

tal cleaning,<sup>15</sup> HCW education, and surveillance and isolation of new NICU admissions with *S. marcescens* infection or colonization terminated transmission. Extrinsically contaminated soap containing 1% chlorxylenol, a phenol derivative, amplified a reservoir of *S. marcescens*, resulting in a discernible outbreak.

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## Lack of Isolation Despite Respirator Use Leads to MDR-TB Outbreak

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An outbreak of seven cases of multidrug-resistant (MDR) tuberculosis (TB) occurred in a hospital in Chicago, all on one floor. The outbreak involved six patients and one healthcare worker, all of whom had AIDS. Case-patient 1 was admitted to the hospital and placed in a private room, and workers were required to wear a high-efficiency particulate (HEPA) respirator. Case-patient 1 refused to remain in the room and was the source of infection for case-patient 2. Case-patient 2 remained in his room, but was the source of infection for case-patients 3, 4, 5, and 6. Case-patient 7, a healthcare worker, drew blood from case-patient 2 before a diagnosis of TB was made. Case-patients 1 and 2 never were placed in acid-fast bacilli (AFB)-isolation rooms (negative pressure with >6 air exchanges per hour), because these rooms were not available at the time. Case-patients 4, 5, 6, and 7 all were placed in newly installed AFB isolation rooms. Case-patient 3 did not have sputum samples smear-

positive for AFB. Smoke-tube testing revealed that the private rooms used by case-patients 1 and 2 had positive air pressure in relation to the hall, and the AFB-isolation rooms had negative air pressure in relation to the halls. All seven *Mycobacterium tuberculosis* isolates were resistant to isoniazid and rifampin and had matching DNA fingerprints. Of patients exposed to *Mycobacterium tuberculosis*, those who developed TB had lower CD4+ T-lymphocyte counts and were more likely to be ambulatory than those who did not. Of the 75 exposed healthcare workers, the 11 (15%) who had conversion on tuberculin skin testing were no more likely than those who did not have conversion to report that they always wore a respirator with a HEPA filter.

Several factors are believed to have contributed to this outbreak. Case-patients 1 and 2 both were infectious, and the flow of contaminated air from their rooms (which had positive air pressure in relation to the hall) facilitated the spread of infectious droplet nuclei throughout the outbreak floor. Organisms were spread to healthcare workers who did not

directly care for a patient with TB and to one secretary who did not have patient-care responsibilities. In this situation, a respiratory protection program did not prevent transmission to healthcare workers. Case-patients 1 and 2 were placed on anti-tuberculosis medication either at admission or within 3 days of admission, but the delayed recognition of and inadequate therapy for MDR-TB could have contributed to transmission. The authors note that the excellent skin-testing program facilitated the detection of new cases and that germicidal ultraviolet irradiation (which was not used in this facility) may be used as a supplemental environmental control measure to reduce concentrations of infectious droplet nuclei. Finally, a respiratory protection program alone cannot protect all healthcare workers from infection, especially those who work on the wards but do not enter patient rooms. Prompt identification of patients with TB and appropriate isolation need to be emphasized.

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