

Outbreak Reports

A Tuberculosis Outbreak at a School — Xinjiang Uygur Autonomous Region, China, 2019

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Summary

What is already known about this topic?

Worldwide, tuberculosis (TB) continues to be the most important cause of death from a single infectious agent, and China has a high TB burden. Although the reported incidence of TB in students is lower than that in general population, TB outbreaks in schools have continuously been reported in the past years, suggesting that schools are a high-risk setting for TB transmission.

What is added by this report?

In total, 31 TB patients were founded in students. Epidemiological linkage among all TB cases could not be determined due to absence of genome sequencing. However, based on the analysis of screening results, the index case was probably the source of transmission.

What are the implications for public health practice?

The preventative measurements should be implemented in schools. Adding TB examinations into entrance examinations and strengthening health education could find TB cases early, and improving ventilation could decrease the risk of TB transmission in schools.

On March 8, 2019, Aletai City People's Hospital in Xinjiang Uygur Autonomous Region confirmed and reported 1 student with pulmonary tuberculosis (TB). The Aletai-County CDC verified this TB case and carried out epidemiological investigation and close contact screening immediately according to the National Standard of Tuberculosis Prevention and Control in Schools (2017) (*1*). In total, 31 TB patients were identified and reported in this investigation.

INVESTIGATION AND RESULTS

This outbreak occurred at a vocational school with 26 classes in 3 grades with a total of 1,125 students (790 resident students) and 146 staff members. A school doctor was responsible for disease control work

and health emergencies. There were 392 male students (34.8%) and 733 female students (65.2%). Each dormitory room has 6 residents and the windows of the rooms were often kept closed, which may have resulted in poor ventilation. Each class has its own fixed classroom.

The index patient was a 21-year-old female student in Grade 3. The interview with this student revealed that she visited the local hospital in her place of origin on March 3, 2019 complaining of chest tightness and shortness of breath and was treated as a suspected TB case according to the Standard of Diagnosis for Pulmonary Tuberculosis (WS 288–2017) (*2*). Subsequently, she was transferred to the Aletai County designated TB hospital and hospitalized for further examination. On March 8, she was confirmed to have TB and was reported to the National Notifiable Disease Report System (NNDRS).

According to National Standard of Tuberculosis Prevention and Control in School (2017), Aletai-county CDC launched close contact screening immediately. All students and teachers sharing the same classroom and dormitory with the index case received suspected TB symptom screening, tuberculin skin test (TST), and chest X-rays (CXR). Sputum examination followed for those with TB symptoms or strongly positive purified protein derivative (PPD) reactions (defined as an average diameter exceeding 15 mm) or abnormal CXR to identify new cases. In total, 38 students and 8 teachers were screened from March 10 to April 9. Out of these close contacts, 16 out of 38 students (42.1%) and 2 out of 8 teachers (25%) had strong positive PPD reaction, and 5 TB cases were identified among students, including 3 bacteriologically positive TB patients. During this time period, 2 students visited the local hospital proactively and were diagnosed as bacteriologically positive TB and active TB respectively. Their close contacts were given screening by using the same screening procedure, and 2 clinically-diagnosed TB cases were founded.

Because new TB cases were identified, Aletai-

County CDC expanded screening to all students and teachers in the same floor of both the teaching building and the dormitory. Out of a total of 198 students and 63 teachers, 48 students (24.2%) and 8 teachers (12.7%) had strong positive PPD reaction, and 14 new TB cases were founded in students, including 4 bacteriologically positive TB patients. A third screening at a larger-scale was subsequently carried out, and all unscreened students, teachers, and other staff were screened. Strong positive PPD reactions were founded in 68 out of 838 students (8.1%) and 9 out of 37 teachers (24.3%), and 7 clinically-diagnosed TB cases were found among students.

Other strict control measurements were conducted in this school. All TB patients were treated in hospitals and given home-based treatment after discharge. Among persons having strong positive PPD reaction, 8 received preventative therapy (3), and others received periodic CXR at regular intervals of 3, 6, and 12 months after screening. In addition, daily symptom screening for each student and isolation of those with suspected TB symptoms were strengthened, and ventilation was improved in this school.

Absence of sputum culture resulted in a failure to conduct genome sequencing. The results of screening revealed that there were higher rates of strongly positive PPD reactions and TB incidence among students in the same floor of both the teaching building and dormitory with the index case, and these rates reached 42.1% and 15.4%, respectively, in the index patient's class. Because these students shared the same space, they had increased chances to come in direct contact with the index case, and the epidemiological linkage could therefore be established based on this analysis. According to the time of TB symptom appearance, the index case probably acted as the source of transmission among students in the same floor of both the teaching building and the dormitory. The epidemiological linkage of these patients with others could not be determined.

DISCUSSION

The epidemiological investigation yielded several contributing factors for this outbreak. First, preventative measures were not implemented in this school. Although TB examination for student entrance physical examination were required since 2010 (4), all students entering this school before 2018 did not receive examination. Students who had previously been infected with TB might have entered this school and

acted as the source of transmission for this outbreak.

Second, health education for students was insufficient in this school. During the first round of screening, a student with TB-like symptoms was diagnosed. This patient was likely to have onset of symptoms as early as January 2019 but did not visit a hospital until March 16 because of worsening condition. Delayed diagnosis and treatment increased the risk of transmission in this school, especially among classmates.

Finally, environmental hygiene was not sufficient in this school. Ventilation is an important measure for TB infection control, and the classrooms and dormitories had poor ventilation. Cases of pulmonary TB in classrooms and dormitories are likely to transmit infectious aerosols in rooms with poor ventilation, and students coming into contact are at high risk of infection.

This investigation showed the implementation of preventative measures were important for TB control in schools. Under the guidance of local CDCs, entrance examinations, health education, and improved environmental conditions in schools could establish a firm foundation for TB control and prevention.

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