regularly and the risk of transmission to the public significantly reduced. In addition, health education is necessary for contacts, including parents or surrogates of contacts who are age below 20 year, TB symptoms and the risk of active disease. Remind them to go to hospitals as soon as possible if any suspected symptoms occurred, and to tell exposure history of TB to doctors, in order to reduce the risk of delay diagnosis in future onsets. Screen for contacts by symptoms queries and chest X-ray to find out active TB cases. If the index case is highly contagious and epidemiologic link also confirmed by investigation and strain molecular typing, latent TB infection diagnosis and treatment should be considered for the high-risk contacts after excluding active TB. Expanded contact tracing may be needed when any new evidence appears.

### **The epidemiological data of TB outbreaks**

Till February 2012, a total of 423 TB suspected outbreaks was reported in Taiwan

**Table 1** · TB suspected outbreaks in Taiwan from 2007 to 2011

Year	Confirmed	Total	Outbreaks confirmation rate
2007	11	70	15.7%
2008	13	89	14.6%
2009	13	47	27.7%
2010	9	58	15.5%
2011	21	159	13.2%
Total	67	423	15.8%

**Table 2** · The confirmation rate of TB suspected outbreaks in Taiwan by institutional category from 2007 to 2011

	2007 N (%)	2008 N (%)	2009 N (%)	2010 N (%)	2011 N (%)	Average N (%)
Respiratory care wards	2(15.4)	2(16.7)	1(12.5)	1(14.3)	0(0.0)	1.2(11.8)
Populous institutions	4(9.3)	4(5.9)	7(26.9)	1(3.6)	7(10.0)	4.6(11.1)
Others*	2(66.7)	0(0.0)	2(100.0)	1(20.0)	2(13.3)	1.4(40.0)
Campus	2(25.0)	7(87.5)	2(33.3)	5(55.6)	9(27.3)	5(45.7)
Health care work	1(33.0)	0(0.0)	1(20.0)	1(11.1)	3(10.0)	1.2(14.8)

N=Number of confirmed outbreaks

\*Workplace (non-medical care)

during 2007 to 2011, of which 67 (15.8%) were confirmed (Table 1). Though suspected outbreaks in 2011 substantially increased, the rate of confirmed outbreaks didn't significantly rise. The Policies on TB control have begun to strengthen contact tracing and latent infection treatment since 2008, the awareness to detect suspected outbreak was increased on front-line of public health. Among the suspect outbreaks in congregating setting (Table 2), the confirmation rate among suspected outbreaks in campus was highest (45.7%).

### Campus outbreaks

For the analysis of 19 suspected outbreaks in campus during 2006 to 2009 [3], approximately 30% of TB cases in the suspected outbreaks showed cavities by chest X-ray when TB was diagnosed. This illustrated the young may delay in medical diagnosis and treatment thus increasing the risk of transmission in the campus. Public health units totally tracked 5,544 contacts in the nineteen suspected outbreaks (including five confirmed outbreaks), with an average of 63.7 contacts tracing for each reported case. Subsequent 38 cases were found in one-year contacts tracing after exposure. The incidence rate of contacts in campus outbreaks was up to 685 cases per 100,000 populations, represented 32.7 times of the 10 to 34 year-old general population. This analysis showed that lots of public health manpower and resources are often required for contact tracing in each TB suspected outbreaks in campus. Moreover, it will increase the difficulties on contract tracing when students graduated, transferred, or leaved school. In the past few larger campus outbreaks, molecular typing may be used to clarify the possible chain of transmission between cases

with the same strain and unclear epidemiological link at the beginning of the outbreak investigations. For example, it was found in a university outbreak in 2007 that same genotyping results existed among cases neither within the same class nor the same bedroom, which were not the hot zone of TB transmission. Further epidemic investigation revealed the connection between cases was a physical training club. The venue for this club was a closed training room with poor ventilation, and the members of the club attended from 2006 to 2008 became high-risk contacts. Diagnosis of latent infection and treatment were decided to give to high-risk contacts after discussing by the Committee of Experts. Among the high-risk contacts, 25 cases (45%) were latent infections, which meant normal results of chest X-rays and positive tuberculin skin test (TST  $\geq$  10 mm). Of which 15 cases received treatments for latent tuberculosis infection and directly observed treatment short-course (DOTS). Infected contacts, who were unwilling to accept the treatments for latent infections, were tracked and re-examined every six months for two years. As of 2009, cumulative 18 cases were reported in this outbreak, and no further contact has developed TB disease since 2009. In another northern high school outbreak, the hot zones of transmission of the same class, after school activities and school buses were found after molecular typing and interviews to the index case. For contacts exposed to infectious cases more than 40 hours, the Committee of Experts decided to give latent infection diagnosis and treatment. Continuing health education for parents and students by public health staff, so that most of the contacts were sputum negative cases at onsets, and the afterward risk of transmission was relatively low. This outbreak scale was contained in 10 confirmed cases till 2011. In another university campus outbreak in 2011, as of December 2011, a total of 15 cases (including two cases of suspected TB cases have not yet confirmed the diagnosis) were reported. Based on the result of the outbreak investigation, the hot zone of transmission was located in the classroom at the basement with poor ventilation. There were contacts developed symptoms with exposure to the index case less than 40 hours during the contagious period, that demonstrated the risk of TB transmission can happen in different environmental conditions, even with shorter cumulative exposure time. For environmental improvement, experts of Institute of Occupational Safety and Healthy (IOSH) assisted in assessment and suggestion. As well as local health authorities regularly followed the improvement of ventilation.

To summarize the past experience of campus outbreaks control, the challenges we face include: The TB symptoms on young students are not obvious to early diagnosis; The Public often resort to the media with panic and irrational reactions due to misunderstanding and stigmatization of TB; The validity of investigations for the index case in outbreaks will affect the scale of the contact investigation, and missing the timing of early detection and interruption of transmission; Front-line public health staff lack of the abilities of assessment of ventilation. Therefore, we should use the opportunities of media events in the future to strengthen TB health education, promote latent infection treatments for the contacts born after 1986, and prevent the contacts from becoming index cases of campus TB outbreaks once in the future.

The public health personnel today are responsible for prevention, health care, disease control, and safety of food and drug, making the shortage of manpower. Thus we need continuous training for skills of contact tracing while rapid rotation and shifting of public health staffs.

### **Outbreaks in congregate institutes and hospitals**

In congregate institutes, the major residents are the elderly which was the susceptible group to TB. Genotyping for TB isolates in suspect institutional outbreaks showed most cases were reactivation of TB from remote infection. Advanced age and decreased immunity made more re-activation *M. tuberculosis*. Thus the confirmation rate of outbreaks was low. For example, in the respiratory care wards, most residents used ventilators that may cause false alarms of suspected outbreaks due to acid-fast smear positive and culture results of non-tuberculous mycobacteria (NTM), increasing the confusion in clinical TB diagnosis and the work load on public health staff in investigations. A cross-sectional survey in 2007 found that 37% of the suspected outbreaks were actually associated with NTM, and therefore those pseudo-outbreaks were then excluded after genotyping. Hence, a nucleic acid amplification test should be considered to rule out the possibility of NTM when acid-fast smear turns out to be positive. The interpretation of the supine portable CXR should be more careful due to poor quality compared to the general chest X rays, and cases in the respiratory care wards often have recurrent pulmonary infections or chronic lung disease. No matter how high the opportunity of testing out the NTM, suspected cases should be regarded as confirmed cases to quarantine following the Communicable Disease Control Act before excluding TB diagnosis.

In a institution caring patients with mental disorder, there was a TB outbreak with 2 confirmed cases till 2010. However, another one contact became the third case and had moved out the institution when notification. We conducted a investigation and found that the third case had not followed the contact tracing policy to receive the chest X-ray in the twelfth month after exposure. And the case didn't have chest X-ray of entry screening when the case transferred to another long-term care institute, leading to miss out the chance for early detection of the case's onset.

Another long-term care facility reported at least eight TB cases among residents from 2009 to 2010, and another two nurses at different floors were also confirmed as TB cases. Although the genotypes of only two strains from two residents were the same and different from the nurses, we found in the process of the epidemic investigation that despite of living spaces of residents separated by walls, a fake beam extended through all the rooms, forcing all residents to share the same air space. And in fact, the institute has no ventilation with outdoor air, resulting in the entire environment became high risk area of TB transmission. Another outbreak of multi-drug-resistant TB (MDR-TB) in a hospital involved two staff of Work Section (never directly care for patients) and a pharmacist (case 3, worked in the pharmacy in the outpatient hall at first floor). Case 3 had no common exposure with Case 1 and Case2 of Work Section, and did not know each other. However, the genotypes of the strains were the



same without evidence of close contact between cases. The air conditioning expert assessed the outbreak and determined the hospital also has poor ventilation. And the TB strain in the hospital outbreak was the same with the MDR-TB strain of ten people in community C nearby. We inventoried the outpatient list of the hospital and found: seven MDR-TB cases in the community had seek medical treatment in different departments of the hospital during their infectious periods.

To implement the infection control measures in congregate institutes and hospitals can help early detection of infectious patients and early isolation, including the screening assessment before admission, annual chest X-ray examinations for institutional residents and medical care personnel, combined the history taking or coughs monitoring. The improvement of ventilation is also an important part of infection control. Only considering the comfort of air-conditions and operating costs may neglect the ventilation problems and leads to serious consequences. Legislative Yuan has approved the “Indoor Air Quality Management Act” since November 2011. It is believed the “The Detailed Rules and Regulations of The Indoor Air Quality Management Act” and “The Standards of Indoor Air Quality” will be established in the future. In addition, non-scheduled checking the indoor air quality will be helpful to reduce the risk of air-borne diseases in hospitals and schools.

Before the outbreak investigation, the reasons of higher TB transmission than other places and factors of reducing cases in vain should be discussed with the person in charge of the institution to reduce the further spread. The administrative authorities should know how the staffs of the institutions detect suspected TB cases, the quality of annual chest X-ray screening interpretation, and the processing flow of the suspected case. Environmental assessments often require professional assistance. It is also needed to know how the staffs of the institutions use personal protective equipment to protect from infection. The safety for health care personnel in workplaces and patients is the most important consideration.

## **Conclusion**

In past confirmed campus outbreaks, the initial results of outbreak investigation often showed no obviously epidemiological association. The association displayed from molecular typing can further assist in investigation. Interviews to index cases are needed to clarify infectious period and contacts. The index cases of campus TB outbreaks often easily delayed diagnosis, resulting in cases continue to occur. Hence, before an event developed into an outbreak, the diagnosis and treatment of latent infection is proper for the non-active TB contacts of highly contagious index case. CXR screening can just find the active cases not detected in the outbreak, but if cannot effectively reduce further new cases. When follow-up period is over, contacts falling ill are not necessary to be taken seriously, and the transmission repeatedly occurs. Only to implement health education can make contacts seeking medical assistance earlier. Also, TB contacts should be educated to inform the clinicians the exposure history to reduce the severity of the next wave of transmission.

The nucleic acid amplification testing can be used in suspected outbreaks of congregate institutes to assist in excluding suspected TB cases of NTM. Moreover, the assessment of implementation on infection control measures in congregate institutes, and improvement of ventilation with increasing the ventilation rate are also the important measures to guarantee the safety of health care personnel in workplace and residents. Each confirmed outbreak had unique pattern and needed full exchange of opinions and information between local health authorities and Taiwan CDC, fully discussed by the Committee of Experts on the different control strategies, and enhance the attention of TB by all involved units, as well as other relevant governmental departments (such as the Ministry of Education), in order to reduce the spread of TB.

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## A Case Report of Media Communication of Campus Tuberculosis Clustering, 2011

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### Abstract

From the print media surveillance data in recent years, we realized that the trends of news reporting on tuberculosis in campus were increasing year by year. Especially the campus tuberculosis clustering in “School A”, October 2011, drew considerable media attention which demonstrated the media placed much importance on these epidemics.

In this report, we used the news surveillance data obtained from Taiwan Centers for Disease Control in analyzing news contains and surveillance data to probe into the direction of media news report, and to modulate government’s communication strategies. Our results showed that in addition to grasp direction of news through news surveillance, the vigilance of

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senior Spokesperson could help for crisis early warning and initiate crisis management promptly. For epidemics involving multi-level authorities, it would be better to communicate with stakeholders, unify direction of statement, and hold joint press conference if necessary, to control the powering of dominating issues. After continuously communicating with media, the diction of media reports turned into neutral, with less negative news which demonstrated the strategic importance of media communication.

A tuberculosis clustering in campus might involve both local and central epidemic prevention and control authorities and education authorities, we recommend that the local authorities in charge of announcement of the epidemic, and take action in vertical and horizontal multi-organization communication beforehand. Moreover, the local authorities should comprehend media culture and use clear vernaculars in communicating with general public and media. Furthermore, it takes unremitting efforts for the government in promoting correct perception of tuberculosis, and alleviating panics of students in campus and general public.

**Keywords:** campus, tuberculosis, clustering, media communication, crisis management

## **Introduction**

The World Health Organization (WHO) pointed out that the uniqueness of epidemic control was often relied on the communication through media. Communication failures will delay outbreak prevention and control, damage the public trust and compliance, and prolong economic, social and political tumult gratuitously [1]. The mass media communication is not the only channel of dispatching health information, it is the quickest and most frequently used channel. Researches elucidated that applying media in advocating health education would stimulate the change of health behavior, and reduce the disease risk and morbidities in a society [2].

The role of mass media communication in responding to the communicable disease was getting more important. Scholars verified the importance of crisis communication strategies and media effectiveness during the enterovirus epidemics in Taiwan, 1997. The crisis of the outbreak was highly news-oriented, and had attracted great attention of media reports. Besides, the media report has great influences on public's judgment upon organization's image. Improper handling of the outbreak will increase the difficulties in dealing with the crisis [3]. In addition, the roles of media in the process of crisis management are given warning, mobilization and self-control, thus the government should not underestimate the importance of media communication [4]. Although the media have both advantages of rapidly and broadly disseminating information and would provide practical assistance in communicating information regarding preventive measures, but the media may also severely overestimate or underestimate of the event due to

prejudicial information and personal intuitively misunderstanding of the media. Even the media could provide information nearly true, it still will lead to the public's differential perception and make different decision due to the discrepancy of information frame and personal recognition [5]. Thus, it demonstrated the importance of media communication on epidemic prevention and control could not be ignored.

Tuberculosis is distributed worldwide. It was estimated that 8,800,000 incidence cases and 1,450,000 mortality cases worldwide in 2010 [6]. Tuberculosis can be transmitted through airborne pathways and thus cannot be ignored its transmissibility. Taiwan Centers for Disease Control (Taiwan CDC) established a series of contact screening, testing and following-up procedure to fully managing the epidemic situation. In addition, Taiwan CDC promoted latent tuberculosis infection (LTBI) treatment to reduce the latent tuberculosis infected persons from becoming new cases in the future [7].

On October 22, 2011, the media reported tuberculosis clustering in a university, "School A". The index case of this epidemic was confirmed on November, 2010. The health authorities and this school proceeded contact screening and one year followed-up. During the consequent follow-up, some onset cases could be listed outside the contact lists according to the standard operation protocol of preventive measures, thus, the scope of contact tracing were extended and influenced many students. This tuberculosis epidemic were tested by genotyping at Taiwan CDC and the isolates of index case and the subsequent cases were of matching genotypes thus confirmed this epidemic as a tuberculosis clustering in campus which caught abound media attention and follow-up reports. The analysis of tuberculosis incidence for 2009 and 2010, Taiwan CDC revealed that the patient number of 15-24 years old were more than 630 cases [8]. Besides, among the incidence cases in 2011, there were around 500 students, and among them, about 50% were students of colleges and higher. Moreover, there was an average of six tuberculosis clusters occurred in campus during these two years. Of which, the tuberculosis in faculties was about 50 to 70 persons each year. All of these tuberculosis epidemics in campus demonstrated the importance of tuberculosis prevention and control in campus [9].

Inside the campus is also an area of network information instantly interchanged. According to an investigation, there were more than 99.6% of 15-24 years old students ever use broadband to access the World Wide Web (WWW) and of more than 56.3% web-citizens ages older than twelve years old ever reached social network [10]. Therefore, once the incorrect perceptions of this disease among students were dispatched through network, it will mislead other students, and their parents and faculties just relaying on the erroneous message and might cause their panic. Our study took the tuberculosis clustering in campus of "School A" as a case study on Taiwan CDC's experience on media communication of this epidemic and provided the reference on future media communication strategies in campus epidemics.

## Materials and Methods

This report was a synopsis of News Surveillance System (NSS) of Taiwan CDC. This system adopted Contain Analysis Method which was often applied in the field of mass media to describe how media look upon the public sectors and their possession business, to grasp the likely report orientation, and in addition, to frame the media communication strategies.

The data analyses were separated into two parts. The first part of data analysis was the “contains of media reports and analysis of communication of preventive measures”. To fully demonstrate news regarding this epidemic, the analysis of print media included newspaper media of the China Times, the United Daily News, the Liberty Times, the Apple Daily, the United Evening News and the China Daily News etc., but also the Youth Daily News, the Taiwan Daily, the Taiwan Shin Sheng Daily News, and the Foreign Newspaper. In addition, for the analysis of electronic media report surveillance data, we adopted monitoring records of communicable diseases news obtained from the Media Information Office of Taiwan CDC. The second part of data analysis was the “analysis of media surveillance statistics”. For the reason of comparison with historical data, we analyzed reports from six print media including the China Times, the United Daily News, the Liberty Times, the Apple Daily, the United Evening News and the China Daily News.

## Results

### I. Contains of media reports and analysis of communication of preventive measures

Retrospection of the campus tuberculosis clustering of ‘School A’, the first information disclosure was able to be traced back to a report of a female undergraduate student of Japanese nationality who committed suicide by jumping onto the rails of the Mass Rapid Transit System, Taipei Rapid Transit Corporation on October 20, 2011. Moreover, the announcement of initial screening and test results in the press conference on October 30 could be regarded as the primary cut-off point of media communication of this epidemic. The lists of print and electronic media reports were listed in Table 1 and Table 2. From the cycle of crisis communication, it could be categorized into stage prior to the crisis onset, crisis initiation stage, crisis continuous stage and crisis relief stage, and each stage has certain information requirement [11].

**Table 1. List of print media reports regarding campus tuberculosis clustering of School A\*, Taipei**

No.	Date	Print Media	Page Location	Title	Contains	Word Counts	Front Page	Headline	Report Attribute	Resources of Information
1	10/20	The China Times	A10/ Gossip	20 Years-old Japanese Undergraduate Student Jump onto MRT Rails were Sent to Hospital for First Aid.	Case report	200-500	N	N	Neutral	Taipei City Police Department, Taipei City Fire Department
2	10/21	The Apple Daily	FrontPage Stories	Japanese Girl Dropped on MRT Rails, Crushed to Death with Broken Metacarpal.	Case report	200-500	N	N	Neutral	Taipei City Police Department, school representatives
3	10/22	The Apple Daily	A2/ Top Stories	Already Eight Infected Diseases, Outbreak of Tuberculosis in School A*. Poor Classroom Air-conditioning and 300 Faculties and Students Screened with Panic.	Epidemic situation / Prevention and control	More than 1100	N	Y	Negative	Taiwan CDC, Department of Health, Taipei City Government, students in school

**Table 1. List of print media reports regarding campus tuberculosis clustering of School A\*, Taipei (continue)**

No.	Date	Print Media	Page Location	Title	Contains	Word Counts	Front Page	Headline	Report Attribute	Resources of Information
4	10/22	The Apple Daily	A2/ Top Stories	Risk Elevated, Contacts Required Screening. Prophylaxis on Latent Tuberculosis Infection.	Disease knowledge	500-800	N	N	Neutral	Taiwan CDC
5	10/22	The Apple Daily	A2/ Top Stories	Tuberculosis is Nothing to be Afraid of. Mother of 'Nine Knives' Overcame Tuberculosis and Advocate Tuberculosis Prevention and Control. Chronicles of Tuberculosis Clustering of 'School A'	Disease knowledge / Epidemic situation	800-1100	N	N	Neutral	Taiwan CDC
6	10/23	The China Times	A4/ Living	Outbreak of Tuberculosis in Succession, Mass Screening on Faculties and Students	Epidemic situation / Prevention and control	500-800	N	N	Negative	Taiwan CDC, school representatives
7	10/23	The China Daily News	B1/ Health	Extended Screening on More than 300 Persons of the Tuberculosis Clustering- The Epidemic is Under Control and All Eight Cases Participated DOTS#	Epidemic situation / Prevention and control	500-800	N	N	Neutral	Taiwan CDC
8	10/23	The China Daily News	B1/ Health	Outbreak of Tuberculosis in a University, the DOH Reviewed Screening Process- Being Not Identified Latent Tuberculosis Infection, Lead to Eight More Infected at the Second Epidemic. Experts Found Insufficient Ventilation at Part of the Buildings and Patients Slipped Through Screening.	Epidemic situation / Prevention and control / Disease knowledge	500-800	N	Y	Negative	Taiwan CDC, Department of Health, Taipei City Government
9	10/23	The Libert Times	A14/ Living	Outbreak of Tuberculosis Clustering, 'School A' Extensively Screen 322 Persons.	Epidemic situation / Prevention and control	More than 1100	N	N	Negative	Taiwan CDC, Department of Health, Taipei City Government, school representatives, experts and scholars
10	10/23	The United Daily News	A1/ Top Stories	Outbreak of Tuberculosis in 'School A' with Two Epidemics and Eight Infected. 300 Faculties and Students Screen Tomorrow.	Epidemic situation / Prevention and control	800-1100	Y	N	Negative	Taiwan CDC, staffs in school, students in school, experts and scholars
11	10/23	The United Daily News	A6/ Living	Outbreak of Tuberculosis, A Japanese Student Infected Who Committed Suicide for Love, Suspected.	Epidemic situation / Prevention and control	500-800	N	N	Negative	School representatives, students in school
12	10/23	The Apple Daily	A6/ Living	Outbreak of Tuberculosis, Students Wear Masks to Protect Themselves- Students in 'School A': We Just Knew the Epidemic after Reading the Apple Daily.	Epidemic situation / Prevention and control	800-1100	N	N	Negative	Taiwan CDC, Department of Health, Taipei City Government, school representatives, students in school, experts and scholars
13	10/23	The Youth Daily News	4	Outbreaks of Tuberculosis in 'School A', the DOH Screened and Controlled.	Epidemic situation / Prevention and control	500-800	N	N	Negative	Taiwan CDC, school representatives
14	10/23	The Youth Daily News	4	The Process of Tuberculosis Will be Reviewed.	Epidemic situation/ Prevention and control	200-500	N	N	Negative	Taiwan CDC
15	10/23	Taiwan Times	4	Source of Tuberculosis Epidemic Identified.	Epidemic situation/ Prevention and control	500-800	N	N	Neutral	Taiwan CDC
16	10/23	The Taiwan Shin Sheng Daily News	A2/ Top Stories	Tuberculosis Mass Screening- Mobilization of Taipei DOH. 322 Students Received Chest X Ray and Tuberculin Skin Test.	Epidemic situation/ Prevention and control	500-800	N	Y	Neutral	Department of Health, Taipei City Government, school representatives

**Table 1. List of print media reports regarding campus tuberculosis clustering of School A\*, Taipei (continue)**

No.	Date	Print Media	Page Location	Title	Contains	Word Counts	Front Page	Headline	Report Attribute	Resources of Information
17	10/23	The Taiwan Daily News	A2 / Shin Sheng Top Stories	Leak in the Screening Net, Self-criticizing and Adjusting Needed.	Epidemic situation/ Prevention and control	200-500	N	N	Negative	Taiwan CDC
18	10/23	The Taiwan Daily News	A2/ Shin Sheng Top Stories	Health: This Epidemic is Under Control.	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Taiwan CDC
19	10/23	The Taipei Times	2	TB Outbreak in Taipei School Contained.	Epidemic situation/ Prevention and control	500-800	N	N	Negative	Taiwan CDC
20	10/24	The United Daily News	A15/ Public Opinion Forum	It's Just the Tip of the Iceberg of the Tuberculosis Clustering in 'School A'.	Disease knowledge	500-800	N	Y	Neutral	Experts and scholars
21	10/24	The United Daily News	A6/ Living and Medicine	Tuberculosis Clustering, 'School A' No Orders to Seal.	Epidemic situation/ Others	200-500	N	N	Neutral	School representatives
22	10/24	The United Evening News	A8 / Living and Medicine	Tuberculosis Screening in 'School A', Results to be Announced in Three Days- Among Eight Infected Persons, One was Cured, and the Rest Under Therapy for Six to Nine Months.	Epidemic situation/ Measures	500-800	N	Y	Neutral	Department of Health, Taipei City Government
23	10/24	The United Evening News	A8/ Living and Medicine	Legislator: Insufficient in Prevention and Control, Taiwan CDC: Difficult in Elimination.	Supervised by elected representatives	200-500	N	N	Negative	Taiwan CDC
24	10/24	The Youth Daily News	9/ Medicine and Health	Tuberculosis Clustering in 'School A', 300 Persons to Be Screened in Two Days.	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Department of Health, Taipei City Government
25	10/24	The Commons Daily	15	Deputy Minister of DOH: the Epidemic in 'School A' is Under Control.	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Taiwan CDC, Taichung City Government
26	10/24	The Taiwan Shin Sheng Daily News	9	Tuberculosis Clustering in 'School A', 300 Students to be Screened- Results of Chest X Ray and Tuberculin Skin Test Available on Thursday.	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Department of Health, Taipei City Government
27	10/25	The China Times	A7/ Living	Tuberculosis Clustering in 'School A', 300 Students Screened, More Infected Persons than Expected.	Epidemic situation/ Prevention and control	500-800	N	N	Negative	Taiwan CDC
28	10/25	The Liberty Times	A12 / Living	322 Students in 'School A' Screened for Tuberculosis.	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Taiwan CDC, school representatives
29	10/25	The United Daily News	B2/ Taipei	Scares at Tuberculosis, Take a Snapshot.	Epidemic situation/ Prevention and control	Less than 200	N	N	Negative	Students in school
30	10/25	The Youth Daily News	9/ Medicine and Health	Tuberculosis Clustering, Taiwan CDC: Fully Under Control	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Taiwan CDC
31	10/25	Taiwan Times	14	Tuberculosis Clustering in 'School A', 300 Students Screened by DOH- Eight Infected. Results of Chest X Ray and Tuberculin Skin Test Available the Day after Tomorrow.	Epidemic situation/ Prevention and control	500-800	N	N	Neutral	Taiwan CDC, Department of Health, Taipei City Government
32	10/25	The Commons Daily	4	Tuberculosis Clustering Screening, Results Available on the 27 <sup>th</sup> .	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Department of Health, Taipei City Government, students in school

**Table 1. List of print media reports regarding campus tuberculosis clustering of School A\*, Taipei (continue)**

No.	Date	Print Media	Page Location	Title	Contains	Word Counts	Front Page	Headline	Report Attribute	Resources of Information
33	10/25	The Taiwan Shin Sheng Daily News	9	Tuberculosis Clustering, Cause Identified: the Air-conditioning Setting Remained at Recycle Lead to the Pathogen Sustained in the Air.	Epidemic situation/ Prevention and control	200-500	N	N	Neutral	Taiwan CDC, Department of Health, Taipei City Government
34	10/25	The China Post	20/ Local	Over 300 students at SHU receive TB test	Epidemic situation/ Prevention and control	500-800	N	Y	Neutral	Taiwan CDC, Department of Health, Taipei City Government
35	10/26	The China Times	A5/ Living	Tuberculosis Clustering, the Taipei DOH Completed Screening.	Prevention and control	Less than 200	N	N	Neutral	None
36	10/29	The China Times	A8/ Living	Clustering Alarm Cleared.	Epidemic situation	200-500	N	N	Neutral	Taiwan CDC
37	10/29	The China Daily News	B1/ Health	Tuberculosis Screening in 'School A', Eight Chest X Ray Abnormal- Eight among 312 Contacts Required Double Check. 159 Persons' Skin Tuberculin Tests Greater than 10 mm and Would be Followed-up for Two Years. Prophylaxis to be Evaluated.	Epidemic situation	500-800	N	Y	Neutral	Taiwan CDC, Department of Health, Taipei City Government, representatives of Wan Fang Hospital
38	10/29	The Liberty Times	A17/ Living	Tuberculosis Screening in 'School A' Published, DOH: No Additional Infected Person.	Epidemic situation	200-500	N	N	Neutral	Taiwan CDC, school representatives
39	10/29	The United Daily News	A6/ Living	Tuberculosis Clustering Under Control, No Newly Infected Persons Identified.	Epidemic situation	500-800	N	N	Neutral	Taiwan CDC, Department of Health, Taipei City Government, school representatives
40	10/29	The Youth Daily News	9	Tuberculosis Clustering in 'School A', Examinees Confirmed No Transmissibility.	Epidemic situation	200-500	N	N	Neutral	Taiwan CDC
41	10/29	Taiwan Times	11	Latent Tuberculosis Infection, Prophylaxis and Follow-up- Tuberculosis Patients Won't Transmit if Take Medicine Regularly or Sputum Tested Negative. Prophylaxis on Latent Tuberculosis Infected Persons Could Reduce Probability of Onset.	Epidemic situation/ Disease knowledge	500-800	N	N	Neutral	Taiwan CDC
42	10/29	Taiwan Times	14	Tuberculosis Screening in 'School A', Eight Abnormal Identified.	Epidemic situation	200-500	N	N	Neutral	Taiwan CDC, Department of Health, Taipei City Government, representatives of Wan Fang Hospital
43	10/29	The Commons Daily	5	Tuberculosis Screening in 'School A', Eight Additional Abnormal Identified.	Epidemic situation	200-500	N	N	Neutral	Taiwan CDC, Department of Health, Taipei City Government, representatives of Wan Fang Hospital
44	10/29	The Taiwan Shin Sheng Daily News	2	Eight Confirmed Tuberculosis Cases at 'School A', without Transmissibility.	Epidemic situation	Less than 200	N	N	Neutral	Taiwan CDC, Department of Health, Taipei City Government, school representatives
45	10/29	The China Post	16	Eight more Suspected Tuberculosis Cases Found at University.	Epidemic situation	200-500	N	N	Neutral	Taiwan CDC, Department of Health, Taipei City Government, school representatives, representatives of Wan Fang Hospital
46	10/30	The Taipei Times	2/ Taiwan	Students and Teachers Get Tuberculosis Checks	Epidemic situation/ Prevention and control	200-500	N	Y	Neutral	Taiwan CDC, school representatives, representatives of Wan Fang Hospital

\* 'School A' represents the University where this tuberculosis clustering occurred.

# "DOTS" represents Directly Observed Treatment, Short-course



**Table 2. Lists of electronic media reports regarding campus tuberculosis clustering of ‘School A\*’, Taipei**

Date	Time	Media	Title	Resources of information
10/22	09:31, 12:10, 13:13	TVBS	“Outbreak of Tuberculosis Clustering in ‘School A’, 300 Faculties and Students Screened”, “To Prevent Transmission, the School Informed Screening by Short Message Service”, “Outbreak of Clustering in Campus, at Least Eight Students Confirmed”	Department of Health, Taipei City Government, school, representatives, students in school
10/22	11:26, 12:19, 12:57, 16:01, 17:30, 20:14	CTI Television	“Panic! Outbreak of Tuberculosis in University Campus, Eight Confirmed”, “Outbreak of Tuberculosis in University Campus, the School Informed through Network, Students Know Nothing about This”, “Outbreak of Tuberculosis in Taipei’s Famous University, Eight Confirmed”, “Poor Air-conditioning Ventilation in Close Classroom, Rapid Transmission, Panic!”	School representatives, students in school
10/22	11:42, 12:09, 12:51, 17:48	ERA News	“Outbreak of Tuberculosis Clustering in ‘School A’, Eight Confirmed and 300 Faculties and Students Screened”, “Prior to Eight Student Onset, the Japanese Female Student Committed Suicide the Day Before Yesterday were also Infected”, “Outbreak of Tuberculosis in ‘School A’, Poor Ventilation and Crowded Suspected”, “Tuberculosis Transmitted in Whole School? Hundreds of Faculties and Students Panic”, “Screened for Three Times Since Last November, Epidemic Continues”, “Two Additional Cases on September, Taiwan CDC Ordered Extended Screening”	Department of Health, Taipei City Government, school representatives, students in school
10/22	12:04	China Television (CTV)	“Outbreak of Tuberculosis in ‘School A’, Seven Students and One Family Infected”, “To Avoid Transmission of Tuberculosis, 300 Faculties and Students Screened Next Week”	School representatives, students in school
10/22	12:16	TAIWAN TELEVISION (TTV)	“Outbreak of Tuberculosis in ‘School A’, Eight Confirmed”, “Insufficient Ventilation in Classroom Suspected, Panic in Campus”, “More than 300 Students and Faculties in Campus to be Screened Next Week”	Department of Health, Taipei City Government, school representatives
10/22	12:16, 18:16	Sanlih E-Television	“Tuberculosis Invading University Campus, Eight Infected as Clustering”, “Tuberculosis Clustering, 300 Students and Teachers in University Screened”	Department of Health, Taipei City Government, school representatives
10/22	12:58, 16:20, 17:28	Formosa Television (FTV)	“Outbreak of Tuberculosis Clustering in ‘School A’, Eight Confirmed”, “Outbreak of Tuberculosis in Campus, Students Wear Masks”, “Tuberculosis Clustering, 300 Students and Teachers in University Screened”, “Health Education in Campus”	Department of Health, Taipei City Government, School Representatives, students in school
10/24	17:47, 18:49	Formosa Television (FTV)	“Tuberculosis Epidemic in ‘School A’, 322 Persons Extensively Screened”, “High-standard Preventive Measures, Both ‘School A’ Faculties and Students Screened”, “Blockade Tuberculosis Epidemic, ‘School A’ Enhanced Air-conditioning Disinfection”	Department of Health, Taipei City Government, school representatives, students in school
10/24	17:57	TVBS	“Outbreak of Eight Tuberculosis in ‘School A’, 322 Students and Faculties Screened”	School representatives, students in school
10/24	18:17	Gala Television (GTV)	“Tuberculosis Clustering in ‘School A’, 322 Persons Screened”, “Oral Advocacy by School? Students been Aware when Watching TV”	Department of Health, Taipei City Government, School representatives, students in school
10/24	19:16	China Television (CTV)	“Tuberculosis Clustering in ‘School A’, Eight Confirmed”, “Eight Confirmed Tuberculosis in ‘School A’, Transmission Through Air-conditioning Suspected”, “Tuberculosis Crisis in ‘School A’, 320 Persons Screened Extensively”, “Taiwan CDC Proved Campus Clustering, Same Genotyping”	Taiwan CDC, students in school
10/24	19:17	DaAi Television	“Eight Persons Infected Tuberculosis, Early Symptoms Detection, Early Treatment”, “Students Organized Tuberculosis Prevention Working Group to Correct Perception”, “Student’s Health Examination Included Tuberculosis Screening”, “Eight Persons Confirmed Infected Tuberculosis, Under Treatment”, “Outbreak of Eight Tuberculosis in ‘School A’, 322 Persons Screened Extensively”, “Multiple Channel in Advocating Screening to Ensure Tuberculosis Prevention and Control”, “Cough More than Two Weeks, Seek Medical Care Immediately”	Department of Health, Taipei City Government, school representatives, students in school
10/24	19:28	TAIWAN TELEVISION (TTV)	“Tuberculosis Clustering in ‘School A’, 322 Persons Screened in These Two Days”, “Chest X Ray and Skin Tuberculin Test, Reports Available on Friday, the Fastest”	School representatives, students in school
10/28	17:33	TVBS	“Tuberculosis Screening in ‘School A’, Double Check Needed for 167 Faculties and Students”	News Anchors’ Express
10/28	18:05	ERA News	“Up-to-date! Outbreak of Tuberculosis in ‘School A’, 167 Faculties and Students Requires Double Check”	News Anchors’ Express
10/28	18:28	Gala Television (GTV)	“Tuberculosis Screening in ‘School A’, One Mortality among Eight”, “Tuberculosis Screening for Students and Faculties, No Transmission”	joint press conference
10/28	19:21	DaAi Television	“Tuberculosis Screening in ‘School A’ Available, Eight Abnormal in Chest X Ray”, “Eight Confirmed in ‘School A’, Extended Screening Continued”	joint press conference
10/28	19:34	China Television (CTV)	“Tuberculosis Epidemic in ‘School A’, Student without Source of Infection Identified”	joint press conference
10/28	20:14	Public Television Service	“Tuberculosis Screening in ‘School A’, Eight Abnormal Requires Double Check”, “159 Persons in ‘School A’ Tuberculin Test over Criteria, Prophylaxis Evaluating”	joint press conference

\* ‘School A’ represents the University where this tuberculosis clustering occurred.

A. **Precrisis phase:** During October 20 and 21, vigil to crisis, initiation of crisis management system and preparedness in advance.

1. Print media

(1) October 20: the China Times reported news entitled “Japanese undergraduate student jumped onto MRT rails was sent to hospital for first aid”. The content of this news mentioned that this Japanese lady was an undergraduate student in ‘School A’ in Taipei City. In addition, some other media reports stated that this female student had medical records relating to tuberculosis and the reason of her motivation of jumping onto the rail were still to be clarified. This news was located in the gossip news column and its title had nothing to do with communicable diseases.

(2) October 21: None.

2. Electronic Media: None.

3. Communication of preventive measures: the Spokesperson and Deputy Director of Taiwan CDC, Wen-Yi Shih, received an inquiry of this rail jumping Japanese female student and tuberculosis from journalist of the Apple Daily on October 21. Although Spokesperson Shih promptly replied to the journalist and reminded him/her regarding the privacy protection issue, but according to Spokesperson Shih’s vigilance against interaction with media, he had been aware there might be a great lengthy report on the next day and immediately initiated crisis management in preparing and responding to this event, including:

(1) Formation of an internal taskforce by Public Relation Office, the Third Division (the Division of Tuberculosis Prevention Policy Making), and the First Branch. This internal taskforce communicated with the Department of Health, Taipei City Government, the Ministry of Education, and the school representatives, consolidated complete epidemic information and then drafted prevention and response measures.

(2) Submit a report to the Department of Health, Executive Yuan instantaneously.

(3) Preparation of press release in hand to be issued when necessary.

(4) Continuously understanding the dynamic situation of media report.

B. **Crisis initial phase:** October 22 to 23, illustrate the current status of the epidemic of the prevention and response measures of this epidemic, and constantly communicate with stakeholders.

1. Print media

(1) October 22: the Apple Daily reported this epidemic on A2 page with full version, in addition, it provided tips and knowledge of tuberculosis, the snapshot of World Tuberculosis Day press conference held by Taiwan CDC in 2010 and health advocacy information on the same page.

(2) October 23: there were totally eight media including the China Times, the United Daily News, the Liberty Times etc., and foreign media, e.g., the Taipei Times,

reported this topic in succession. Most of the terms and wordings of those reports were “Outbreak” of tuberculosis, “tuberculosis clustering” and “tuberculosis mass screening” in describing this epidemic.

2. Electronic media: electronic media followed up to report this event massively in succession on the same day after the report of the Apple Daily on October 22. On that day, both of the cable and wireless television stations intensively reported this event for at least 20 times at the news update section. The majority of news reports were description of the epidemic, and the interviewees were mostly of Department of Health, Taipei City Government and the school representatives.

3. Communication of preventive measures

(1) On October 22, the Department of Health, Taipei City Government made an announcement on behalf of the epidemic prevention and control authorities at the first time, and was interviewed by the electronic media.

(2) Continuously implementing preventive measures in campus and communicating with the Department of Health, Taipei City Government, the Ministry of Education and the school representatives.

C. **Crisis maintenance:** the epidemic prevention and control authorities initiated contact screening and health education, and actively announced number of contact being screened and the scheduled date to issue the results of screening and testing to convey the attitude toward handling and responding this epidemic by transparent information during October 24 and 29. In addition, they released the routes of transmission of tuberculosis, criteria of taking contact screening and testing, and prevention and responding measures at the same time, through the media’s dissemination to improve general public’s accurate understanding of tuberculosis.

**a. October 24 to 25**

1. Print media

(1) October 24: there were wholly five media reported, including the United Daily News, the United Evening News, and the Taiwan Shin Sheng Daily News. The content of news reports were mostly preventive measures being implemented, number of contact being screened and tested and the progress of interrogation of the Social Welfare and Environmental Hygiene Committee in a balanced reporting manner at the same time.

(2) October 25: there were totally seven media reported, including the China Times, the United Daily News, the Liberty Times and foreign media, i.e., China Post. The majority content of news reports were still on number of contact being screened and tested, and date of screening and testing results to be issued. In addition, part of the media quoted the statement of “the Epidemic were Totally Under Control” and “Improving the Ventilation and Air-conditioning System of this School” by Director-General of Taiwan CDC during his responding to interrogation in Legislative Yuan.

2. Electronic media: there were up to six television stations reported seven timeframes on October 24, the direction of news reports were mostly followed up with print media in describing the epidemic and number of contacts being screened and tested.
3. Communication of preventive measures
  - (1) To conduct extended screening and testing of the contact faculties and students, and health education.
  - (2) To set the tone of responding media as “the epidemics was under control”.

#### **b. October 26 to 28**

##### 1. Print media

- (1) October 26: only one picture issued on the China Times illustrating that the Department of Health, Taipei City Government had completed the screening and the results will come out on October 28.
- (2) October 27 to 28: none.

##### 2. Electronic media

- (1) October 26 to 27: none.
- (2) October 28: through satellite news gathering (SNG) reported during evening news. There were totally six television stations reporting among six timeframes with the direction of reporting were the contents released during press conference.

##### 3. Communication of preventive measures

- (1) Held a pre-press conference communication meeting with the Minister of Education, the Department of Health, Taipei City Government and the school representatives on October 27, planned and prepared for the press conference to be held on October 28.
- (2) Announced media interview notice to inform scheduled date of publishing screening and test results.
- (3) The Taiwan CDC held a joint press conference with the Department of Health, Taipei City Government, the Minister of Education, and the school representatives at five o'clock in the afternoon on October 28, and made a clear narration of the meaning of screening and testing results and the TB transmissibility by professional medical officer to correct misleading concepts.

#### **c. October 29**

1. Print media: there were totally eight media reported, including the China Times, the United Daily News, the Liberty Times and foreign media, i.e., China Post. The majority content of news reports were describing as followings including “Eight Contacts Showed Chest X Ray Abnormal, Pending for Double Check”, “No Transmissibility Found among Examinees”, “No Additional Infected Person Identified”. Part of the other media entitled news reports as “Alarm Cleared”.
  2. Electronic media: none.
-

3. Communication of preventive measures: implemented school contacts follow up following guidelines and continued surveillance media reports.

**D. Resolution:** since October 30, examined the process of communicating with media and experiences we got as future reference in handling and responding epidemics in addition to continuously surveillance news reports.

1. Print media: the Taipei Times, a foreign language media, reported this epidemic, the content of this news report was the screening and testing results of students and faculties.

2. Electronic media: none.

3. Communication of preventive measures: implemented school contacts follow up and continued surveillance media reports following guidelines. In addition, draw up a plan of incorporating the tuberculosis prevention and control campaign in campus as the main scheme of yearly health education and advocacy.

## **II. Analysis of media surveillance statistics**

Analysis of media surveillance statistics based on the print media, including six media, i.e., the China Times, the United Daily News, the Liberty Times, the Apple Daily, the United Evening News and the China Daily News.

A. Among the 171 news reports regarding tuberculosis in 2009, there were two (1.2%) related to epidemics in campus. In 2010, among the 133 tuberculosis news reports, there were 14 (10.5%) reports regarding epidemics in campus. And in 2011, among the 162 tuberculosis news reports, there were 53 (32.7%) reports related to epidemics in campus.

B. In the 69 news reports related to campus epidemic during 2009 and 2011, all of these epidemic reports were originated from the local jurisdictional health agencies, and among them, only 35% ( $n = 24$ ) remained in the page location of local page, and the rest of 65 were listed in the national page.

C. During the campus tuberculosis clustering of 'School A' news surveillance period, October 20-30, 2011, there were 166 news reports appeared from six media companies. There were 24 (14.5%) news reports related to this epidemics, with one news report was published on the headline (October 23 on the United Daily News), four were published on the header of top stories (October 22 on the Apple Daily, October 23 on the China Daily News, October 24 on the United Evening News and October 29 on the China Daily News) with longest published story reached 1,100 words.

## **Discussion**

### **I. Contains of media reports and analysis of communication of preventive measures**

#### **A. Media surveillance is as important the awareness of Spokesperson**

As we reviewed the process of media communication of this epidemic, the initiation of print media report was on October 20. Since part of the contents of news report of "Japanese Female Undergraduate Student Jumping onto Rails" mentioned "tuberculosis",

although the focus of these reports were on the “Died after Jumping onto Rails”, but the Spokesperson Shih’s vigilance against interaction with media, he immediately initiated crisis management in preparing and responding to this event. On October 22, when the epidemic was published on the newspaper as the topic of “tuberculosis”, the Spokesperson had grasped the epidemic information clearly in hand and promptly responding to it. From the consequent direction of news reports, very few of the news reports focused on the fatal event of female student jumping onto rails, which demonstrated that the effectiveness of media communication prior to the crisis. It can be seen that the surveillance of media news reports should take contents of reports regarding epidemics even in the local gossip stories to master news pulsations completely and grasp the gold opportunities in responding to the media.

From the media surveillance we could see the complete pictures of how the news event goes, but the Spokesperson not only should extensively absorb media information, but also played roles in bridging the department and the outsiders [3]. A Spokesperson has to be adept in explaining the standpoint of his/her organization, and by continuous training to cultivate his/her experiences in responding media and sensitivities in news report. By doing so, the Spokesperson would be able to gain the trustfulness from the media and to improve the image of the organization. Studies also affirmed that the importance of the Spokesperson in dealing and managing crisis [3, 12].

#### **B. Communicating with other stakeholders prior to communicate with the media**

The stakeholders in a media event could be extensively considered as any organization, team, enterprise and individuals who were related or interested in this event in addition to media. In this case, the Taiwan CDC promptly organized internal taskforce while alerting a news crisis, and closely and directly communicated with the Department of Health, Taipei City Government, the Minister of Education and the school representatives. As a consequence, the Taiwan CDC were able to initiate the cross-unit crisis management promptly, which was based on not only the well-established disease and epidemic reporting system, but also rely on the smooth channel in communicating with stakeholders to maintain cooperative partnership.

The news reports regarding campus tuberculosis were often originated from local news reports. For the process of news report preparation, after the journalists in the local news stations interviewed the jurisdictional Bureau of Health, the information will be send back to central news station. The central news station will dispatch journalists to interview the Taiwan CDC again according to the magnitude of epidemics to obtain more complete statements and verify them. Thus, upon the local health authorities vigilant an emerging news crisis, the department should not only to complete the communicable diseases report process, but also provide comprehensive prevention, control, manage and respond of this epidemic through telephone, email or fax to reach a common consensus through communication beforehand.



Scholars had proposed that the nature of the relationship between an enterprise with various stakeholders (including positive and negative relationship and the intimacy of relationship) is the important indices of successful business crisis management. A positive relationship built prior to the crisis will positively influence the general public to count on the business's ability in handling the crisis and will decrease the lethality of the crisis toward this enterprise [3]. Therefore, we should build up positive communication relationship with stakeholders to be contributive to manage crisis. Furthermore, the Centers for Disease Prevention and Control of United States also suggested directly communicating tuberculosis clustering with partners and stakeholders [13].

The communication with general public was initiated at the first official announcement right after the epidemic came out [1]. To reduce the crisis by the first announcement, we should better implement cross-unit communication to unify direction of statement, and prevent distribution of incorrect information which increases the difficulties in dealing with the crisis.

### **C. Convening joint press conference to master power of dominating issues**

When an outbreak occurred, the way to maintain the general public's feeling of trust depends on the transparent information [1]. Moreover, scholars had pointed out that during the period of crisis, the authorities should release the most updated information at all times to reduce the chance of outsiders to conjecture on this event and hold the power of dominating issue building [3]. Therefore, whenever there is a preliminary result comes out, the authorities should explain to the outsiders as soon as possible other than receiving the interview by media during the period of crisis initiation. In this case, we unified stakeholders including the Department of Health, Taipei City Government, the Ministry of Education and the school representatives to convene a joint press conference publishing contact screening results and the following preventive measures which caught media's attention most and invite professional tuberculosis clinical physician in interpreting the screening and testing results and transmissibility in chorus. In this joint press conference, we reached our aims in mutual communication with the media and mastered the power of dominating issues, moreover, we designated preliminary endpoints of this epidemic reports. There was a large attendance of the media on that day, and even some electronic media live online report through satellite news gathering (SNG).

### **D. The terms and wording of media reports turned to neutral, the occurrence of negative news declined, and the increasing portion of quoting remarks of health authorities demonstrated the importance of communication strategies**

There were 46 news reports revealed with an average of four news reported each day during October 20-30, 2011. This phenomenon demonstrated that this epidemic continued getting media's attention. The content of news report focused on the epidemic information, preventive and control measures, and disease knowledge. The number of

media reports reached plateau on October 23 and gradually decreased afterwards. Figure 1 demonstrated that after the announcement of screening and testing results in the joint press conference on October 29, almost zero news reports revealed. As to the negative news reports, it reached plateau on October 23, and none of negative news reported after October 25. Moreover, we analyzed the diction of news reports title, panic words were often used during the period of epidemic initiation including “outbreak”, “Cases Leaked in the Screening Net”, “Flaw”, and “Ineffective in Epidemic Prevention and Control”, but following the deliberation of transparency epidemic information, and initiation of communication of preventive measures, the diction turned into neutral words including “No Newly Infected Person” and “No Transmissibility”. Furthermore, when we analyzed the sources of information of print media, 87% (n = 40) were came from the Taiwan CDC and the Department of Health, Taipei City Government, and 6% (n = 3) came from other sources including the school representatives and students.

In this case, our strategies of promptly collect and publish the truth of this event, organize taskforce, a spokesperson system, communication with stakeholders and holding the power of dominating issues and media communication plus sincere attitude soothed the impact of crisis.

## II. Analysis of statistics of media surveillance data

From the statistics of number of tuberculosis-related news in print media during 2009-2011 demonstrated that the percentage of tuberculosis epidemic in campus related news to tuberculosis-related news increased from 1.2% to 32.7% and were in a continued increasing trend. Moreover, even all the news reports regarding tuberculosis epidemics in campus were originated from local jurisdiction authorities, about 65% were located on the national page which showed the media think highly of the importance of similar epidemic news. This phenomenon highlighted the importance of message transmission and close communication between local and central jurisdiction authorities. Furthermore, the amount of news reports revealed in print media were the highest among tuberculosis clustering in campus since 2009, which demonstrated the special meaning of this epidemic and provided a warning message to the epidemic prevention and control authorities.

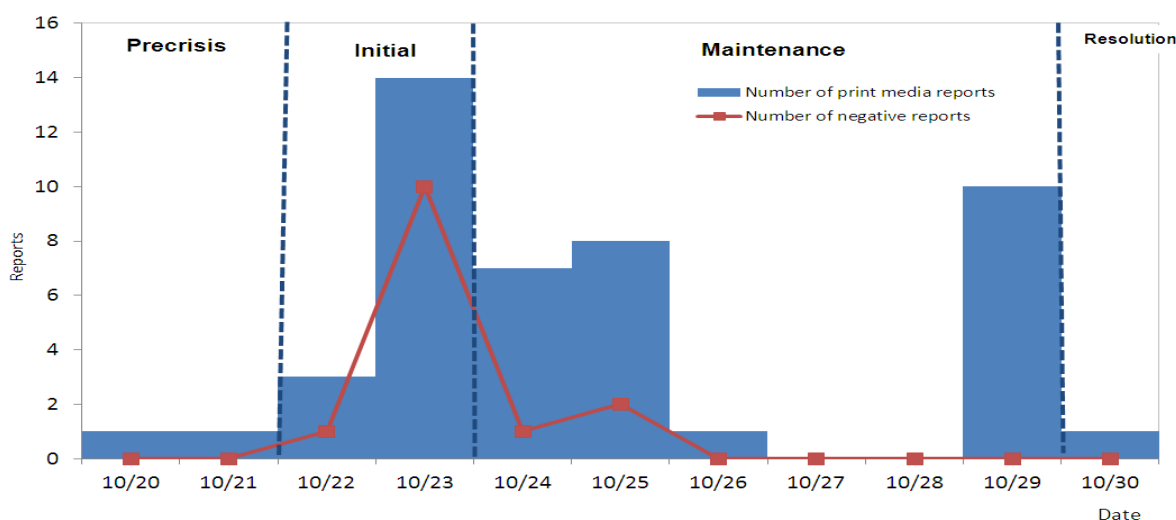


Figure Number of print media reports regarding campus tuberculosis clustering of 'School A', Taipei

## **Recommendation**

The tuberculosis epidemics in campus gradually became the focus of media attention. Although the majorities of origination of these news reports were from local authorities, about sixty percent of these news became located on the national page, thus, we cannot ignore the influence of these kind of news. We summarized the media communication experience in this case and recommended that:

### **I. Establishing communication and cooperation channels with stakeholders during peacetime**

In addition to reporting system, the epidemic prevention and control authorities should establish communication and cooperation channels with stakeholders during peacetime and transmit messages frequently to strengthen crisis management. Besides, horizontal communications between organizations are of equal importance. The organizations should mutual communicate with each other, i.e., the Ministry of Education and the Taiwan CDC, the local Bureau of Health and the local Bureau of Education and the school representatives, to obtain epidemic information and consensus on dealing and responding against the impact of media news reports.

### **II. Local authorities in charge of publishing and announcing the campus tuberculosis epidemic information and preventive measures done**

When a tuberculosis epidemic occurred in school is very stressful. The health authorities have to balance the privacy and the right to receive education of individual cases and the response of other faculties and students. But at the same time, the initiation of epidemiologic investigation and contact screening and testing often lead to students and their parents' panic and even complain to the media, and the health authorities usually became the targets being accused. Although the epidemic prevention and control authorities and the education authorities usually take controlling epidemic as first priority, if they could actively announce epidemic information and explain clearly the following preventive measures toward special or campus epidemic with news crisis under the protection of individual privacy will not only sooth the stress of 'School A' and the questioning from parents but also avoid media to report in the direction of "concealing epidemics".

### **III. Transferring those professional terminology to communicate with media and the public**

The process of diagnosis, treatment, follow-up and screening of tuberculosis is a series of professional and complicated method, and is very difficult for layperson to clarify. Take the tuberculosis contact screening which draws most attention of general public as an example, it is often mistaking contacts of the patient or persons with skin tuberculin test positive results as infectious tuberculosis cases, thus, we should apply more clear vernaculars in illustrating the meaning of test results, and broadly disseminate the message through the media advocacy to alleviate the general public's panic and adopt government's preventive and control measures.

In addition, we should continue advocacies in campus, especially students are heavy internet users, if they have wrong perception of the epidemic and to gossip incorrectly relay that erroneous message will lead to serious panic. Thus, by advocating tuberculosis recognition, prevention and treatment through variety of routes of communication to establish accurate attitude toward this disease are the most fundamental part and requires strengthening it.

#### **IV. Understanding the media culture, and continuously communicate with open attitude to establish trustable image of the institution**

From the viewpoint of media report, it needs various statements from each party to bring balance and multidimensional reports for the readers and listeners. Thus, the media news report might have gaps in the organizational statement and the expectation of direction on advocacy. But we should respect the professionalism of media and with openhearted to understand the reason and try to fulfill the gaps. In addition, we should continuously provide correct information, periodically information exchange with the media and meet media's need based on "sincere" and "willing to talk" attitude to establish long-term positive relationship. By doing so, the media and the epidemic preventive and control authorities could meet mutual needs in a balanced manner, and gain the general publics' trust in the organization and build well image.

#### **Research limitations**

According to the various media attributes and the differential impact of their influences, this study focused only on the media effectiveness of news media. However, the surveillance of electronic media reports consumes higher cost and has difficulties in completeness; thus, we did not analyze this part comprehensively.

#### **Acknowledgements**

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