Journal of Hospital Infection 92 (2016) 332–336

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Effectiveness of the CareCentre® at improving contact precautions: randomized simulation and clinical evaluations

O. Anderson, G.B. Hanna*

Department of Surgery and Cancer, Imperial College London, London, UK

ARTICLE INFO

Article history:
Received 25 August 2015
Accepted 6 December 2015
Available online 17 December 2015

Keywords:
Cross-infection
Hand hygiene
Health personnel
Handwashing
Infection control

SUMMARY

Background: Bedside hygiene is important to reduce healthcare-associated infection rates. The CareCentre® is an end-of-hospital-bed table, housing: alcohol-based hand rub, gloves, aprons, waste bin, and an ergonomic writing surface.
Aim: To determine the effectiveness of the CareCentre at improving bedside hygiene.
Methods: In the randomized cross-over simulation evaluation, 20 participants used the CareCentre and standard conditions to perform common bedside tasks. In the randomized cross-over clinical evaluation, nine pairs of acute adult hospital ward bays received CareCentres and standard conditions for one week each. Researchers measured adherence to the World Health Organization's 'my five moments for hand hygiene' and donning and disposing of gloves and aprons at the bedside.
Findings: Adherence to hand hygiene guidelines improved from 48% to 67% ($P = 0.04$) in the simulation and from 14% to 40% ($P < 0.001$) in the clinical evaluation. Donning and disposing of gloves at the bedside improved from 19% to 79% ($P < 0.001$) in the simulation and from 30% to 65% ($P = 0.014$) in the clinical evaluation. Donning and disposing of aprons at the bedside improved from 14% to 78% ($P < 0.001$) in the simulation and from 10% to 53% ($P = 0.180$) in the clinical evaluation.
Conclusion: The CareCentre improved bedside hygiene and might help reduce healthcare-associated infection rates as part of a multimodal strategy.

Introduction

Improved contact precautions are associated with reduced healthcare-associated infection (HCAI) rates and adherence to hand hygiene is considered the single most important factor.[1] It has been estimated that complete adherence to hand hygiene guidelines would reduce the rate of HCAIs by 40%.[2] Other infection prevention strategies, such as wearing gloves and aprons as contact precautions, are also proven to reduce HCAI rates.[3] However, the adherence by healthcare workers to hand hygiene and contact precautions has repeatedly been shown to be suboptimal despite multimodal interventions (education, reminders, increasing hand hygiene facilities, and feedback).[4] Design changes, such as more numerous alcohol-based hand rub dispensers and reminders placed in the line of sight of

* Corresponding author. Address: Department of Surgery, 10th Floor, QEQM wing, St Mary's Hospital, London W2 1NY, UK. Tel.: +44 (0)20 3312 2124; fax: +44 (0)20 3312 6309.
E-mail address: g.hanna@imperial.ac.uk (G.B. Hanna).

http://dx.doi.org/10.1016/j.jhin.2015.12.003
0195-6701/

healthcare workers, have resulted in improvements in hand hygiene adherence that were sustained and associated with reduced HCAI rates.[5] The hand hygiene guidelines from the US Centers for Disease Control and Prevention and the World Health Organization (WHO) state that alcohol-based hand rub should be made available at the entrance to the patient's room or other convenient locations, but these reports do not consider any other factors concerning the location of hand hygiene facilities that may affect adherence.[1,6] There is no published evidence for an ergonomic intervention to improve adherence to bedside hygiene and the value of this component is unknown. One of the objectives for future research of the WHO is the implementation and evaluation of individual components of multimodal hand hygiene interventions to assess their value.[7]

The CareCentre® (Bristol Maid Hospital Metalcraft Ltd, Blandford Forum, UK) is an end-of-hospital-bed table incorporating a writing surface, patient charts, alcohol-based hand rub, aprons, gloves, medications locker, and waste bin (Figure 1). We designed the CareCentre to improve bedside hygiene by providing the equipment needed to safely perform bedside tasks at a prominent convenient location. The CareCentre was one product of the Designing Out Medical Error (DOME) project, which tested the hypothesis that a multidisciplinary team of designers, clinicians, psychologists and business analysts could design interventions to improve patient safety in hospital wards.[8—10] In this paper, we aimed to determine the effectiveness of the CareCentre at improving bedside hygiene.

Figure 1. The CareCentre® (reproduced with permission; copyright © 2011 Bristol Maid Hospital Metalcraft Limited).

Methods

Study design

We present two prospective studies of the CareCentre versus standard control conditions in simulation and clinical evaluations.

Setting

We conducted these studies at a National Health Service (NHS) Trust in London, between 2011 and 2012. An NHS research ethics committee and Audit, Development & Research department approved the project (Bloomsbury NHS REC Ref.: 11/LO/1188).

Study 1: simulation evaluation

This was an individually randomized cross-over evaluation in a purpose-built simulated ward in a dedicated clinical skills centre. We used hospital ward paraphernalia as props including beds, bedside furniture, and ward equipment (Figure 2). More realism was added by playing sounds recorded from hospital wards into the room at 60 dB.[11] An appropriately dressed actor played the role of a patient who had a meticillin-resistant *Staphylococcus aureus* hospital-acquired infection and who was situated in a two-bedded bay. A mannequin represented a patient who was not infected in the other bed. The infected patient had an isolation precautions sign hanging beside the bed. All healthcare workers including registered staff, senior nurses and student nurses, who routinely delivered medication, measured and documented vital signs and removed cannulas, were eligible for inclusion. Convenience sampling was used to recruit participants. We asked 20 participants to perform three tasks on the infected patient: deliver the medication, measure and document vital signs, and remove a simulated cannula from the arm. The participant was then randomized to receive either the experimental or control condition first. After completing the tasks with the first condition, the participant then crossed over and performed the same tasks again with the alternative condition. In the control condition, an alcohol-based hand rub was attached to the foot of the bedframe, the vital signs and drug charts were attached to a clipboard also at the foot of the bedframe, and the patient's medications were in the bedside cabinet. In the experimental condition, the alcohol-based hand rub, vital signs and drug charts, and patient medications were all in the CareCentre. In both conditions, aprons, gloves and cleaning wipes were placed by the sink. A sharps bin, cotton wool, bandages, tape, and trays were placed on a procedures trolley next to a trolley with equipment for measuring vital signs. Participants were filmed and data were extracted from the recordings.

Study 2: clinical evaluation

This was a cluster-randomized cross-over evaluation. Nine acute adult medical and surgical wards were included that had at least two 4—6-bedded bays each. Each pair of bays was randomized. One received the experimental condition and the other received the control for one week; then the conditions were reversed during the subsequent week. The run-in period