The potential of Internet-of-Things for Patient Safety in Infection Control:

using indoor-location systems to improve nurses' hand hygiene performance

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Hospital-acquired-infections are a major patient safety problem. Their occurrence can lead to higher morbidity and mortality rates, increased length-of-stay, and higher costs for both hospital and patients. Performing hand hygiene (HH) is a simple and inexpensive prevention measure, but healthcare workers' compliance is often far from ideal.

To raise awareness regarding HH compliance, individual behaviour change and performance optimization, an Internet-of-Things (IoT) solution was implemented to collect data and provide real-time feedback accurately in an engaging way.

A Design Science Research Methodology was used to design, implement and evaluate the solution. Two work-iterations were performed applying gamification components, each using a different indoor-location technology. Preliminary experiments, simulations and field studies were performed in an Intensive Care Unit (ICU) of a Portuguese tertiary hospital. Nurses working on this ICU were engage during, participating in several sessions during implementation.

Nurses enjoyed the concept and considered that it allows for a unique opportunity to receive feedback regarding their performance. Tests-performed on the indoor-location technology applied in the first-iteration regarding distances estimation presented an unacceptable lack of accuracy. Using a proximity-based technique, it was possible to identify the sequence of positions but with low precision. In the second work-iteration, a different indoor-location technology was explored with sucess, showing the importance of IoT technology to respond to the ward demands.

Combining automated-monitoring systems with gamification seems to be an innovative approach, based on the already achieved results. Involving nurses in the project since the beginning allowed to align the solution with their needs.