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Research paper

Exploring new approaches to improve hand hygiene monitoring in healthcare

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Abstract *Objective:* Hand-mediated transmission of micro-organisms is a major factor for the spread of healthcare associated infections. Ensuring that optimal hand hygiene (HH) practices are followed remains a challenge and monitoring remains a key activity in measuring healthcare professional's adherence to HH protocols. This paper describes the role that methods from engineering, specifically Morphological Analysis (MA), can play in developing and improving the efficacy of HH monitoring in healthcare. MA is a process of considering the required functions or features of a system and then identifying all possible methods to fulfil them. Considering the different methods to achieve each function or feature results in new ways of addressing a challenging problem and can pave the way for innovative system design.
Methods: Using an expert discussion panel of infection prevention specialists, MA was applied as a means to discuss the current system of HH monitoring and explore possible future system improvements.
Results: The discussion revealed themes of; The adequacy of current HH monitoring systems; Goals of HH monitoring improvement; Access to HH monitoring data for patients; The value of MA to identify new possibilities for HH monitoring.
Conclusions: The application of morphological analysis has highlighted how condition monitoring may improve HH monitoring. Condition monitoring measures, such as staff satisfaction, may be a useful addition to existing HH monitoring measures and aid meaning for the recipients of HH feedback data. Additionally, these may also potentially indicate a forthcoming change, both positive and negative, in HH behaviour.

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Highlights

- Morphological Analysis mapped the process of hospital hand hygiene monitoring.
- Improvements to hand hygiene monitoring were successfully modelled.
- Condition monitoring may improve hand hygiene monitoring.

Introduction

Hand hygiene (HH) is an effective measure to break the chain of healthcare associated infection [1—5]. In many countries HH is regularly monitored as part of quality assurance, placing a burden on the resources of infection prevention (IP) personnel [6]. Numerous approaches to HH monitoring have been described but there are limitations associated with each and HH compliance remains low and is difficult to sustain in the fast moving, rapidly changing clinical environment [6,7]. New ways of ensuring HH monitoring data is valid is required to encourage compliance and enhance quality of care. Lessons learnt from human factors research and engineering systems may offer a solution [8].

Socio-technical system design

Socio-technical systems design (STSD) is an approach that considers human, social, organisational and technical factors in the design of organisational systems [9]. STSD has previously been used in healthcare [10].

In order to achieve effective STSD it is necessary to consider all possible configurations of a system in order to design the most efficient and effective. The technique of Morphological Analysis (MA) can help shape and identify possible paths for designers in STSD [11]. MA is a process of considering the required functions or features of a system and then identifying all possible methods to fulfil them. Considering different methods to achieve each function or feature can result in new ways of addressing a challenging problem and pave the way for innovative system design. The method has been applied broadly to engineering based STS but has yet to be applied to the healthcare context. HH monitoring can be considered a STS due to the interaction between human, technologies (sink and soap infrastructure, gel dispensers, electronic monitoring systems) and job task within an organisational setting.

Aim

The aim of this study was to 1) apply MA to define current and future approaches to HH monitoring practice in a healthcare setting, 2) to identify strategies for HH monitoring improvement and 3) to test the feasibility of rolling out the MA approach more generally to understand HH monitoring.

Methods

A one day discussion event, lasting four hours, took place between two IP specialists guided towards new ways of thinking by two facilitators, one with human factors expertise, and the other with expertise applying MA. The number of people participating in the discussion was appropriate to generate the detailed and nuanced discussion required in an exploratory, qualitative study [12]. This may be considered a phenomenological approach as the focus was on the experience and interpretation of the participants regarding HH monitoring. MA was used to structure these experiences and insights to identify opportunities to improve system design.

The purpose of discussion was to understand the benefit of applying MA before rolling out the approach more generally to HH monitoring in other settings. A semi-structured proforma was used to direct discussion with open-ended questions to allow elaboration on points of interest as they arose. The questions that framed discussion were:

I. What is the current process for monitoring HH?
II. How can HH monitoring be improved?

Bespoke MA computational software was employed.

Preparation

Prior to the discussion event, post hoc thematic analysis of 20 interviews with healthcare professionals was carried out to understand their perceptions and experience of the HH monitoring system within a large acute hospital setting. Semi structured interviews were held at a large University teaching hospital in the UK from April—October 2012 and analysed using applied thematic analysis [13]. Participants were grouped based on their level of involvement in HH monitoring (see Dawson [14]):

- Generators of Data (GoD): those responsible for monitoring HH, and managing audit (n = 6).
- Recipients of Feedback (RoF): those for whom data was prepared (e.g. senior ward staff) (n = 7).
- Subjects of Observation (SoO): individuals whose behaviour may be assessed during audit (n = 7).

Seven novel features associated with the use of the HH monitoring system were identified; mode of data collection, monitoring metric, feedback time, display, access, targets and associated metrics. For the discussion event the different methods available to address these seven features were listed, creating a problem space; a mixture of current HH monitoring process features and future methods to monitor HH with these areas identified as potential improvement strategies (Table 1).

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