

A community outbreak of Legionnaires' disease caused by outdoor hot tubs for private use in a hotel

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Abstract

Background. Along the period October - November 2017, twenty-seven cases of legionellosis associated with a touristic neighborhood of Palmanova (Mallorca, Spain) were declared to the Spanish Health Authorities. Near all cases were reported by the European Centre of Disease Prevention and Control (ECDC) as travel associated cases of Legionnaires' disease (TALD), mostly in different cluster alerts. No cases were reported among the local population residing in the area.

Methods. ECDC definitions were used for confirmed and probable cases of Legionnaires' disease (LD). Epidemiological information on the cases was collected and reported following usual European Legionnaires' disease Surveillance Network (ELDSNet) procedures. All tourist establishments associated with one or more TALD cases were inspected and sampled by public health inspectors. Possible incidents in the operation of the municipal water distribution network, which was also sampled, were investigated. All relevant sources of aerosol emission initially detected were investigated and sampled: public and private sprinkler irrigation systems, ornamental fountains, beach showers, street cleaning vehicles, and a car wash station. An active search was carried out, with the help of the local police, of other possible sources of aerosol emission, including misting cooling units that had been in operation during the outbreak period and the previous month. The absence of active cooling towers in the affected area was verified, documentary and on-spot. Eventually, samples of hot tubs for private use located on the terraces of the penthouse rooms of a hotel in the area were included in the study.

Results. 27 cases of Legionnaires' disease were reported in this outbreak (26 confirmed and 1 probable). 24 cases were diagnosed outside Spain, after the return of those affected to their country of origin. All cases except one (a worker at one of the hotels in the area) were tourists staying in 11 different hotels or touristic apartments of the affected area. One of the hotels was associated with 10 cases, one with 4, one with 3, two with 2, and the rest with 1 case. All hotels associated with cases were located within a radius of about 200 meters from the epicenter of the outbreak. Three clinical isolates were identified as *Legionella pneumophila* sg1, mAb type France/Allentown, ST 82. In three additional cases partial SBT profiles were obtained, all of them compatible with ST 82. 176 samples of water from the different potential sources were collected and tested for *Legionella* spp. Identical *Legionella pneumophila* serogroup 1, France/ Allentown, ST 82 isolates were recovered from the hot tubs for private use of a hotel in the area. Extremely high concentrations ($> 10^6$ CFU/L) of *L. pneumophila* were found in the unused hot tubs of vacant rooms of the hotel in question.

Discussion. The hot tubs for private use on the terraces of penthouse rooms of a hotel were the most likely source of this community outbreak. To our knowledge, this could be the first outbreak of Legionnaires' disease caused by outdoor hot tubs for private use affecting a wide geographical area. Stagnation, reduced maintenance in vacant rooms and location of the involved hot tubs likely contributed to the growth and subsequent spread of *Legionella* in the community. In this outbreak, the environmental investigations were key to elucidating its origin. Hot tubs for private use located outdoors should be considered when investigating community outbreaks of Legionnaires' disease of unclear origin.