

Client:	NHS Hospital, London
Location:	Intensive Therapy Unit (ITU)
Project Timeline:	December 2023 - January 2025

CASE STUDY: THE 20°C DIFFERENCE

How Remote Monitoring Enhanced Patient Safety and Operational Efficiency in the NHS

Challenge

During the commissioning of an NHS hospital's newly constructed Intensive Therapy Unit (ITU), a high-risk augmented care ward, it was discovered that the Domestic Hot Water (DHW) system was not compliant with HTM 04-01.

The new ward was constructed on the ground floor of a multi-storey building. The DHW was to be supplied from nearly twenty pre-existing subordinate loops on the first floor. Unfortunately, inaccurate and assumed flow rates were used throughout the design specification prior to construction, resulting in almost a total lack of hot water circulation. Therefore, stagnant water in the return loops and a lack of thermal balancing systems resulted in non-compliant DHW temperatures being observed throughout the entirety of the new ward.

This posed a significant risk for bacterial proliferation, particularly Legionella. In an environment where patient immunity is often compromised, ensuring compliance with ACoP L8 and HTM 04-01 standards was critical for infection prevention.



Solution

To address this, the hospital approached Citritek to implement a solution for continuous monitoring, validating the efficacy of remedial work planned to improve the DHW system. The plan involved the deployment of wireless temperature sensors for real-time data collection and ongoing bacterial sampling of representative areas.

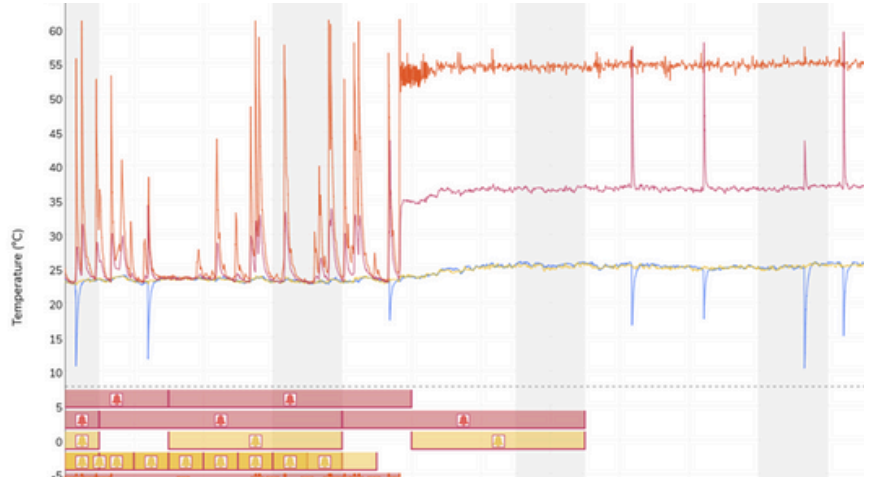
Additional flow rate assessments were also conducted, resulting in the installation of over 100 thermal balancing valves (TBVs) across all tertiary and subordinate loops in the affected areas.

Water temperature sensors were installed across the DHW in isolation rooms, showers, bed bays, and staff changing facilities, representing a range of high-risk and high- and low-usage zones. As the installation of TBVs progressed, Citritek's remote monitoring solution provided the Trust with categorical evidence of the effectiveness of the remedial works during the project.

Outcomes

Improved Temperature Compliance

- Average hot return temperatures increased from 33.09°C to 53.76°C.
- Average HWS temperatures during flushing rose by 43.58% on average.
- Automated alerts from Citritek's Online Portal were reduced by over 75%.



Bacterial Risk Reduction

- Pre- and post-installation water sampling confirmed a significant reduction in bacterial levels across the ITU of 70.7% on average. Based on Total Viable Count laboratory testing at 37°C for 48 hours and 22°C for 72 hours.
- Thermal pasteurisation of pipework is now readily achieved and sustained in all monitored outlet locations.

Operational Efficiency

- 94% of outlets now show stable, predictable thermal performance, reducing the need for manual intervention via frequent flushing regimes.
- Flushing regimes that have continued for low-use outlets have become more effective and less resource-intensive.

Conclusions

The integration of Citritek's remote temperature monitoring with strategically placed thermal balancing valves delivered measurable improvements in both patient safety and operational reliability. This project not only mitigated the immediate risk of bacterial proliferation but also laid the foundation for proactive, data-driven estate management.

The outcome sets a benchmark for modern water hygiene practices. It demonstrates how digital infrastructure can play a central role in achieving system control and water compliance, as well as assist infection prevention strategies in critical care settings with tangible, quantifiable improvements.

Real-Time Data Insights

- Citritek's remote sensors allowed for granular performance tracking at each outlet, enabling targeted interventions.
- Flow adjustments (e.g., increased at Bed Bay 01; restricted at Bed Bay 16).
- Optimised flushing schedules for underused areas like the Assisted WC Showers and Side Rooms
- Energy savings through temperature reduction at over-performing assets.

Key Data Snapshots

Location	Average Hot Return Temperatures Before → After
Side Room Ensuite - Shower	29.46°C → 55.85°C
Isolation Room Lobby - WHB	29.31°C → 56.28°C
Single Bed Bay (01) - WHB	33.60°C → 59.38°C
Assisted Bathroom - Shower	31.37°C → 54.65°C