

A Suspected TB Cluster at a Certain Development Center in Taipei City

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Foreword

It was thirty-five minutes passed four o'clock in the afternoon of January 13, 2006, when an official at Taipei City Health Bureau received a formal disease outbreak notification from some colleagues working at the TB Control Section of Taipei City Hospital – Branch of Disease Control (also called Lin Shen Branch), saying that they had just spotted a new open TB case (sputum AFB smear positive, chest X-ray showing suspicious TB images), which had already triggered off an investigation effort, starting with a local case-management specialist being sent immediately to the residence of the suspected patient. The field specialist found that the suspect was currently residing at a certain development center in Shilin District, Taipei City, and that only about three weeks earlier on December 21, 2005, the very development center had another notified open TB case (with similar sputum AFB smear positive, chest X-ray showing suspicious TB symptoms). According to the *TB Control Manual*, an important guideline issued by Taiwan CDC, it is defined that “whenever there are two or more open TB cases being detected on the same premises within a time period of 30 days, it is a definite case suspect of clustering infection.” and the regulation also subjected all 23 employees and 53 residents of the development center to a chest X-ray screening campaign in order to further understand the situation by figuring out the relevance of pathogenesis of the individual cases involved.

A brief introduction to the development center

This unspecified development center is an institution taking care of a few dozens under-privileged and handicapped individuals. It was originally founded by the government but is currently maintained and operated by some private business entity. The Center provides minimum housing and necessary care to a total of 53 people. The majority of the residents were mentally retarded, and there were a few formerly homeless people with mental problems. Among them 48 residents were staying at the Center round the clock, but the rest 5 were there only during the day but not the night. They were 26 males and 27 females, and their age ranged between 15 and 75. To run the business, the institution employed a work force of 23 including 6 alien workers. The Center is located in a 10-story high building and occupies its entire third and fourth floors. There were 9 resident bedrooms (7 six-bed rooms and 2 single rooms) within the institution, and it shared with the rest of the building occupants a central air-conditioning system. In order to prevent the Center's residents from wandering out of the building by themselves and placing themselves in danger of possible bodily harm, card-reading locks are installed to guard all elevator entrances to the institution, so that no residents could enter or leave the building without the company of a staff member. Other than bedrooms, the Center has other public installations and facilities, such as rehabilitation rooms, recreation rooms, dining area, open places for laundry, etc., and the use is shared among all center residents. Each single day, the Center arranges various activities in the rehabilitation rooms, and every resident would be required to participate in the events except those confined in bed or hapless bed-ridden cases.

Epidemiological investigation

The TB Control Section of Taipei City Hospital, affiliated to the Disease Control Branch, dispatched a mobile chest X-ray clinic to the vicinity of this Center on January 16 and 23, 2006, to proceed with an chest X-ray screening survey (taking small photos) on all residents and workers (including nurses, social workers, care-takers, and alien workers) of the institution. During these two days, 74 people out of the 76-targeted individuals completed the examination. The only 2 exceptions, which failed to show up at the mobile clinic, were due to hospitalization. Results of the preliminary survey showed that 10 residents and one nurse among those surveyed had abnormal chest X-ray appearances and required further checkups and tests, whereas the rest were determined normal by the specialists .

Because of the Lunar New Year Holiday Season, re-examination of those 11 persons with aberrant preliminary chest X-ray showings was held off until February 6 when they were bussed to the Lin Shen Branch of Taipei City Hospital to take a more detailed chest X-ray examination along with a sputum AFB smear test and a sputum culture inspection. The findings from the X-ray examination further identified 4 out of the group to be suspected TB sufferers, and among them, 2 were also found positive in both their AFB and sputum culture tests. The third person turned out to be positive in his sputum cultivation trial in spite of a negative AFB showing. Therefore, these three verified cases were notified to the local health authority on February 7. The last person with negative results in both AFB smear and sputum culture tests, however, was put through a chest computed tomographic (CT) scan, which verified that she was a positive TB case as well. So the authority was eventually notified about her more than one month later on March 13.

In the end, this TB clustering event at the development center involved 6 individual cases, and they were referred to as Cases A, B, C, D, E, and F (their respective basic personal information are listed in Table 1). Case A was a male, aged 51, a Down's syndrome patient who moved into the Center on October 22, 2001. He was showing at the time several indications of TB, including fever, pneumonia, and feet edema, and gave positive AFB smear and sputum culture test results. Case B was a female, 49 years old, who had been living at the Center since January 5, 2004. She had diabetes mellitus, hepatitis history, and long-term or chronic respiratory disorder symptoms, and gave positive AFB smear and sputum culture test results. Case C was a male, 42 years of age, who moved in on August 2, 2002. He had hepatitis B disease history, was severely mentally handicapped, and gave positive AFB smear and sputum culture test results. Case D was a 41-year old male. He used to be a homeless and became a resident of the Center on September 30, 2002. He was also heavily mentally retarded, coughed often with sputum, and gave positive AFB smear but negative sputum culture test results. Case E was a 48-year old male, who used to be a homeless, and had lived at the Center since December 21, 2001. At the time he had a fever and coughed with sputum, but both AFB smear and sputum culture tests were negative. Finally Case F was a 31-year old nurse working at the place. Her chest X-ray gave unusual images but without cavities, and both her AFB smear and sputum culture tests were negative.

An epidemiological analysis was carried out on this clustering of individual cases in terms of relevancies of personal interrelations, timing, and locality, and it was found that with the only exception of Case F (the nurse), all five afflicted Center residents were dwellers on the third floor of the building: Case A and Case E were roommates, while the other three each lived in a separate room with other

roommates. At the time of our study, Case A was confined in bed because he was quite sick, but the other four suspects were feeling well enough to move around in the premises. Sputum AFB smear test results suggested that Case A and Case E were infected with the Beijing strain of the bacterial species.

Conclusion and discussion

Tuberculosis is a quite common infectious disease caused by the bacillus *Mycobacterium tuberculosis* and transmitted through aerosolized droplets. At this very moment, it is still found almost everywhere in the world. Comparatively speaking, its incident rate is higher in men than in women, higher among the elders than in the younger generations, and higher in people of lower social levels than those better off. A research report [1] indicates that anyone having intimate relation or day-to-day contact with a family member who's an open (infectious) TB case would have a 30% chance to get infected.

The objective of this unspecified development center is to provide basic accommodation and care to underprivileged mentally retarded individuals, sufferers of chronic diseases (such as diabetes, kidney diseases) and homeless people. Those chronic disease patients constitute a high-risk group of TB [2-5]. For this reason, the regulation stipulates that every staff member of the organization as well as the accommodated residents must take physical examination annually to facilitate early detection of communicable disease cases for the very purpose of preventing any clustering of infectious diseases from happening. On top of that, the rule book also says that whenever there is any individual appearing to have persistent coughing, he or she should be checked by chest X-ray screening to identify its real causes. As to the verified TB cases among the underprivileged social groups of mentally retarded and homeless people, the

health authorities ought to put more emphasis to “curing them all” treatment strategy in order to achieve complete results.

We found that this development center in fact did observe the regulation to have all its employees and residents going through a routine physical examination on September 22, 2005. However, the Center did not pay enough attention, nor did it do any follow-ups, tracking down efforts or reexaminations on those subjects showing doubts of abnormalities in the preliminary checkup and those having not completed the examination in the first place. This kind of negligence is what we think the Center should focus on improving from now on.

Recommendations

1. The diagnosis, therapeutic treatments, and chest X-ray interpretations of TB are all quite complicated and demand high level of professionalism. Therefore, all hospitals and clinics engaging in TB should strengthen their taskforce by all means and by keeping relevant educational training in TB-related issues active all the time, so to facilitate the efficiency of TB control in their respective areas.
2. During the process of case investigation and case management, health workers should watch for both faithful implementation and effectiveness of scheduled routine physical examinations, and make sure that doubtfully aberrant individual cases receive proper reexamination and necessary treatment, so that potential clustering infection within the organization may be avoided.
3. It is recommended to convert the existing “TB control educational training” to a compulsory course in the basic training for prospective head administrative personnel of densely populated organizations or institutions.
4. Local health authority, the Health Bureau, should set and actively push for

higher standards in the quality of chest X-ray interpretation at clinics or hospitals that are in the position to carry out routine physical examinations for densely populated organizations and institutions.

References

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Table 1. Basic Data of TB Cases at Unspecified Development Center in Taipei City

Case	Sex	Age	ID	Date of admission	Diagnosed based upon	Room No.	Date of notification
A	M	51		2001/10/22	Sputum smear (+)	306	2005/12/21
B	F	49		2004/01/05	Sputum smear (+)	301	2006/01/13
C	M	42		2002/08/02	Sputum smear (+)	304	2006/02/07
D	M	41	Homeless	2002/09/30	Sputum smear (+)	309	2006/02/07
E	M	48	Homeless	2001/12/21	Sputum culture (+)	306	2006/02/07
F	F	31			X-ray checkup abnormal		2006/03/13

Note: Case F is a nurse working at the Center.