Cluster of legionnaires' disease linked to cooling towers in a Portuguese University Hospital

Eugénio Cordeiro[1], F. Lopes[1], R. Rodrigues[2]
[1] *Departamento de Saúde Pública e Planeamento da Administração Regional de Saúde do Centro, Coimbra, Portugal*
[2] *Instituto Nacional de Saúde Dr. Ricardo Jorge, Lisboa, Portugal*

Background

In Portugal, Legionnaires' disease is reportable to the Health Authorities since 1999 (1) and crude routine statistics are published annually (2). Besides that, published studies have identified sporadic cases (3) and an outbreak associated with a decorative fountain (1). The obstacles to establish a correlation between environmental and clinical strains have been identified as an additional difficulty to investigate an outbreak source of legionellosis (4).

The alert

On 10 April 2006, our department was informed that two workers (C1 and C2) from the Maintenance Service of the University Hospitals of Coimbra (HUC) had been admitted to hospital due to atypical pneumonia. Two days later a third case of atypical pneumonia was identified in an in-patient (C3) from a distinct ward, hospitalized 22 days before due to a non-pneumonia illness (myocardiopathy, waiting for heart transplant). This patient had been authorized to spend the weekend at home, from 6 to 9 April (fig.1).

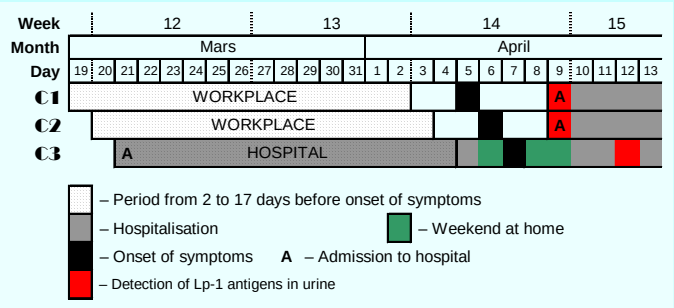


Fig.1 – Cases by possible time (and place) of exposure, onset of symptoms, diagnosis and admission to hospital, 2006

Methods

Additional data on the cases was requested to the hospital. In order to find the source of infection we followed the suggestions of EWGLI (5), collecting "information on the whereabouts of the patients with Legionnaires' disease to look for links between cases such as staying at or visiting the same places before became ill" and "looking for the legionella bacteria in the suspected water sources and in clinical specimens from patients". Samples for microbiological study were taken from the 2 cooling towers (CT) of the hospital (Fig. 2), water supplies and C3 respiratory secretions.

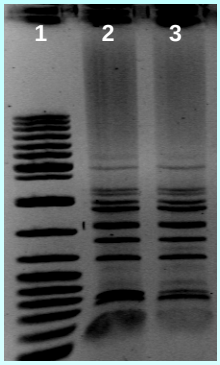
Fig. 2 – Cooling towers

Results

The three patients tested positive for *Legionella pneumophila* Lp1 urinary antigen. *L. pneumophila* was isolated by culture from the respiratory secretions of patient C3. All three cases survived and no further cases were identified. Samples from CT tested positive for Legionella. A private company was in charge of hospital air conditioning system maintenance, including the CT.

Isolates from C3 matched the ones from CT, tested by Sequence Based Typing and Amplified Fragment Length Polymorphism (Fig.3).

An epidemiological link was found between cases: C1 and C2 could have been exposed to the CT aerosols by walking daily to the work; it is very likely that C3 had been exposed to CT aerosols 17 days before symptoms onset, by walking from the car parking into the hospital. The path taken by C1 and C2 to the work place, the car parking and CT are all located close to the main building, in the hospital yard (Fig.2).



1 – Molecular weight tracer
2 – Human strain
3 – Environmental strain 409 C1

The agarose gel analysis at 1%, obtained by the AFLP technique, as recommended by EWGLI, shows the same profile for the human and the environmental strain 409 C1.

Fig. 3 – Amplified Fragment Length Polymorphism (AFLP) National Institute of Health, Lisbon, June 2006

Discussion

Close proximity to CT was associated with an higher risk to be infected. No other opportunity of proximity to CT was found for patient C3, except the day of hospitalisation (21 Mars). This implies an atypical incubation period of 17 days. No evidence of other expositions at CT aerosols was found for C3. What made the investigation of this cluster different from usual was the proven link between the source (Hospital CT) and patient through the use of the epidemiological investigation, confirmed by the lab.

Outsourcing, with the aim of downsizing costs, can lead to serious lack of security.

Recommendations

We strongly recommend the review of maintenance program, contract clauses and regular evaluation of its accomplishment.

References

1. Correia AM, Gonçalves G, Reis J, Cruz JM, Freitas JAC. An outbreak of legionnaires' disease in a municipality in northern Portugal. Eurosurveillance 2001; 6: 121-124.

2. Portugal, Ministry of Health. Doenças de Declaração Obrigatória, 2002-2006. Regiões, Sub-Regiões de Saúde no Continente, Regiões Autónimas. Direcção Geral da Saúde (Editor). Direcção dos Serviços de Informação e Análise. Divisão de Epidemiologia. - Lisboa: DGS, 2007.

3. Oliveira A, Orfao MR, Maciel L, Carvalho MJ, Catry MA, Fernandes E, Freitas AF. A sporadic case of legionnaire's disease in Oporto [Portuguese]. Acta Med Port. 1988 Mar-Apr;1(2):145-8.

4. Marques MT, Bornstein N, Fleurette J. Combined monoclonal antibody typing, multilocus enzyme electrophoresis, soluble protein profiles and plasmid analysis of clinical and environmental Legionella pneumophila serogroup 1 isolated in a Portuguese hospital. J Hosp Infect 1995 Jun;30(2):103-10.

5. EWGLI – The European Working Group for Legionella Infections. Factsheet – About Legionnaires' Disease (Legionellosis). March 2006. Available from: http://www.ewgli.org/

Acknowledgements

We are grateful to the cooperation and work of Dr. Vitor Pombo, from the Infectious and Epidemiology Hygiene Commission of the HUC, Prof. Dr. António Veríssimo from the Environmental Microbiology lab of the Department of Zoology of the University of Coimbra and Dr.ª Leonor Falcão from the National Institute of Health in Lisbon. We are also grateful to Prof. Dr. Guilherme Gonçalves for the valuable comments and review of this poster.