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

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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 fist 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 cultures 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 (≥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 L. pneumophila 0< cfu/L**	*Number (percent) of installations with L. pneumophila 1000 ≤ cfu/L < 10.000*	*Number (percent) of installations with L. pneumophila 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 (≥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 tor 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. Ie. filter solutions or operational optimization procedures.

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