Outbreak of Legionnaires' disease in a nursing home, Slovenia, August 2010: preliminary report

A Trop Skaza (alenka.skaza@zzv-ce.si)[1], L Beskovnik[1], A Storman[1], S Ursic[1], B Groboljsek[2], D Kese[3]
1. Institute of Public Health Celje, Slovenia
2. Primary Health Care Centre Sevnica, Slovenia
3. Institute of Microbiology and Immunology, University of Ljubljana, Slovenia

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We report an outbreak of Legionnaires' disease in a nursing home in Slovenia in August 2010 affecting 15 of 234 residents. To date, Legionnaires' disease has been confirmed in four patients. Further serum analyses and genotyping of isolates are ongoing. The building's water distribution system with dead end sections has been identified as the probable source of infection.

The regional institute of public health Celje, Slovenia, was informed on 19 August 2010 that one resident from a nursing home in the region had been hospitalised with pneumonia caused by *Legionella pneumophila*, serogroup 1. On 20 August 2010, an epidemiological investigation was launched that revealed an outbreak of Legionnaires' disease with the onset of symptoms in the first case on 8 August. For the investigation of the outbreak, the case definition of the European Working Group for *Legionella* Infections were applied [1]. A case was classified as confirmed when they met the clinical and laboratory criteria for Legionnaires' disease [2].

In total, 15 of 234 residents of the nursing home showed clinical signs of the Legionnaires' disease between 8 August and 28 August 2010 (Table, Figure). The average age of cases was 55 years (ranging from 37 to 80 years) and 10 were male. None of them had left the institution during the incubation period. No further cases have been detected as of 29 September 2010.

In the following short report we would like to share our experience with others who have been involved in management of similar outbreaks.

Clinical findings and hospitalisation

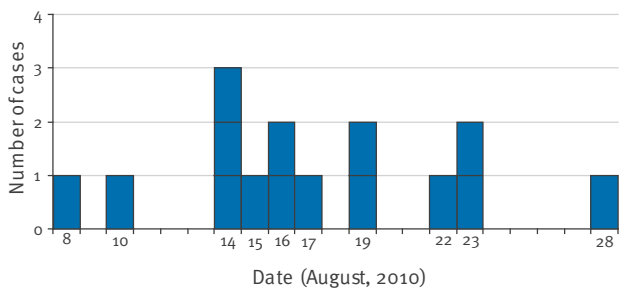
All patients in this outbreak had fever (≥39oC) and some experienced dyspnoea (n=5), coughing (n=5), muscle and joint pain (n=4), chills (n=2), malaise (n=2), abdominal pain (n=2) and vomiting (n=2). Three patients experienced confusion, restlessness and/or headache. Twelve patients were mentally or psychologically impaired and in addition, patients had other pre-existing illnesses including conditions following ischaemic cerebrovascular insult, diabetes, asthma, chronic obstructive lung disease, urogenital cancer, plasmocytoma, spastic tetraparesis, multiple sclerosis and arterial hypertension (Table). Nine patients were smokers and two were former alcohol addicts. One patient was receiving immunosuppressive therapy during the incubation period for *Legionella*.

The C reactive protein values from samples taken at the onset of each patient's symptoms ranged from 100 to 350 mg/L.

Six patients were hospitalised with a medium length of hospital stay of 7.5 days (ranging from 2 to 15 days). Chest radiographs, taken from these six patients at various times of their hospitalisation, showed an infiltrate. Three of them received antibiotic therapy with fluoroquinolone (moxifloxacin) which is appropriate for *Legionella* [3, 4]. One patient, who was admitted with heart failure eight days before the index case, was not subject to diagnostic tests for Legionnaires' disease at that time. After the index case was confirmed, we also tested his serum for *Legionella* with a positive result for IgG (1:512) (IgM ‹1:16), urine tested negative. The two patients, hospitalised before the index case was confirmed.

Figure

Epidemic curve for Legionnaires' disease cases by date of onset of symptoms, Slovenia, August 2010 (n=15)



The remaining nine patients were treated as outpatients. Before the index case with Legionnaires' disease was identified on 19 August 2010 they had received antibiotics that were not appropriate for legionellosis. After *L. pneumophila* was suspected as the cause of their disease, they were treated with fluoroquinolone antibiotics.

None of the 15 patients identified in the outbreak needed mechanical ventilation. All made a full recovery.

Laboratory investigations

The microbiological diagnostics were performed by the regional microbiology laboratory in Celje and the Institute of Microbiology and Immunology at the medical faculty in Ljubljana. Urine samples from the 11 patients were analysed using the BinaxNOW immunochromatography test. We have confirmed four cases positive for soluble antigen against *L. pneumophila* sg. 1 in the urine (Table). We could not collect urine samples from four incontinent patients.

Sputum for cultivation and identification of *Legionella sp.* was collected from six patients, who were able to produce enough material. Samples were analysed by real-time PCR using the reagent set *Legionella* species r-gene Primers/Probe (Argene) with the DICO Ampli r-gene DNA as internal control. For two patients, *Legionella sp.* DNA was confirmed in the sputum, and for one of these two, *L. pneumophila* sg. 1 was additionally confirmed through cultivation (Table). Genotyping of the isolates is currently in progress.

First blood samples were collected from 14 patients and analysed for specific IgM and IgG antibodies against *Legionella pneumophila* sg. 1-14 by indirect immunofluorescence (R-Biopharm) (Table). Serological investigation of paired sera is ongoing.

Environmental investigation and control measures

After the outbreak was identified on 20 August, a chemical disinfection of the cold and hot water system was done in the nursing home [5]. In addition, thermal disinfection was used for the hot water distribution system. Interventions also included maintaining appropriate water temperature of 55°C for hot water and below 20°C for cold water and disinfectant concentration, ensuring unobstructed flow in the hot and cold water distribution system by additional rinsing, identification and

Table

Laboratory results and existing conditions of Legionnaires' disease cases, Slovenia, August 2010 (n=15)

Patient	Onset of disease	Hospitalised	Urine sample	Sputum sample	Sputum sample	Serum 1. sample	Serum 1. sample	Existing conditions
				Culture	PCR	IgM	IgG	
1	8 August	No	Negative	Negative	Negative	1:128	1:256	Schizophrenia, head injury
2	10 August	Yes	Negative	-	-	<1:16	1:512	Schizophrenia
3	14 August	No	Negative	Negative	-	1:16	<1:128	Schizophrenia
4	14 August	Yes	Positive	-	-	-	-	Ischaemic cerebrovascular insult, arterial hypertension
5	14 August	No	-	-	-	1:64	<1:128	Epilepsy, cerebral atrophy
6	15 August	Yes	Positive	Positive (*L. pneumophila* sg. 1)	Positive	1:128	1:512	Schizophrenia
7	16 August	Yes	Positive	-	-	-	-	Schizophrenia
8	16 August	No	Negative	-	-	1:256	1:2048	Schizophrenia, diabetes
9	17 August	No	Negative	Negative	-	01:16	<1:128	Schizophrenia
10	19 August	No	Negative	-	-	01:16	<1:128	Asthma
11	19 August	No	-	-	-	01:16	<1:128	Chronic obstructive lung disease, urogential cancer
12	22 August	No	-	-	-	<1:16	<1:128	Oligophrenia
13	23 August	No	-	-	-	01:32	1:256	Dementia
14	23 August	Yes	Negative	Negative	Negative	01:16	<1:128	Schizophrenia, spastic tetraparesis, multiple sclerosis
15	28 August	Yes	Positive	Negative	Positive	<1:16	<1:128	Plasmocytoma

Negative means negative laboratory result.
Positive means positive laboratory result.
"-" means the sample was not taken (patients were not able to produce enough material).

removal of dead end sections, removal of sediment, cleaning of meshes, and inspection of problem areas where the water temperature and/or disinfectant concentration were found to be inadequate. In addition, we recommended that exposure of the residents to aerosols should be avoided (prohibition of showering and bathing). Considering the underlying conditions of the residents, we recommended brushing teeth with bottled water and drinking either bottled water or tea [6]. All these measures were performed until 17 September.

On 20 August 2010 we collected 23 environmental samples at the nursing home from different locations for cold and hot water before and after rinsing (sink faucets and shower heads in the shared bathrooms, sink faucets in the patient rooms, air condition devices, etc.). The presence of *Legionella* was confirmed according to the ISO standardised method using the Oxoid *Legionella* Latex Test, which can identify the following serotypes: *L. pneumophila* serotype 1, *L. pneumophila* serotype 2-14, and *Legionella sp.* [7], *L. pneumophila* serotype 1 and *L. pneumophila* serotype 2-14 and *Legionella sp.* was detected in concentrations ranging from ≤ 10 to 61,000 colony forming units (CFU)/1,000 ml.

Following the interventions described above, until 6 September, we collected additional 30 samples to monitor the effect of implemented measures. The results of environmental sample testing after the interventions ranged from ≤ 10 to 14,000 CFU/ 1,000 ml. According to these values, the disinfection in some places was inadequate and the interventions followed by sample testing had to be repeated [5]. We repeated 13 environmental samples. The results of repeated samples ranged from ≤ 10 to 80 CFU/1,000 ml and only *Legionella sp.* was isolated.

Genotyping of the environmental and human isolates is currently in progress.

Conclusions

We describe the first confirmed outbreak of Legionnaires' disease in residents of a nursing home in Slovenia. The underlying conditions of affected patients were relevant in this outbreak similarly to what has been described in the scientific literature [6,8]. The combination of several factors hindered earlier detection and control of this outbreak: the delayed x-ray examination of the first hospitalised patients, and the fact that the first four patients were treated in three different hospitals so that it was more difficult to establish a link between the cases. An earlier x-ray examination would have lead to the earlier detection of pneumonia and eventually Legionnaires' disease and environmental investigations could have started more timely. However, the rapid and positive interdisciplinary cooperation of epidemiologists and hygienists in the region after the detection of the index case has enabled us to control the outbreak shortly hereafter. The fact that no further cases have been detected as of 28 August 2010, indicates that the measures taken to control the outbreak have been successful so far.

References

1. European Legionnaires' Disease Surveillance Network (ELDSNet). Case definition. Stockholm: ELDSNet. Available from: http://www.ecdc.europa.eu/en/activities/surveillance/ELDSNet/Pages/EU%20case%20definition.aspx
2. Official Journal of the European Union 18.6.2008 L 159/65. COMMISSION DECISION of 28 April 2008 amending Decision 2002/253/EC laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council (reference number C(2008) 1589) 2008/427/EC. Available from: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:159:0046:0090:EN:PDF
3. Amsden GW. Treatment of Legionnaires' disease. Drugs. 2005;65(5):605-14.
4. Pedro-Botet L, Yu VL. Legionella: macrolides or quinolones? Clin Microbiol Infect. 2006;12 Suppl 3:25-30.
5. ASHRAE Guidelines 12-2000. Minimizing the risk of legionellosis associated with building water systems. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Atlanta, 2000.
6. Seenivasan MH, Yu VL, Muder RR. Legionnaires' disease in long-term care facilities: overview and proposed solutions. J Am Geriatr Soc. 2005;53(5):875-80.
7. Water quality -- Detection and enumeration of Legionella. ISO 11731:1998. Geneva: International Organization for Standardization; 2009.
8. Carratalà J, Garcia-Vidal C. An update on Legionella. Curr Opin Infect Dis. 2010;23(2):152-7.