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Letter to the Editor

Use of low-dose, high-frequency in situ simulation for preventing healthcare-associated infections — the STOP-HCAI pilot project

Dear Editor,

Despite concerted efforts, health care-associated infections (HCAIs) continue to be the most frequent adverse event during care delivery with largely avoidable effects at both the patient and population levels [1]. It is estimated that 35—50% of all HCAIs are related to just five patient care practices [2]. Thus, a large proportion of HCAIs can be prevented through the institution of effective infection prevention and control (IPC) measures. A study conducted in Hull University Teaching Hospital (HUTH) UK on *Escherichia coli* bloodstream infections (BSI) revealed that of 195 cases, 50 were deemed to have avoidable BSI all of which were HCAIs [3]. Although there have been efforts to promote high impact intervention (HII) strategies across health facilities in the UK, suboptimal organisational-level and individual-level responses persist [4]. In HUTH, the HII are advocated in mandatory electronic learning and face-to-face teaching for medical staff. However, little is known as to the effectiveness of these approaches in promoting the practice of HII among staff members.

Simulation is a method of artificially representing a real world process in order to facilitate experiential learning and achieve educational goals. Simulation-based learning is emerging as effective strategy for achieving the educational goals of transfer of knowledge, reinforcement of cognitive strategies, and skill development while promoting communication strategies, and teamwork skills [5—7].

In this quality improvement project tagged the STOP-HCAI pilot project, we sought to assess the effect of using simulation training in improving health workers' satisfaction and confidence levels with respect to two key interventions namely: central venous catheter (CVC) care and stewardship in antimicrobial prescribing. We utilised resources from the Hull Institute for Learning and Simulation (HILS) in HUTH to run this descriptive study in April 2021. A total of 8 doctors and 2 medical students were trained on the gastroenterology ward in HUTH. The doctors comprised of 4 foundation year (FY) 1 doctors (2 from gastroenterology; 2 from acute medicine) and 4 FY2 doctors (2 from gastroenterology; 2 from acute medicine). The tasks involved taking blood samples from a CVC and undertaking a simulation on the appropriate selection and prescription of antibiotics which are key principles of antimicrobial stewardship [8]. The junior doctors are typically involved in collecting blood samples from CVCs although specific training is not necessarily provided for this task.

We adopted the low-dose, high-frequency (LDHF) in situ training to repeatedly expose the participants to a short, simple training session with focused aims. The sessions were deliberately limited to 20 minutes or less, to minimise disruption to clinical work. The combined time for training the 10 participants was 140 minutes. The "in situ" component entailed conducting the simulation on the gastroenterology ward where CVCs were commonly used to deliver total parenteral nutrition to patients (Figure 1). The in situ nature of the training was advantageous as the staff could attend the session during breaks in their daily activities without having to take time off work.

To keep the session focused, no more than three related and clearly stated learning outcomes were utilised. At the end of training day, the participants came together for structured debriefing which was delivered using the debriefing with good judgement strategy. This strategy involved the reflective practice of examining the candidate's values, assumptions, and knowledgebase that drove their actions [9] rather than just highlighting their shortcomings. Those who successfully engaged in reflection were able to self-correct and improve their skills. Each participant was involved in more than one session on the same day. This enabled the participants to put into practice any feedback they received in the first iteration. To determine the effect of simulation-based learning on the participant's practice of the HII, a tool based on the 5-point Likert scale was used to assess satisfaction and self-confidence [10]. This tool which was designed specifically for this trial by the innovation and research unit of HUTH was administered at the end of the debriefing session.

Mean reported levels of confidence increased among the doctors following the simulation training with over 75% of them finding the training exceptionally useful. There was also reported improvement in the confidence levels of participants with checking for drug allergies, adjusting for drug dose for low estimated glomerular filtration rate and deciding on appropriate antibiotics. This increase in confidence levels was matched with improvements in simulated psychomotor skill performance with reduction in overall time the participants spent performing the tasks.

Despite the small number of participants, our descriptive study provides support for the use of simulation to provide deliberate, flexible and experiential learning and increase confidence in performing key clinical tasks. We combined both high and low fidelity simulation to deliver the training. Fidelity

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Figure 1. Setup for insitu simulation in a room on the ward with a SimMan ® mannequin and laptops.

in simulation refers to the extent to which the simulator reproduces reality. Based on this definition, simulation can be termed either 'low' or 'high' fidelity depending on how closely they represent real-life conditions. Our simulation on antibiotic prescription involved the use of a mannequin that could be programmed to produce bronchial breath sounds and crackles in the lung fields to simulate a pneumonia. One advantage of high-fidelity simulation is that it promotes engagement in the learning activity as the participants respond to being in a near real-life situation.

Following its successful implementation, the LDHF simulation format has been revised and incorporated into IPC training in HUTH. Further piloting is required to assess the feasibility of its utilisation at scale and impact on preventing HCAIs and similar conditions.

Ethics approval

This was a service improvement project and so ethical approval was not required for this.

Financial support

None.

Conflict of interest statement

No conflict of interests exists.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.infpip.2024.100368.

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