

LEGIONELLOSIS, FATAL - GERMANY: (BAVARIA, BADEN-WUERTTEMBERG)

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Preliminary report: outbreak of Legionnaires' disease in the cities of Ulm and Neu-Ulm in Germany, December 2009 - January 2010

[Rapid communications: H von Baum, G Haerter, A Essig, et al]

Currently an investigation is ongoing to explore and control an outbreak of Legionnaires' disease affecting 65 people as of 22 Jan 2010, in the cities of Ulm and Neu-Ulm, southwest Germany. A hitherto unidentified wet cooling system in these twin cities is considered as the most likely source of infection.

On 5 Jan 2010, Ulm University Hospital informed the local health office of a cluster of hospitalisations due to community-acquired pneumonia caused by *Legionella pneumophila* serogroup (sg) 1. As of Fri 22 Jan 2010, 65 cases including 5 deaths were under investigation by the local and regional health authorities. With only a few exceptions all cases were living or working in Ulm or Neu-Ulm in southwest Germany. All cases are German residents aged between 27 and 96 years (median age 67 years).

The majority of patients identified as of 22 Jan 2010 had to be hospitalised, n=61. All patients and, if the clinical condition of the patient made an interview impossible, their family members, were interviewed using a standardised questionnaire to investigate potential sources of exposition, personal risk factors and the onset of symptoms. For 40 cases the onset of symptoms was during the last week of December 2009. All but 2 patients who were admitted to our hospital had underlying diseases.

Clinical findings

In 41 of the patients who had been admitted to the University Hospital the following clinical symptoms were observed: fever in 35 of 41 patients, cough in 30 of 41 patients, abdominal pain and/or diarrhea in 11 of 41 patients, and symptoms relating to the central nervous system (confusion, somnolence or loss of consciousness, fainting) in 27 of 41 patients. In all patients' chest radiographs showed an infiltrate. All patients were treated with standard antibiotic treatment consisting of a macrolide (clarithromycin), or preferably a fluoroquinolone (levofloxacin) for at least 14 days (1). 4 patients required mechanical ventilation. 4 patients, 2 of whom had received mechanical ventilation and who had been treated in the

University Hospital, died between several hours and 8 days after admission. The other patients responded well to treatment and the majority recovered promptly. The median length of hospital stay of the patients who were discharged as of 22 Jan 2010 was 9.9 days (range 4-16 days).

Laboratory investigations

For the investigation of the outbreak, the case definitions of the European Working Group on *Legionella* Infection were applied (2).

Results

All patients with a microbiological workup in our laboratory had a positive urinary antigen test. PCR for *L. pneumophila* was positive in the respiratory material of 10 patients. Four clinical isolates belonging to sg1 were further subtyped by using monoclonal antibodies (MAb). All these isolates were identified as monoclonal subtype Knoxville (carrying the virulence associated epitope recognised by MAb 3-1 monoclonal antibody) (3). Molecular identification of cultured legionellae was achieved by 16S rRNA gene sequencing that showed a 99 percent homology to *L. pneumophila* in 3 isolates. So far, one isolate was genotyped and belongs to sequence type (ST) 62 (4).

Epidemiological investigations and findings

Epidemiological and environmental investigations are coordinated by the local authorities in Ulm and Neu-Ulm, with support of the state health offices in Baden-Wuerttemberg and Bavaria. Investigations are in progress to identify the potential source of this outbreak by comparing environmental isolates from the patients' [homes] and wet cooling systems from the areas of both cities with the clinical [isolates]. According to the patient interviews, the cases had no common exposure to water supplies in public buildings, hotels, sport facilities, or similar sources. Only living in, working in, or visiting Ulm or Neu-Ulm appeared as a common characteristic of the affected persons. Further epidemiological investigations are planned.

Conclusions

This is the largest community-associated outbreak of Legionnaires' disease recognised in Germany so far. In dealing with the event several important steps in outbreak detection and management were confirmed: the importance of a rapid clinical diagnosis and thorough microbiological confirmation and the immediate involvement of the health authorities. The latter is necessary to initiate investigations to detect the source of the outbreak, to raise awareness of the problem in the community and to optimise

communication of all involved parties. Furthermore we realised that an outbreak of Legionnaires' disease most likely related to wet cooling systems is not restricted to the warm seasons.

Hospitals, general practitioners and the public have been informed of the situation by the local authorities on a regular basis, starting on 5 Jan 2010. As of 23 Jan 2010, health authorities have no indication that persons from other countries have been affected. The last clinical case was hospitalised on 13 Jan 2010. We would be grateful for any reports of cases from other countries that could potentially be linked to this outbreak.

References

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2. European Working Group for Legionella Infections (EWGLI). Case definition. London: EWGLI. Available from <http://www.ewgli.org/data/european_guidelines/eg_appendix1.pdf>.
3. Helbig JH, Bernander S, Castellani Pastoris M, et al: Pan-European study on culture-proven Legionnaires' disease: distribution of *Legionella pneumophila* serogroups and monoclonal subgroups. *Eur J Clin Microbiol Infect Dis*. 2002 Oct; 21(10): 710-6. [Abstract available from <<http://www.ncbi.nlm.nih.gov/pubmed/12415469>>].
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[Legionnaire's disease is the acute pneumonic form of infection caused by Gram-negative bacilli of the genus *Legionella*, which are environmental microorganisms found in soil and water. About 80-90 percent of cases are caused by *L. pneumophila* serogroup 1. Legionnaires' disease is usually acquired by inhalation by a susceptible person of an infectious dose of aerosolized *Legionella*. Risk factors in

adults include age over 50 years, cigarette smoking, diabetes, chronic heart or lung disease, and immuno-suppression. Pediatric cases of Legionnaires' disease are uncommon.

Usually a building's water system is incriminated as the source. *Legionella* are found primarily in the hot water portion of plumbing systems and in cooling towers. Warm water temperatures of 25-40 deg C (77-104 deg F) support the highest concentrations of the organism in plumbing systems. In addition, *Legionella* are embedded in a biofilm that lines the inner walls of the plumbing system's pipes and containers. Concentrations of the organism in the water can be increased by any disruption of this biofilm. Infectious aerosols can be generated by a building's faulty air conditioning systems, shower heads, whirlpool spas, grocery store mist machines, decorative fountains, respiratory therapy equipment, or industrial plants.

Some industrial plants, which can disseminate large volumes of potentially contaminated water aerosols over long distances, could be involved in community-wide outbreaks (see Addiss DG, Davis JP, LaVenture M, et al: Community-acquired Legionnaires' disease associated with a cooling tower: evidence for longer-distance transport of *Legionella pneumophila*. Am J Epidemiol 1989; 130(3):557-68; abstract available from <<http://www.cababstractsplus.org/abstracts/Abstract.aspx?AcNo=19902073525>>; Che D, Decludt B, Campese C, Desenclos JC: Sporadic cases of community acquired legionnaires' disease: an ecological study to identify new sources of contamination. J Epidemiol Community Health. 2003 Jun; 57(6): 466-9; available from <<http://jech.bmj.com/content/57/6/466.abstract>>; and Blystad H, Brantsaeter AB, Lovoll O: Outbreak of community-acquired legionnaires' disease in southeast Norway, May 2005. Euro Surveill. 2005; 10(21): pii=2709. Available from <<http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2709>>).

Elimination or reduction of legionella colonization in a hot water system is difficult. For a discussion, please see <<http://www.dhmv.state.md.us/html/legionella.htm>>.

Ulm, in the state of Baden-Wuerttemberg, is a city on the Danube with a population of about 120 000 in 2006 (<<http://en.wikipedia.org/wiki/Ulm>>). Neighboring Neu-Ulm is a town in the state of Bavaria with a population of 51 110 in 2005 (<<http://en.wikipedia.org/wiki/Neu-Ulm>>). Ulm and Neu-Ulm can be located on the HealthMap/ProMED-mail interactive map of Germany at <<http://healthmap.org/r/013x>>. - Mod.ML]

[see also:

Legionellosis - France: (AM) 20100115.0185 2009

Legionellosis, fatal, hotel - United Arab Emirates: (Dubai) 20090205.0509 2007

Legionellosis, hotel - Scandinavia ex Thailand (Phuket): alert 20070113.0178 2006

Legionellosis, tourists - Malaysia 20061027.3064 Legionellosis, craft fair - France (Lorraine) 20061012.2924 Legionellosis - France (Paris) (02): background 20061002.2823 Legionellosis, spa pool - UK (England) 20060929.2787 Legionellosis - France (Paris) 20060928.2775 Legionellosis - Italy (Venice): alert 20060912.2588 Legionellosis - Switzerland (Aargau) 20060816.2292 Legionellosis - Netherlands (Amsterdam)(03) 20060719.1982 Legionellosis - Netherlands (Amsterdam): alert, RFI 20060713.1929 Legionellosis - Spain (Pamplona)(03) 20060609.1611 Legionellosis - Spain (Pamplona) 20060604.1558 2005

Legionellosis, potting soil - New Zealand (South Island) 20051027.3126 Legionellosis - Australia (NSW) 20050216.0526 Legionellosis, hotel - Sweden (Dalarna): susp. 20050204.0383 Legionellosis, fatal, potting soil - Australia (VIC): 2004 20050123.0250 2004

Legionellosis, fatal 2003 - UK ex India 20040628.1724 1999

Legionellosis - Singapore 19991024.1913 Legionellosis - UK ex Thailand 19990422.0673 Legionellosis, imported - Thailand 19990320.0442 1998

Legionellosis - Thailand ex India (02) 19980530.1039 Legionellosis - Thailand ex India: RFI 19980520.0974]ml/mj/dk