Optimising Hospital Operating Theatre Energy Usage with IoT: Data-Driven Sustainability Strategies

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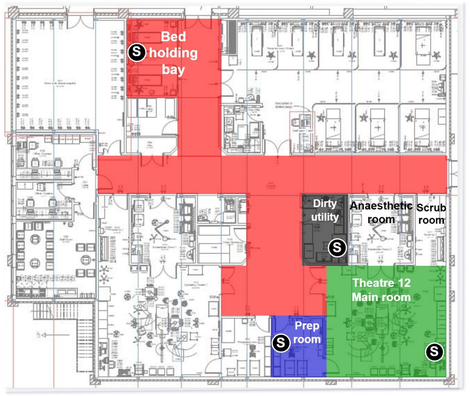
Introduction

- Operating theatres in hospitals usually have their ventilation system on at all times, which leads to high costs.
- The objective of this research is to study the risk of switching off the ventilation system in operating theatres.
- More specifically, studying the risk of having reverse airflow from dirty areas to sterile areas when switched off which could lead to airborne contamination.

Methods

An experiment was conducted at Whipps Cross Hospital, London which involved monitoring air pressure levels before and after switching off a theatre. 4 IoT air pressure sensors were deployed (indicated on the following floorplan).



Air pressure sensors in Operating Theatre (left), Wi-Fi connected air pressure sensors (right)

Low risk of **reverse air flow** when **switching off** operating theatres in **hospitals**

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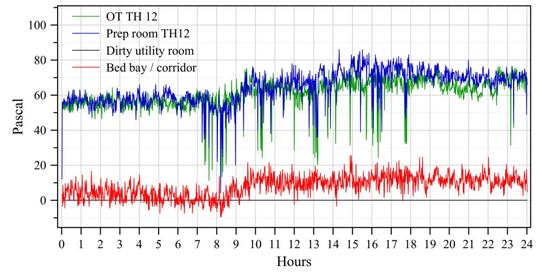
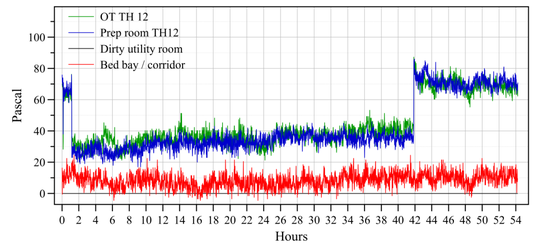
Results

Recorded relative pressure levels during normal day of operations (backpressure is subtracted):



Air pressure levels during a switch-off period:



Discussion

Several sudden air pressure drops are visible in the first figure, which seem to be concentrated between 07:00 and 18:00. This is due to the door opening by staff (40 to 50 door openings a day).

The second figure shows that air pressure levels were holding during a switch-off. Air pressure levels in Prep room and Theatre room never dropped below the levels in the dirty areas, indicating no reverse air flow.