

A prolonged outbreak of Legionnaires' disease associated with an industrial cooling tower – how far can airborne transmission spread?

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Background: In outbreaks of Legionnaires' disease (LD) associated with cooling towers (CT), airborne transmission has been reported to extend up to 2-3 km. From November 2003 to January 2004, 86 confirmed cases of LD occurred in a 12-km radius around Harnes, a rural commune in northern France. We investigated the source of the outbreak and risk factors for developing LD.

Methods: Following the descriptive study, a case-control study matched 59 patients to three controls per case by commune of residence, age and sex. Water samples taken from all patient's homes and potential sources of contamination within 12 km of Harnes were cultured for Legionella. Isolates were subtyped using pulsed field gel electrophoresis (PFGE). Atmospheric dispersion of potentially contaminated aerosols was modelled based on emissions from CT of a suspected plant (plant A) in Harnes and meteorological data.

Results: The epidemic curve was bimodal suggesting a common intermittent source of infection. The risk of LD increased for persons who smoked (OR=2.7; 95%CI=1.1-6.8), had silicosis (OR=3.6; 95%CI=1.3-9.9) or had spent >100 min per day outdoor during the 10 days prior to illness (OR=3.1; 95%CI=1.1-9.0). The 23 clinical strains had an identical PFGE pattern to isolates from the CT of plant A. The first wave of the outbreak ended following closure of the CT. The second wave started within one incubation period of reopening of the CT and lasted until closure of plant A. The aerosol dispersion curves over the area support the hypothesis that the source of the outbreak was the CT of plant A.

Conclusions: We suggest that the outbreak resulted from airborne transmission of legionella over a distance of 12 km from a contaminated industrial CT.

Keywords: aerosol exposure, cooling towers, Legionella, Legionnaires' disease, outbreak