



**AALBORG UNIVERSITY**  
DENMARK

**Aalborg Universitet**

## **Survey of legionellae in water systems of care homes in two Danish cities**

Nielsen, Niss Skov; Uldum, Søren Anker

*Publication date:*  
2019

*Document Version*  
Early version, also known as pre-print

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*  
Nielsen, N. S., & Uldum, S. A. (2019). *Survey of legionellae in water systems of care homes in two Danish cities*. Abstract from ESGLI Study Group for Legionella Infections, Athen, Greece.

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

### **Take down policy**

If you believe that this document breaches copyright please contact us at [vbn@aub.aau.dk](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.

## **Survey of legionellae in water systems of care homes in two Danish cities**

Authors: Niss Skov Nielsen<sup>1</sup>, Søren Anker Uldum<sup>2</sup>

### **Introduction**

In two independent occasions, two Danish municipalities/cities did surveys of the presence of legionellae in the water systems of all their care homes (primarily for the elderly). Both cities are areas with relative few registered cases of legionnaire's disease, the incidences are between one and two cases per 100.000 population per year, which is two to four times below the average for the entire country. No cases of legionnaires' disease (LD) were known to be associated with the investigated institutions.

### **Aim**

The aim was to evaluate the risk of transmission of legionellae to this vulnerable group of citizens, and to identify risk systems for remedial actions.

### **Materials and Methods**

Samples (n=160) were collected from 48 care homes in city 1 (North Jutland), all were first flush hot water samples. 100 samples were collected from 49 care homes in city 2 (Copenhagen), all were collected at constant temperature (hot water).

All samples were cultured according to ISO 11731 at Statens Serum Institut (SSI). At least five colonies (if possible) from each sample were analysed with the Oxoid Legionella latex test to separate into serogroup 1, serogroup 2-14 and other Legionella species. Some isolates of serogroup 1 was further analysed with the Dresden panel of monoclonal antibodies to identify the subgroup for further risk assessment (Pontiac and non-Pontiac subgroups).

On 5 care homes in City 2 an interventions study took place based on measurements of cfu/L from the water systems taken before and after onset of operating optimization procedures. This includes that the temperature in hot water tanks was raised to 55-60 deg., a temperature rise once a week in hot water tanks (65-70 deg.) and cleaning of the water tanks once a year. The intervention period was on average 4 month.

### **Results**

A high proportion of installations in care homes were colonised with Legionellae (75% in City 1) and (92% in City 2), and more institutions in City 1 (40%) had samples with high levels ( $\geq 10.000$ ) of legionellae than in City 2 (18%). As shown in the last column was the median in both cities much lower than the average number of colonies between the samples.

**Table showing number of investigated care homes in two Danish Cities, and the presents of Legionella in their water systems**

City	Number of Institutions	Average number of samples pr. Institution	Number (percent) of Institutions with <i>L. pneumophila</i> 0< cfu/L*	Number (percent) of installations with <i>L. pneumophila</i> 1000 ≤ cfu/L < 10.000	Number (percent) of installations with <i>L. pneumophila</i> cfu/L ≥ 10.000*	Average (median) cfu/L
City 1	48	3.3	36 (75%)	10 (21%)	19 (40%)	28,972 (100)
City 2	49	2	45 (92%)	14 (29%)	9 (18%)	4,929 (400)
Intervention City 2 (B-samples) Operation optimized	5					
- before		1	5 (100%)	2 (40%)	1 (20%)	6120
- after		1	5 (100%)	2 (40%)	0 (0%)	1808

Most of the care homes water systems were colonised with *L. pneumophila* serogroup 2-14 only. In few institutions serogroup 1 was also found (8% in both cities), but the investigated colonies were found to belong to the non-Pontiac (less-virulent) group in both cities.

Interventions strategies on 5 institutions in City 2 showed, that the operating optimization solution resulted in a 70% reduction in the average number of colonies. This includes that 1 of the 5 operationally optimized care homes had more colonies than before the intervention.

## Conclusions

The higher proportion of institutions in City 1 compared to City 2, with levels ( $\geq 10.000$ ) of Legionellae, can probably be explained by the different sampling techniques used in the two cities. Samples from first flush was used in City 1 versus samples from constant temperature in City 2.

The low levels of the medians compared for the average levels regarding cfu/L indicate, that many of the samples from the institutions had zero to few cfu/L. On the other hand does the high average levels show, that several of the institutions possessed water installations with very high levels of *L. pneumophila*, which were judges to posing a high risk to the group of vulnerable residents, and remedial actions were implemented. I.e. filter solutions or operational optimization procedures.

1: Scientist, Ph.D., M.Sc.

Tel. +45 20749716

Mail: nin@sbi.aau.dk

Dep. Building Energy Efficiency, Indoor air Climate and Sustainability

Danish Building Research Institute (SBI)  
Aalborg University, Copenhagen  
A.C. Meyers Vaenge 15, 2450 Copenhagen SV, Denmark

2: Senior scientist, Ph.D.  
Tel. +45 3268 3194 |  
Mail: su@ssi.dk  
Statens Serum Institut  
Artillerivej 5, 2300 Copenhagen S, Denmark

1: Scientist, Ph.D., M.Sc.  
Dep. Building Energy Efficiency, Indoor air Climate and Sustainability  
Danish Building Research Institute (SBI)  
Aalborg University, Copenhagen  
A.C. Meyers Vaenge 15, 2450 Copenhagen SV, Denmark

2: Senior scientist, Ph.D.  
Statens Serum Institut  
Artillerivej 5, 2300 Copenhagen S, Denmark