Notes from the Field

Large Tuberculosis Contact Investigation Involving Two Hospitals — Okaloosa County, Florida, 2014

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On June 2, 2014, the Director of the Florida Department of Health in Okaloosa County (DOH-Okaloosa) was notified by the infection control practitioner (ICP) at hospital A that four nurses working on the same unit were noted during March–May 2014 to have conversions of tuberculin skin test (TST) results. All four nurses had negative TSTs in 2013, but had induration ranging from 8 mm* to 16 mm during March–May (*1*). Results from follow-up interferon gamma release assays (IGRA) were also positive† (*2–4*). Hospital A was historically considered to be at low risk for tuberculosis according to annual risk assessments (*1*) and had not had any TST conversions among staff members in more than a decade. The testing schedule at hospital A included TSTs for all newly hired employees and random TSTs on hospital staff members from various units throughout the year.

On the basis of a review of annual TST testing results, including zero staff member conversions among 70 random TSTs performed during the first quarter of 2014, the hospital A ICP concluded that tuberculosis transmission had probably recently occurred on the unit where the four nurses worked. The ICP determined from employee screening records that one of the four nurses had tested negative upon hire in August 2013, and had converted by May 2014. This 9-month window represented the shortest period within which to research potential exposure to undiagnosed tuberculosis. The ICP used nurse staff schedules to review medical records of patients cared for by all four nurses, and identified a United States-born, HIV-negative male patient in his early 60s with chronic obstructive pulmonary disease and a history of alcohol and substance abuse as the possible index patient.

The patient had been brought to hospital A on November 16, 2013, after being found unresponsive in his home and received a preliminary diagnosis of aspiration pneumonia. Although his chest radiograph showed pulmonary cavities, tuberculosis was not suspected. No sputum specimens were collected, and the patient was treated with levofloxacin and other broad-spectrum antibiotics. The patient received care on three different units in hospital A, until his discharge on January 27, 2014. Approximately 1 week later, he was admitted to hospital B, where he received care on four different units. Sputum specimens were collected during the patient's admission at hospital B; however, all three acid-fast bacilli smears were negative, and the pending cultures were discarded when the patient died on April 1, 2014. The putative cause of death was listed as respiratory failure, secondary to cardiac arrest. No post-mortem examination was performed.

Contact investigations were initiated on June 10, 2014, (hospital A) and June 18, 2014, (hospital B). Investigators reviewed nursing staff schedules to identify contacts of the putative source patient (*5*). Investigators also reviewed the patient's records from both hospitals. Factors considered when prioritizing hospital contacts included frequency and duration of contact with the patient; the contact's age and immune status; environmental factors; and participation in tracheal intubation and percutaneous endoscopic gastronomy tube suctioning, as these procedures can generate aerosols (*5*). Because tuberculosis transmission was believed to have occurred at hospital A, contacts at high risk included all of the patient's direct caregivers (nurses, nursing assistants, and staff members who had spent at least 8 cumulative hours with the patient), the patient's roommates, and staff members who had shared air with the patient but did not have direct contact with him, including anyone assigned to the units where the patient stayed. At hospital B, the investigation focused only on the patient's direct caregivers and roommates.

At both hospitals, a TST was recommended for all contacts at high risk with no history of a positive TST or IGRA test result, and who had never received a Bacillus Calmette-Guérin (BCG) vaccine, which can cause a false-positive reaction to the TST. IGRAs were recommended for persons who were tested with an IGRA upon hire or who had previously received a BCG vaccine (*1,2*). IGRAs were also used as a secondary test for persons who developed a TST induration <10 mm. A symptom-based assessment was conducted for contacts with a past positive TST or IGRA. Chest radiographs were obtained for persons with TST induration ≥10 mm, a positive IGRA

* Before investigations began, 8 mm would have been classified as a negative result; however, in the context of three other positive tuberculin skin test conversions (>10 mm) among nurses on the same unit, an 8 mm induration in a nurse with a 0 mm TST result upon hire the previous year was considered positive.

† CDC generally recommends against using IGRAs as "confirmatory" tests after a positive TST result, except on a case-by-case basis. It was decided to use IGRAs to confirm the positive TST results in this investigation to determine whether TST conversions might have been because of hospital A's switch from Tubersol (Sanofi Pasteur Limited) purified protein derivative (PPD) tuberculin skin test antigen solution to Aplisol (JHP Pharmaceuticals, LLC) PPD TST antigen solution during a Tubersol shortage from late 2012 to April 2013. According to CDC, TST conversions could be caused by "inherent interproduct or intermethod variability."

result, or symptoms consistent with tuberculosis disease, or history of a positive TST or IGRA result (*5*).

In total, 244 hospital contacts and seven community contacts were sought for examination. Among 177 contacts from hospital A, and 67 from hospital B, 169 (95%) and 62 (93%), respectively, were tested, or had a documented tuberculosis test with a negative result approximately 12 weeks[§] after exposure to the suspected source patient. Thirteen hospital workers (5%) who were no longer employed by the hospitals could not be contacted, despite three attempts by DOH-Okaloosa or hospital personnel. During the hospital A investigation, two additional nurses assigned to the same unit as the original four nurses with TST conversions were found to have positive TST results, bringing the total to six (3%) conversions among 244 hospital staff members tested from both hospitals. Review of nurse staffing records indicated that the six nurses had spent a median duration of 82 hours (range = 12–204 hours) with the suspected source patient at hospital A during November 2013–January 2014; he was presumed to be most infectious early in his hospitalization, before initiation of antibiotic therapy, including levofloxacin.

On the basis of the low number of conversions identified at hospital A, and because the conversions occurred only among nurses who had spent extended periods of time in the suspected source patient's room, testing was not expanded to other persons at hospital A. No conversions were identified at hospital B. Three of four roommates of the suspected source patient from both hospitals were tested; all had negative results. One roommate died of other causes. Three of the seven community contacts had positive results. One contact received treatment for latent tuberculosis infection, one was treated as a clinical tuberculosis disease case until cultures were reported as negative, and the third contact was an out-of-state resident with symptoms consistent with tuberculosis disease identified via a phone interview. The appropriate state health agency was notified through an interjurisdictional transfer, which allowed for follow-up by the state of jurisdiction.

The DOH-Okaloosa's relationships with local ICPs were essential for the successful investigation of this cluster. Earlier consideration of tuberculosis might have reduced tuberculosis transmission at hospital A. This investigation highlights the importance of considering tuberculosis in differential diagnoses, even in counties where tuberculosis is uncommon and when patients are admitted for reasons other than tuberculosis, if patients have findings suggestive of tuberculosis, such as pulmonary cavities.

[§] The recommended period between most recent exposure and final tuberculin skin testing is 8–10 weeks (http://www.cdc.gov/Mmwr/preview/mmwrhtml/rr5415a1.htm). A conservative time period of 12 weeks was used during this investigation, although this is not routine practice.

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