



Reduction of *Legionella pneumophila* colonization in two hospital hot water networks after time flow taps installation.



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BACKGROUND

Legionella spp. control is a critical issue in hospital with old hot water systems. Disinfection methods are applied as control measure over prolonged time periods, but *Legionella* may be resistant to chemical agents in pipeworks characterized by frequent water stagnation and low flow velocities (1).

PURPOSE AND HYPOTHESIS

We evaluated the *Legionella* spp. colonization in the hot water network of two Italian hospitals after the installation of time flow taps (TFTs) in correspondence of dead-end branches.

MATERIALS AND METHODS

After the assessment the hot water consumption (about 60 m³/month) in two 60 and 401 beds hospitals, from May 2016 the continuous disinfections with chlorine dioxide and five and four TFTs were installed (Figure 1). They were programmed in order to obtain an hot water flow 960L/day. Before and after TFTs installation *Legionella* spp. was searched with a monthly basis in sampling points as described by the ISO11731 standard (2).

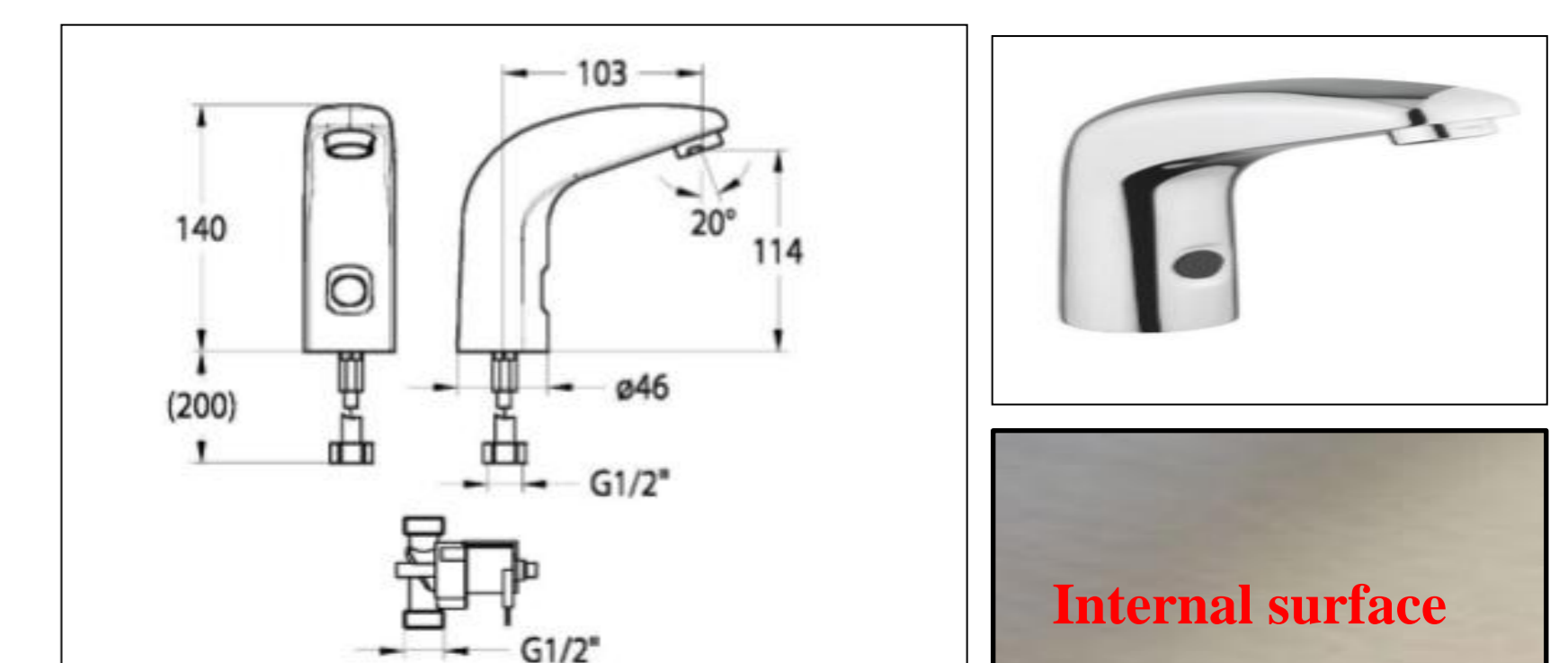


Figure 1: TFTs technical features

RESULTS

In the both hospitals, before TFTs installation, *Legionella pneumophila* sg1 and 2-14 were detected in all points with means of $4 \times 10^4 \pm 3.1 \times 10^4$ and $9.2 \times 10^3 \pm 1 \times 10^3$ CFU/L. In the first hospital, after eight months, *Legionella* colonization persisted in one point with counts from 3×10^2 to 6.8×10^3 CFU/L and it was eradicated after thirteen months. Chlorine concentration was detected in the range between 0.05 and 0.31 mg/l while temperature values were from 38.2 to 44.9°C (Figure 2).

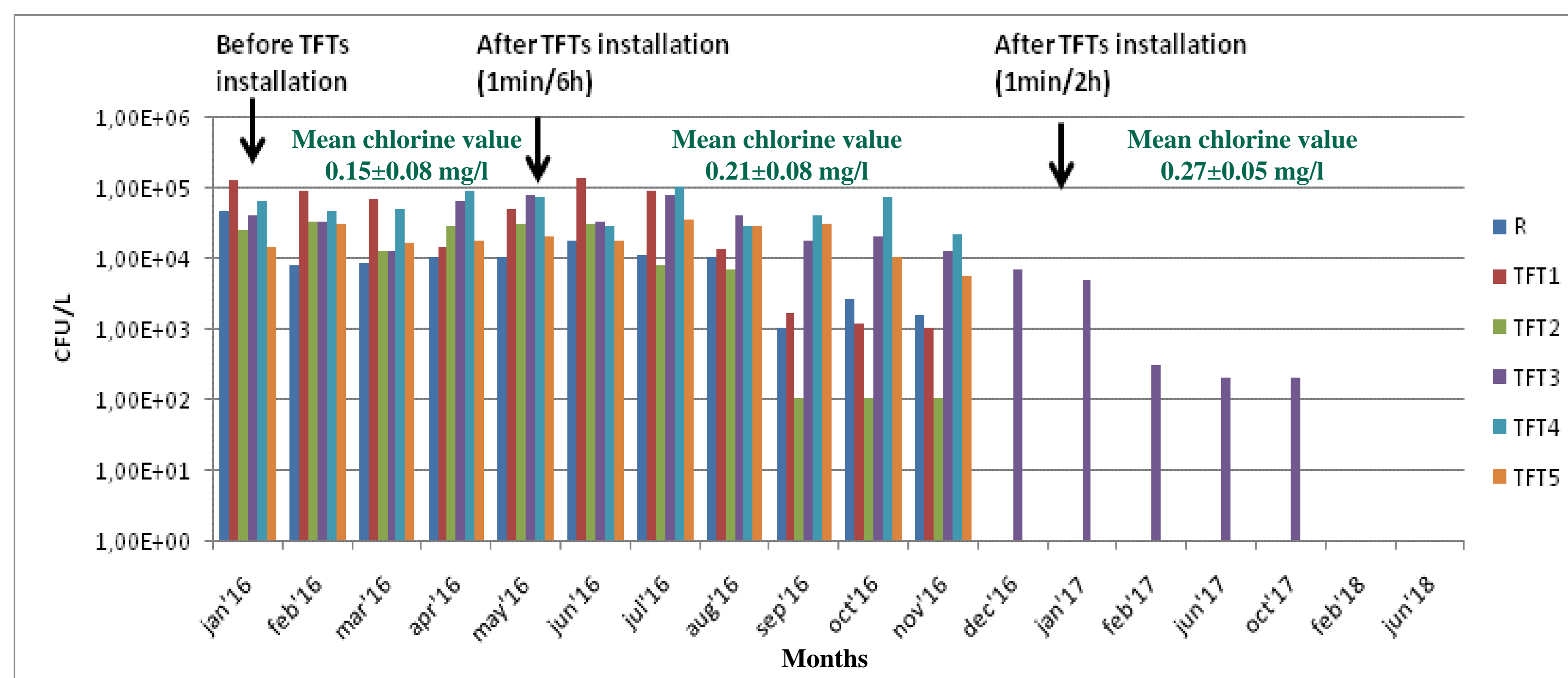


Figure 2: *Legionella pneumophila* sg2-14 counts and distribution in all sampling points. (R= Recirculation; TFT1-5= Time Flow Taps; Lp= *Legionella pneumophila*)

TIMES	R	TFT1	TFT2	TFT3	TFT4	TFT5
BEFORE TFTS INSTALLATION	Lp sg3	Lp sg 10-14	Lp sg 10-14	Lp sg 10-14	Lp sg 10-14	Lp sg 10-14
AFTER TFTS INSTALLATION (1min/6h)	Lp sg 3; Lp sg 10-14	Lp sg 6; Lp sg 10-14	Lp sg 10-14	Lp sg 10-14	Lp sg 3; Lp 10-14	Lp sg 3; Lp 10-14
AFTER TFTS INSTALLATION (1min/2h)	-	-	-	Lp sg 3; 6	-	-

In the second hospital, after two months, *Legionella* growth (900 CFU/L) was detected in one point and from the third month all samples resulted negative. Mean chlorine concentration was 0.29 ± 0.06 mg/l, while mean temperature value was 39.7 ± 3.2 °C (Figure 3).

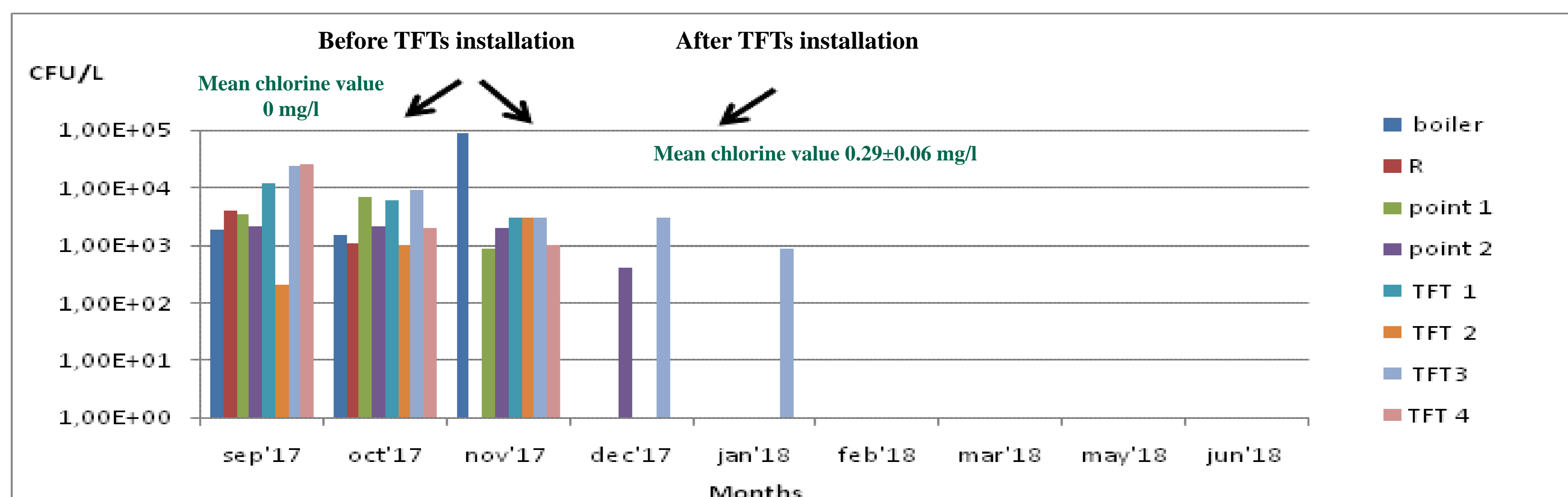


Figure 3: *Legionella pneumophila* sg1 counts in all sampling points. (R= Recirculation; Point 1-2= Sampling points without TFTs; TFT1-4= Time Flow Taps).

CONCLUSIONS

TFTs with chemical disinfection may improve the disinfectants efficacy reducing *Legionella pneumophila* colonization in dead legs.

BIBLIOGRAPHY

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- (2) International Organization for Standardization ISO 11731 Water quality -- Detection and enumeration of *Legionella*, Switzerland 2017.