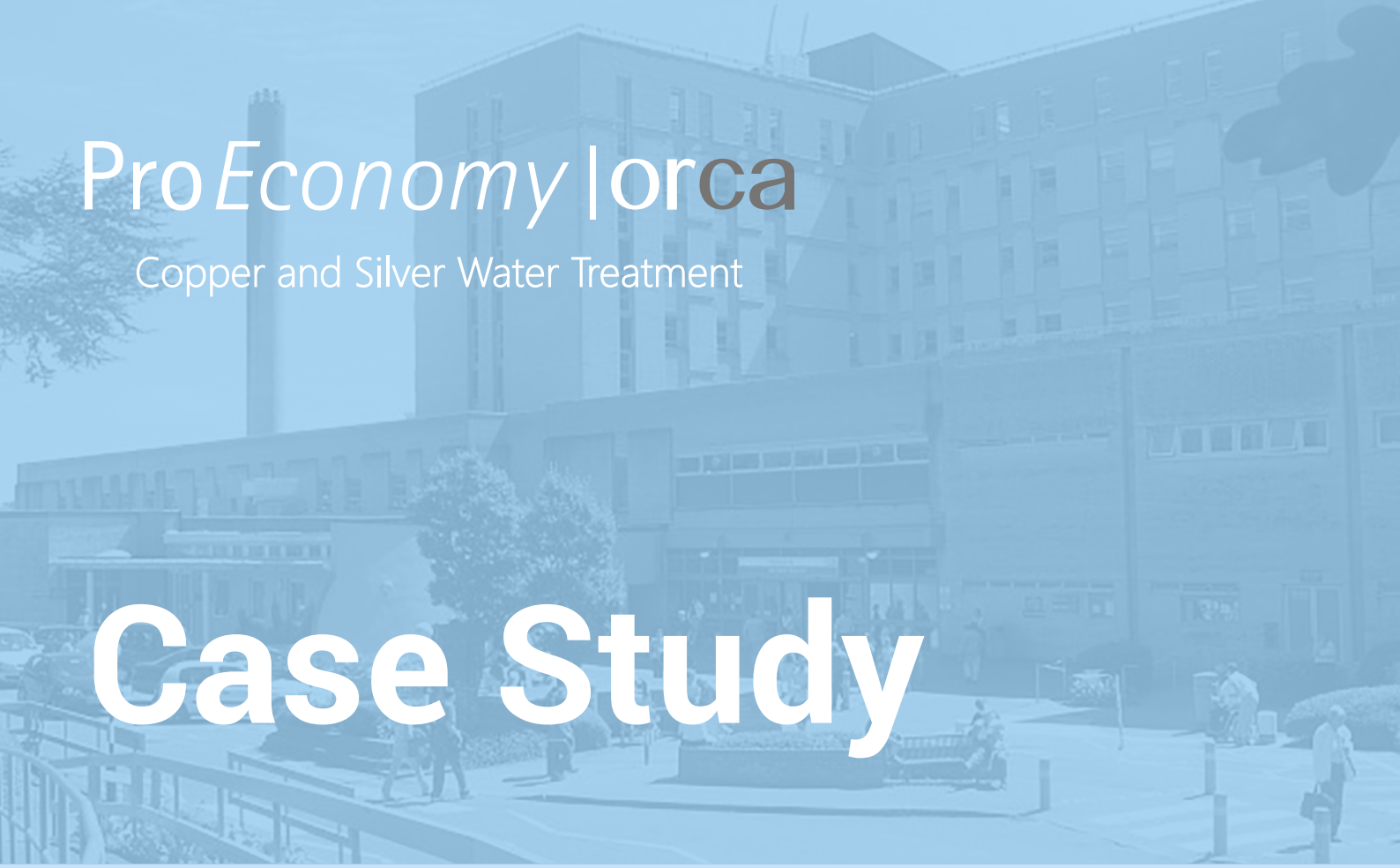

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Copper and Silver Water Treatment

Case Study

Derriford Hospital - Tower Block Building

Controlling Legionella risk in Derriford Hospital Tower Block building using copper and silver ionisation

Background

Derriford Hospital is a large teaching hospital run by the Plymouth Hospitals NHS Trust, which serves Plymouth and nearby areas of Devon and Cornwall. It provides a complete and comprehensive cancer service for patients of all ages, throughout their cancer journey. Tower Block is the main building of Derriford Hospital, which has 12 floors.

Legionella pneumophila is a disease-causing microorganism, which is ubiquitous in water systems and can infect people, being dangerous for vulnerable people, especially for hospital patients that have a compromised immune system. It is well known that hospital-acquired Legionnaires' disease is often directly linked to Legionella presence in the hospital drinking water. Therefore, it is a necessity for the hospital to control the Legionella in their water systems.

Copper and silver ionsation system (CSI), is a relatively new system designed for the control of Legionella, Pseudomonas and other pathogens in water system.

Following the success of ProEconomy Orca copper and silver ionisation system installed in several hospitals in the UK (see other study cases), in May-June 2012, Derriford Hospital chose to install the Orca system (trade name of ProEconomy copper and silver ionization system) in their main tower block building. Before installation, pre-commissioning samples were taken from 62 outlets, identified as being at a risk of Legionella contamination.

Continued sampling

ProEconomy undertakes monthly sampling which are sent for analysis at an independent laboratory to check for the presence of Legionella, and to determine copper and silver concentrations.

Results

After the activation of the Orca system, samples were taken monthly from the outlets since May 2012. During the past four years, 2604 samples (including pre-commissioning) were collected and the Legionella results are shown in figure 1 below.

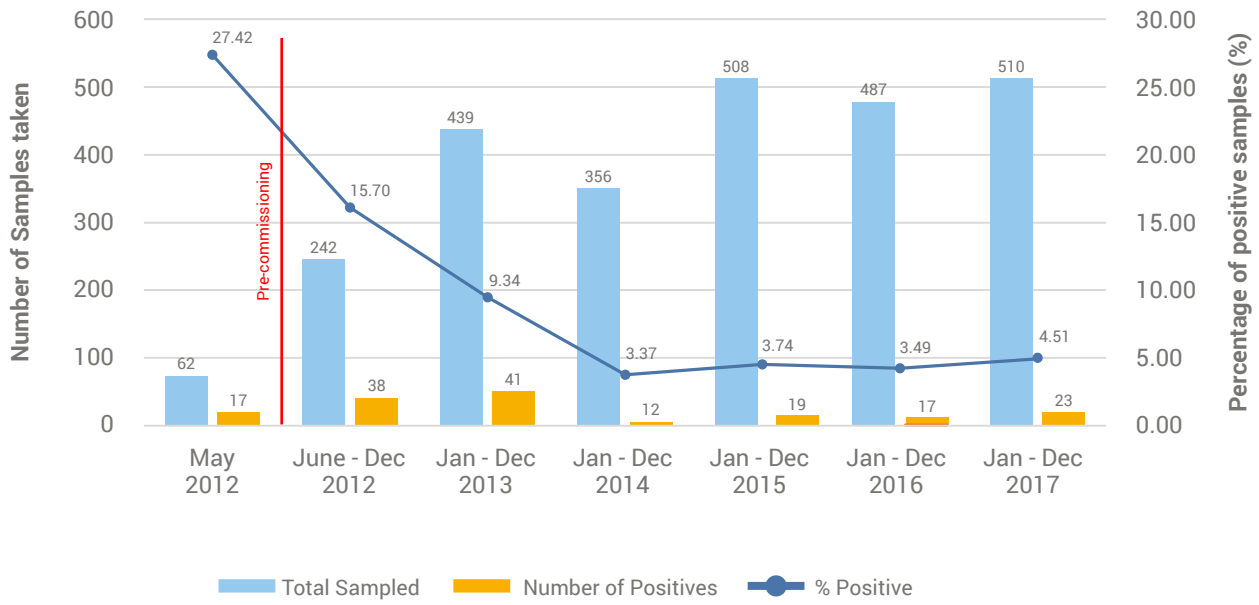

Figure 1. Total samples, number of Legionella positives and percentage positives, Tower Block, Derriford Hospital. Note: Positive Legionella means Legionella >100 CFU/L

Figure 1 shows that Legionella was a problem before the Orca installation, showing that 27.4% of the samples were Legionella positive. However, the situation changed dramatically after the activation of the Orca system. The percentage of Legionella positives dropped from 27.4% to 15.7% (nearly half of the pre-commission level) in the first year. The decreasing trend continued in 2013 and 2014 (9.3% and 3.4% respectively). It can be noted that, the Orca system effectively controlled Legionella in the Tower Block building. From 2014 to 2017, the figure for positive Legionella stabilised at a level below 5%, despite more samples being taken and analyzed. As ProEconomy offers the usual monitoring service when providing the Orca system, the system was regularly monitored to ensure its operation, which helps to keep Legionella at a low level.

CSI works because positively-charged copper and silver ions in water can find negative sites in Legionella bacteria and cause the death of cells. According to research results (Liu et al. 1994, Stout et al. 1998, Huang et al. 2008), when copper and silver ion concentrations are maintained above 0.2 and 0.02 mg/L, respectively, Legionella contamination is avoided. The results of average copper and silver ions concentration are shown in Figure 2.

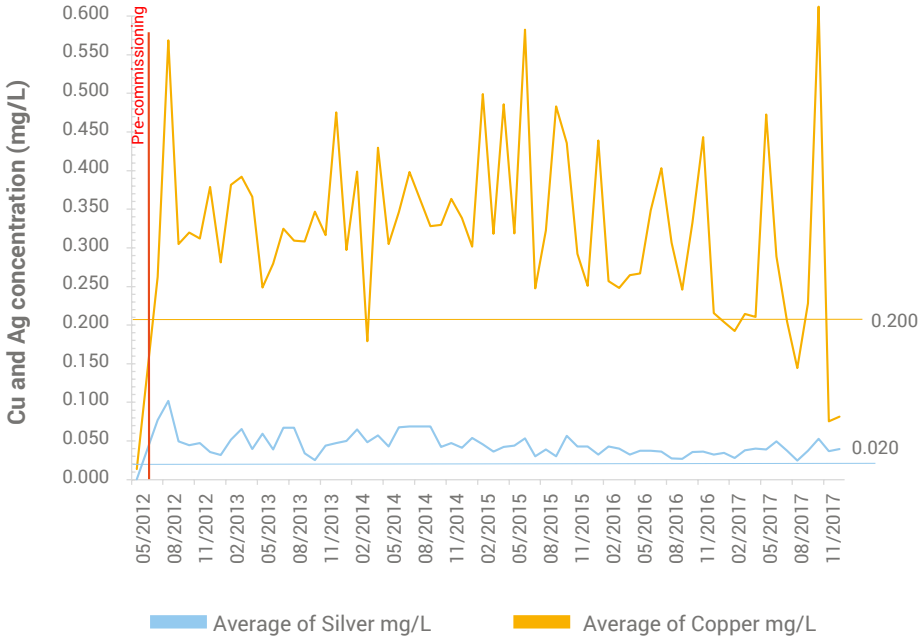

Figure 2. Average copper and silver concentration, Derriford Hospital Tower Block, 2012-2017

Clearly, the copper and silver concentration before the Orca system installation was below the required levels (copper 0.2 mg/L and silver 0.02 mg/L). Since the activation of the Orca system, the average silver concentration fluctuated but never drop to below 0.02 mg/L. The average copper concentration was controlled over 0.2 mg/L for most of time since the system activation, except for February 2014, and February, August and November 2017.

Conclusions

Overall, the Orca CSI system is successfully controlling Legionella in the hospital drinking water with Legionella levels being kept to below 5% of samples analysed between January 2014 and December 2017. The follow up service offered by ProEconomy ensured the effective concentration levels of copper and silver in the Orca system are kept, which guarantee a better control of Legionella.

The ProEconomy Orca system is your best choice to control Legionella in the long-term as we never stop our service.

Study carried out and written by Yiqing Zhou, Intern MSc Student, King's College London. March 2018

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