



# An outbreak of Legionnaires' disease occurred in an area of northwestern Italy

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**Introduction and purpose:** *Legionella pneumophila* (LP) is recognized as a cause of atypical pneumonia known as Legionnaires' disease (LD). The incubation period of LD is typically 5–6 days (range 2-10 days) following exposure to aerosolized water containing the bacteria. Sporadic cases and large outbreaks of LD are reported worldwide. Numerous large outbreaks of LD have been reported typically associated with cooling towers, which distribute aerosolized plumes to relatively large areas. The present study reports an outbreak of LD occurred in Parma (Surface: 260,8 km<sup>2</sup>; Inhabitants:189.996 on 01 January 2015), northern Italy, spanning over a 2-month period during the year 2016.

**Commons Sources of Infection**

Outbreaks of Legionnaires' disease are often associated with large or complex water systems, like those found in hospitals, hotels, and cruise ships.

The most likely sources of infection include:

- Water used for showering (potable water)
- Cooling towers (parts of large air conditioning systems)
- Decorative fountains
- Hot tubs

[cdc.gov/legionella](http://cdc.gov/legionella)

**Methods:** From 27<sup>th</sup> August to 11<sup>th</sup> November 2016, 504 urine samples belonging to 499 patients were examined at the University Hospital of Parma for the direct detection of LP serogroup 1 antigen by immunochromatographic (Alere BinaxNOW *Legionella* Urinary Antigen Card – Alere, USA) and/or immunofluorescence (Sofia Legionella FIA – Quidel, USA) assays. Among the 499 patients, 239 were males (range 6-96 years, median age 72 years) and 260 females (range 2-99 years, median age 72 years). When a positive result was observed by the urine antigen test (UAT), a respiratory specimen for direct detection of microorganism by conventional culture and/or molecular method (Real-time PCR, Allplex Respiratory Panel 4 – Seegene, Korea) and serum samples for antibody evaluation by indirect immunofluorescence (*Legionella* IFA – Focus Diagnostics, USA) were requested in the microbiological report to the patient.

**Results:** Since 27<sup>th</sup> August 2016 when the first LP positive urine sample was reported in a 56-year-old woman, a total of fifty-one of the 499 analyzed cases was positive for the LP antigen (Figure 1). In particular, these positive cases belonged to 22 females (range 27–97 years, median age 69 years) and 29 males (range 41-87 years, median age 68 years). In the majority of the cases (29), these patients lived in the south-east district of the town or attended the same area for working or family reasons (Figure 2). The temporal and geographical distributions of cases are reported in Figure 1 and 2, respectively. Two patients with concomitant pathologies died. Respiratory specimens were sent to the laboratory only in 5 cases: 4 (2 bronchoalveolar lavages, 1 bronchoaspirate, and 1 sputum) which were collected 10-13 days after positive UAT were negative and 1 bronchoalveolar lavage, collected one day after positive UAT, was positive for LP only by the molecular method (Real-time PCR). For 39 patients, at least one serum sample was analyzed for the detection of specific LP antibodies: 11 were negative, 17 had a titer ranging from 1:16 to 1:64 and 11 a titer > 1/64. In 5 cases, after at least one week, a seroconversion (> 4-fold rise in antibody titer) was observed. In the same period, LP serogroup 1-8 antibodies were detected (titer ≥ 1:256) in the sera of 3 additional patients (with UAT negative in 1 case and not performed in 2 cases) living in the epidemic area (Table 2).

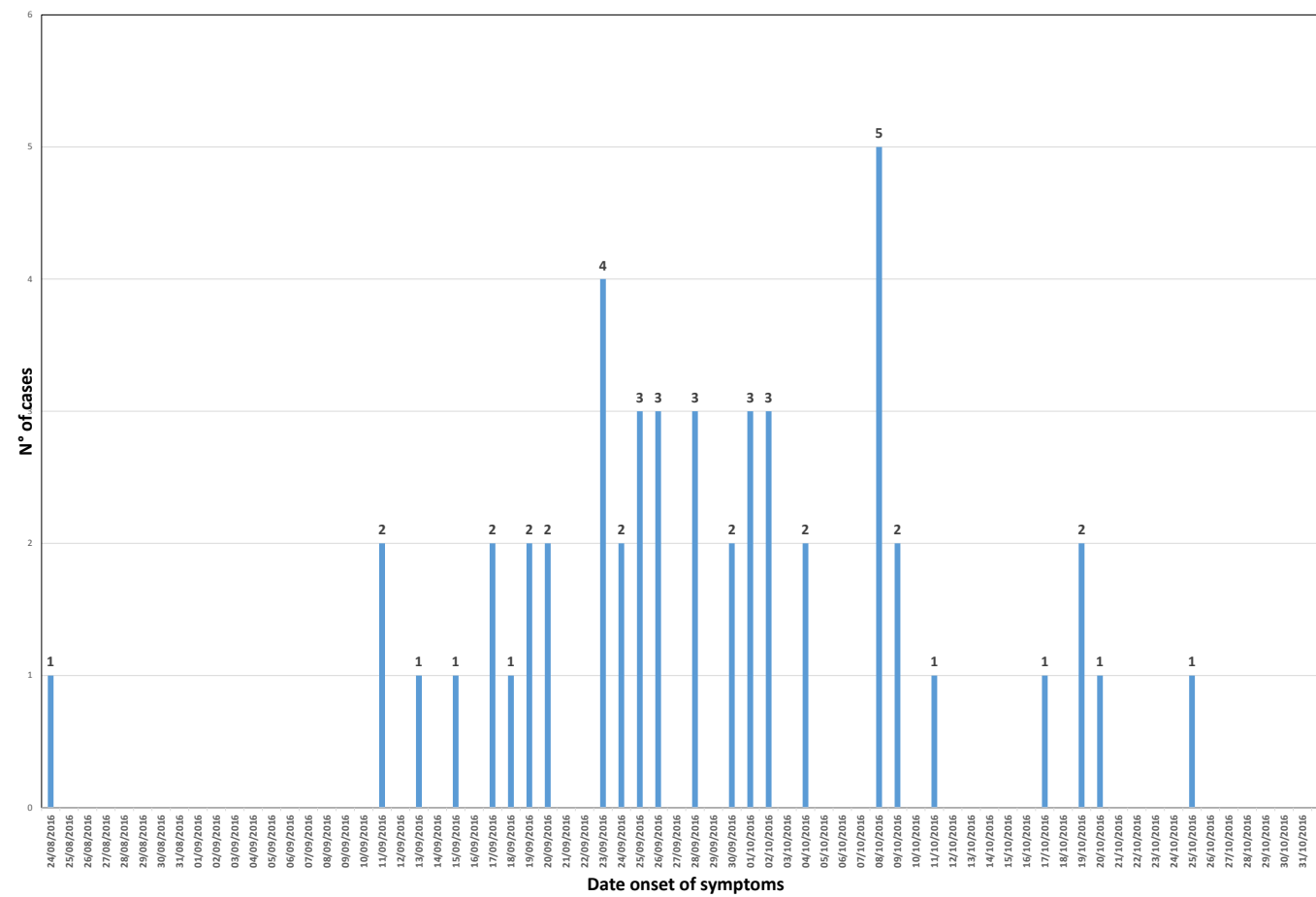


Figure 1. Temporal distribution of cases of *L. pneumophila* infection (27/08/2016 - 11/11/2016) based on the onset of the symptoms.

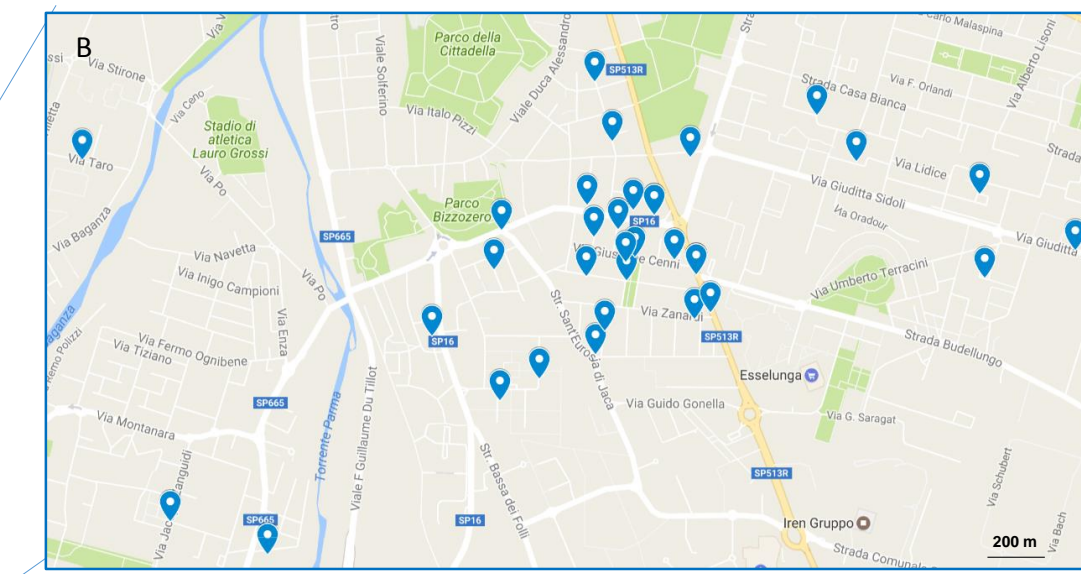
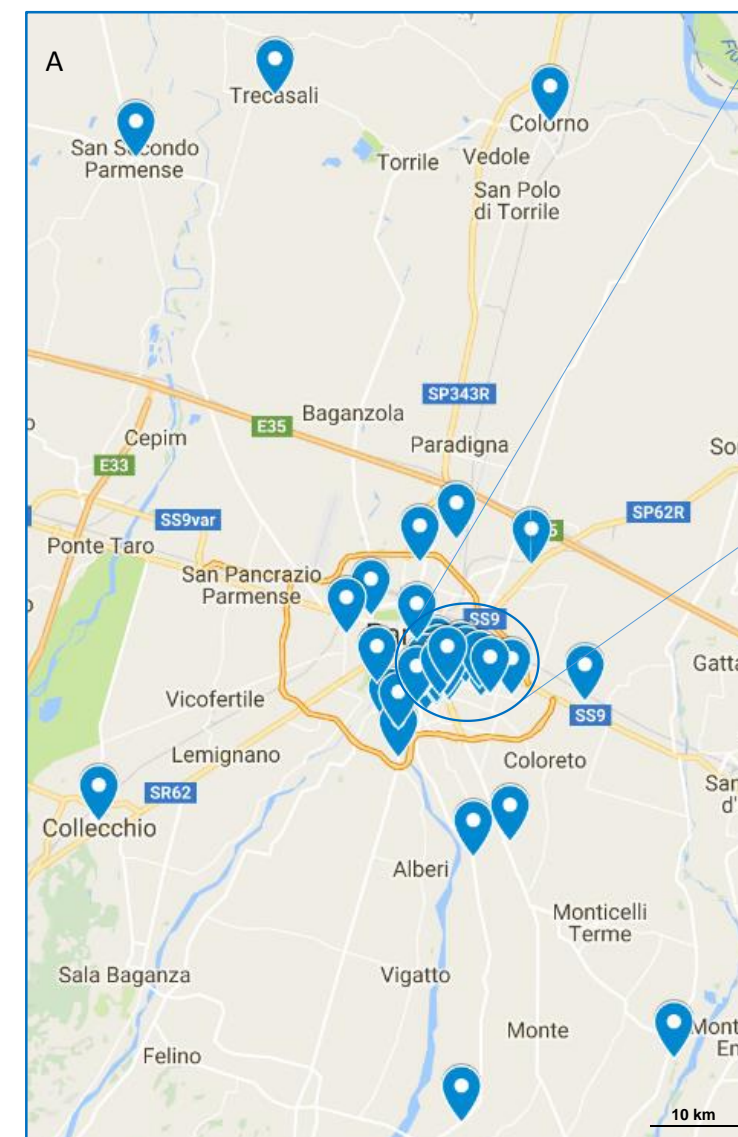


Figure 2. Geographical distribution of cases of *L. pneumophila* infection

- A. Geographical distribution of all the 54 cases reported in the outbreak.
- B. Geographical distribution of 32 patients (in the circle) living in the south-east district of the town.



**Conclusions:** This report describes an outbreak of LD involving 54 patients, 32 of which were geographically related to a district of Parma. Unfortunately, till now, the source of infection is unknown. This unsuccessful investigation may also be due to the collection delay and the lack of respiratory specimens sent to our laboratory for the isolation of the microorganism by the reference conventional culture. Legionellosis outbreaks, frequently observed during season changes, can be difficult to identify; thus, the timely identification and prevention are crucial for the management of the cases and the attention for *Legionella* -associated disease should be maintained at high level.

**References.** 1. Principe L, Tomao P, Visca P. 2017. Legionellosis in the occupational setting. *Environ Res.* 152:485-495. 2. Knox NC, et al. 2017. Unusual Legionnaires' outbreak in cool, dry Western Canada: an investigation using genomic epidemiology. *Epidemiol Infect.* 145(2): 254–265. 3. www.cdc.gov/legionella

Table 2. Results obtained for the 54 patients involved in the LD outbreak.

Patient N°	Sex	Age (years)	Urinary antigen	LP antibody titer (serogroup, sg)
1	F	57	Positive	Negative
2	F	80	Positive	Negative
3	F	73	Positive	ND
4	M	64	Positive	Positive 1/64 (sg 1-8)
5	M	69	Positive	Negative
6	F	54	Positive	Negative
7	F	73	Positive	Positive 1/64 (sg 1)
8	M	75	Positive	Positive 1/16 (sg 1)
9	F	68	Positive	Positive 1/1024 (sg 1)
10	F	87	Positive	ND
11	M	61	Positive	ND
12	M	75	Positive	Positive 1/16 (sg 1)
13	M	71	Positive	Positive 1/32 (sg 1-8)
14	M	42	Positive	Positive 1/128 (sg 1)
15	F	74	Positive	Positive 1/1024 (sg 1)
16	M	85	Positive	Positive 1/16 (sg 1)
17	M	56	Positive	ND
18	F	62	Positive	Negative
19	F	81	Positive	Positive 1/64 (sg 1)
20	M	71	Positive	Positive 1/32 (sg 1)
21	F	69	Positive	Negative
22	M	66	Positive	ND
23	M	43	Positive	Negative
24	M	59	Positive	Positive 1/64 (sg 1)
25	M	56	Positive	Positive 1/512 (sg 1-8)
26	F	83	Positive	Positive 1/512 (sg 1-8)
27	M	76	Positive	Negative
28	M	66	Positive	Positive 1/16 (sg 1-8)
29	F	78	Positive	Positive 1/32 (sg 1-8)
30	F	70	Positive	Negative
31	M	49	Positive	Positive 1/128 (sg 1-8)
32	F	28	Positive	ND
33	M	72	Positive	Negative
34	F	87	Positive	Negative
35	M	88	Positive	Positive 1/128 (sg 1-8)
36	F	61	Positive	Positive 1/512 (sg 1-8)
37	M	62	Positive	ND
38	F	99	Positive	Negative
39	M	83	Positive	Positive 1/128 (sg 1)
40	F	82	Positive	Positive 1/16 (sg 1)
41	M	46	Positive	Positive 1/64 (sg 1-8)
42	F	79	Positive	Positive 1/64 (sg 1-8)
43	M	91	Positive	ND
44	M	48	Positive	Positive 1/16 (sg 1)
45	F	56	Positive	Positive 1/256 (sg 1)
46	M	69	Positive	Negative
47	M	70	Positive	Positive 1/64 (sg 1-8)
48	M	78	Positive	Positive 1/64 (sg 1)
49	M	62	Positive	Positive 1/128 (sg 1-8)
50	F	64	Positive	Positive 1/256 (sg 1-8)
51	M	54	Positive	Negative
52	M	87	ND	Positive 1/256 (sg 1-8)
53	M	85	ND	Positive 1/1024 (sg 1)
54	F	68	Negative	Positive 1/256 (sg 1-8)

ND: not done.