

A Contract Driver of a Certain Hospital Gets Infected with TB and Spreads the Disease to His Family

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I. Background

On March 1, 2006, Taiwan CDC Branch #3, which is located in Taichung City, received notification from Nantou County Health Bureau about the discovery of a family cluster of tuberculosis (TB). The family's surname is Wu and the index case of the outbreak is a male adult Mr. Wu. He was detected, diagnosed, confirmed, and officially notified only a few days earlier, on February 25, as a sufferer of open pulmonary TB. Two days later, on February 27, his toddler son was also notified as having contracted a condition of pulmonary TB along with TB of bones and joints. Since this man works as a contract driver for the hemodialysis unit of a local hospital, providing pick-up services to quite a few immunity-weakened or immunocompromised renal disease patients going to the hospital for dialysis therapy, plus his own young boy was also diagnosed as an affirmative case of *Mycobacterium tuberculosis*, the health authority in charge considered this cluster a risk of potentially massive spreading, and it is necessary to launch a full-scale investigation into Mr. Wu's work contacts to expose possible but still hidden infected cases among them.

II. Discovery story of the case

The index case, Mr. Wu, happens to be a 35-year old man living in Gigi

Town, Nantou County. It was his fourteen-month son who started to display a rather abnormal physical condition in late January 2006, which consisted of a slanted neck and apparent lack of strength in both lower members. On February 21, the sick little boy was sent to a local medical center to find out what was wrong with him. After he was given routine magnetic resonance imaging (MRI) and chest X-ray checkups, the attending physician saw some signs and suspected that the kid might have been infected at his skull, cervical vertebra, as well as both lungs with *M. tuberculosis*. Therefore, the physician strongly recommended that all other members of the boy's family should come in to have chest X-ray examinations right away. The family complied and the findings showed that the boy's father (the index case) had typical tuberculosis lesions showing up on his chest X-ray plate, and his laboratory sputum smear test result was positive, which confirmed the individual a legitimate case suffering from open TB. Right after such evidence was established, the local health authority, Taiwan CDC Regional Branch #3, was formally notified about the case on February 25. In the meantime, the hospital collected some sputum specimen from the young boy under tracheoscope and had it sent to the Central Region Laboratory of Taiwan CDC at the same address as the regional branch for *M. tuberculosis* smear test, but the result turned out to be negative. However, the same sputum sample gave positive results to a PCR assay for *M. tuberculosis* also conducted at the same laboratory. Besides, repeated MRI scan of the boy's skull and cervical vertebra part at the hospital showed clear TB-like lesions and thus it was concluded that there was *M. tuberculosis* infection in him. So the hospital duly reported the case as a sufferer of pulmonary TB plus TB of bones and joints on February 27. The father and son were both admitted to a negative pressure isolation room at the medical center for therapies and treatments.

Personally, the index case, Mr. Wu, had a long history of cigarette smoking habit, but other than occasional coughing (which he thought due to smoking), he had no other uncomfortable symptoms whatsoever. According to his own reflections, he had never suspected himself a TB sufferer, nor was he aware of any relatives with whom he had interacted having connections with such disease in the past. Although his little boy was premature at birth, the boy's growth and development had been considered rather normal. The boy received all regular vaccinations (including BCG Tuberculosis Vaccine) following the recommended schedule for all newborns.

III. Job history of the index case and the tracing outcomes of his contacts

Mr. Wu, the index case, was hired as a non-staff shuttle bus driver in November 2004 by the hemodialysis unit of a local hospital. His main assignments were to pick up and drive around patients of the unit. From the beginning and during the employment, he had never had chest X-ray examinations, and wore no masks while performing his duties. Other than his regular job with the hospital, he also often moonlighted as a tour bus driver and guide for occasional bus tours heading for close-by scenic spots in the area, such as Sanlin Creek, Nantou County. Whenever he was away or out of town, his wife would take over his job of driving patients around, and their little son would stay with his mom on the shuttle bus . In accordance with the above-stated records, we traced back and identified 64 individuals as Mr. Wu's case contacts, including 23 patrons of the hemodialysis unit and 3 family companions on the trips that supposedly had direct contact with Mr. Wu, plus 29 other hemodialysis patients, one family companion, and 8 staff members of the hemodialysis room as indirect contacts. Incidentally, among the indirect contact group, three persons

were found to have passed away. The hospital searched and located some chest X-ray photographs of those deceased taken between September and November 2005 and had them pored by a medical chest specialist. The good doctor found one of the dead appeared to have aberrant chest conditions while still alive, but the signs were not evident or serious enough to ascertain that he had pulmonary TB. More search into descriptions on their death certificates and comparison with information gathered from a national database of TB cases proved to us that none of them were suspected of having died of TB. The rest 61 contacts still alive were urged to take chest X-ray examinations between February 28 and March 1. According to the chest specialists studying all those X-ray photos, 4 subjects had abnormal appearances. We gathered the chest X-ray photos of all involved 64 contacts (including some old photos) and sent them to some other chest specialists under the contract with Nantou County Chronic Disease Control Institution for second opinions. The results were summarized in Table 1. The reviewing physicians suggested us to collect three sputum samples from each of the four contacts with abnormal chest conditions and sent them to three different laboratories for more tests. All personal data were keyed into a national TB case database for comparison and it was affirmatively proven that none of the contacts were ever notified TB cases.

IV. Control approaches

The local health bureau in charge of the neighborhood where the index case resided duly followed the protocol specified in the *Taiwan TB Manual*, i.e. it ordered the engaging hospital to attentively carry out all necessary TB control-related measures, including improvement of health education aiming at TB control, proceeding with tracking down all case contacts, and the stipulation

that all hospital workers have to observe infection prevention measures. Taiwan's health care system has recently experienced a wake-up call from a sudden outbreak of Severe Acute Respiratory Syndrome (SARS). After that, Taiwan CDC tried its best to completely overhaul the regulations and protocols of various infection control measures for domestic hospitals. For the sake of TB control, the law now stipulates that regular healthcare workers at all hospitals should have chest X-ray examinations once every year. However, it is not in clear writing whether temporary and contract employees at hospitals or hired hands at independent hemodialysis centers are included in such new regulation. Because of this particular incident, Taiwan CDC sent official letters on March 9 and 14 respectively to all county and city health bureaus and Taiwan Society of Nephrology, requesting that all their healthcare personnel, administration staff, hemodialysis center employees and contract personnel engaged in direct contact with patients at the workplace must each take a chest X-ray picture annually, and the resulting photos must be carefully examined by either a medical chest specialist or a radiologist. In accordance with this newly promulgated regulation, we duly asked the above-mentioned hospital to change their annual employee chest X-ray checkup routine by adding their contracted outside workers to the list of recipients.

Pulmonary TB is a chronic infectious disease. Its onset is closely related to the immunity condition of the individual involved, and patients on hemodialysis therapy by definition have much weaker than normal immunities. Therefore, the respective county health bureau should keep tracking those contacts of Mr. Wu for at least two years. During this tracking period, the hospital ought to set up a coughing surveillance mechanism at its hemodialysis unit in order to detect possible pulmonary TB sufferers at the earliest developing stage. Meanwhile, all

those contacts are now scheduled to take another X-ray examination three months from the last one.

V. Conclusions

Judging from our tracking down survey, we consider the driver Mr. Wu the index case of this particular TB outbreak, because he is identified as a legitimate open TB sufferer, and in fact he has passed on the disease to his toddler son. Now, we know that there are 26 hemodialysis service users having had direct contact with Mr. Wu while boarding the bus Mr. Wu drove, and another 30 patients of the same nature are classified as indirect contacts. Yet we are still trying to figure out how long each contact having indeed been exposed to this particular infectious source in the past. So far through the preliminary chest X-ray investigations, we have found four patients of this risk group having developed abnormalities in their lungs, but such findings need further tests such as *M. tuberculosis* cultivation using sputum specimens in order to tell if it is the case.

This particular TB incident reminded us the very importance of administrative details on contract hospital workers. In other words, hospitals should by all means tighten up their management of those contract workers who are having contact with patients of weakened or compromised immunities, and give them necessary hygiene and health education or training, in order to avoid similar cases from happening again in the future. In addition, it has become clear that any shuttle bus driver responsible for transporting hemodialysis patients, such as Mr. Wu, should be wearing at least a surgical mask all the time on the job, to steer clear of the possibility of transmitting any respiratory diseases to the unfortunate hemodialysis patients.

Table 1. Results from reassessment of the chest X-ray examinations performed on 64 contacts of the index case, Mr. Wu.

Contact category	Results from reassessment of the chest X-ray examinations			Total
	Normal	Abnormal	Old TB	
	Direct contacts	23	3	
Indirect contacts	25 (2)	2 (1)	3	30 (3)
Healthcare personnel	8	0	0	8
Total	56 (2)	5 (1)	3	64 (3)

Remark: Number in the parenthesis is the number of deceased cases.