



Examining the association between surface bioburden and frequently touched sites in intensive care

C.E. Adams^a, J. Smith^b, V. Watson^a, C. Robertson^{c,d,e}, S.J. Dancer^{b,f,*}

^a Department of Anaesthesia, Hairmyres Hospital, NHS Lanarkshire, East Kilbride, UK

^b Department of Microbiology, Hairmyres Hospital, NHS Lanarkshire, East Kilbride, UK

^c Department of Mathematics and Statistics, University of Strathclyde, Glasgow, UK

^d Health Protection Scotland, Glasgow, UK

^e International Prevention Research Institute, Lyon, France

^f School of Applied Sciences, Edinburgh Napier University, Edinburgh, UK

ARTICLE INFO

Article history:

Received 31 August 2016

Accepted 3 November 2016

Available online 13 November 2016

Keywords:

Hospital cleaning

Intensive care unit

Healthcare environment

Hand-touch sites

Microbial reservoirs



SUMMARY

Background: Critical care patients are at increased risk of infection. Near-patient surfaces act as reservoirs of microbial soil, which may contain pathogens.

Aim: To correlate soil levels with hand-touch frequency of near-patient sites in an intensive care unit (ICU).

Methods: Five sites around each bed in a 10-bed ICU were screened for total microbial soil (cfu/cm²) and *Staphylococcus aureus* every month for 10 months. Selected sites were infusion pump and cardiac monitor, left and right bedrails, and bed table. Ten 1 h covert audits of hand-touch frequency of these sites were performed in order to provide an average hand-touch count, which was modelled against soil levels obtained from microbiological screening.

Findings: Seven of 10 staphylococci were found in conjunction with gross contamination of a specific site ($P = 0.005$) and the same proportion from three most frequently touched sites (bedrails and bed table). There was a linear association between four sites demonstrating gross microbial contamination (>12 cfu/cm²) and mean number of hand-touch counts ($P = 0.08$). The bed table was handled most but was not the most contaminated site. We suspected that customary placement of alcohol gel containers on bed tables may have reduced microbiological yield. Removing the gel container from one table confirmed its inhibitory effect on microbial contamination after rescreening (19% vs 50% >12 cfu/cm²; $P = 0.007$).

Conclusion: Surface bioburden at near-patient sites in ICU is associated with hand-contact frequencies by staff and visitors. This supports the need for targeted hygienic cleaning in a high-risk healthcare environment.

© 2016 The Healthcare Infection Society. Published by Elsevier Ltd. All rights reserved.

Introduction

The hospital environment is habitually contaminated with micro-organisms and may thus play a role in the spread of pathogens such as meticillin-susceptible *Staphylococcus*

* Corresponding author. Address: Department of Microbiology, Hairmyres Hospital, East Kilbride, Lanarkshire G75 8RG, UK. Tel.: +44 (0)1355 585000; fax: +44 (0)1355 584350.

E-mail address: stephanie.dancer@lanarkshire.scot.nhs.uk (S.J. Dancer).

aureus (MSSA) and methicillin-resistant *S. aureus* (MRSA).¹ These pathogens are predominantly located at sites adjoining the patient's bedside and could be transmitted to patients via contaminated hands of healthcare workers.^{2–5} Hospitals promote the importance of hand hygiene but staff do not always clean their hands when they should, and near-patient surfaces do not always receive adequate cleaning.^{6,7}

Patients in an intensive care unit (ICU) are at increased risk of acquiring a nosocomial infection compared with those on a general ward. First, compromised patients are at risk from their own endogenous organisms; second, cleaning frequencies of high-risk surfaces may not be sufficient to impede the risk of repeated recontamination with pathogens.⁸ Whereas hand hygiene remains the cornerstone of infection control, frequently touched sites inevitably host reservoirs of microbes.^{4,9,10}

The objective of this study was to examine which near-patient sites are most frequently handled in the ICU and whether there is an association between hand-touch frequencies and microbial soil found at those sites, including presence of MSSA and MRSA. Recognition of such an association would help prioritize the cleaning of near-patient sites in the ICU, as well as facilitating review of current cleaning frequencies.

Methods

Setting

The study unit is a 10-bed adult ICU in a district general hospital. Five beds are designated for ventilated patients and the remainder for patients who do not require mechanical ventilation. Each ventilated patient is nursed on a 1:1 basis, with highly dependent patients also provided with their own nurse or shared with another patient as appropriate. Bed occupancy within the ICU ranges from 50% to 100%, with daily turnover of at least one to five patients. Cases include multiple trauma, cardiac conditions, community-acquired pneumonia, and those who require support following routine or emergency surgery. The unit also manages immunosuppressed patients, acute sepsis, and alcohol and drug poisoning. Each bed has an adjoining table positioned at the end for patient charts and a bottle of alcohol gel (Spirigel Complete[®]; Ecolab, Northwich, UK).

Cleaning

Domestic and nursing staff share responsibility for routine cleaning of general surfaces and clinical equipment. Domestic staff clean floors, toilets and general surfaces once daily and near-patient sites (furniture and equipment) are cleaned by nurses twice daily (once per 12 h shift). Cleaning is detergent-based, with detergent wipes (Tuffie[™] wipes; Vernacare, Bolton, UK) used for clinical equipment, and water and detergent (Hospec[™]; Robert McBride Ltd, Middleton, UK) for floors and general surfaces. Wipes are confined to one bed-space only, with one wipe allocated for each separate site before disposal. Bed-spaces of patients colonized or infected with hospital pathogens, either in the single isolation room or in the main body of the unit, are cleaned with bleach (Actichlor Plus[™]; Ecolab). All surfaces receive routine bleach cleaning every

Sunday. After a patient is discharged, terminal cleaning of all surfaces within the bed-space is carried out in co-ordinated fashion between domestic and nursing staff. Environmental and hand hygiene audits are regularly carried out by infection control nurses, with written reports fed back to staff and displayed outside ICU.

Pilot study

Hand-touch sites chosen for investigation were selected following prior audit of hand-touch frequency. Staff and visitors in the ICU were not aware that these audits were taking place, in order to obtain as accurate a representation of hand-touch frequency as possible. The five most frequently handled sites common to all ICU patients were: bed table, both bedrails, and control panels of the intravenous (IV) infusion pump and cardiac monitor. Patients' ventilator tubing was also frequently touched but this site was excluded because not all patients are ventilated. The most frequent hand-touch sites identified from the pilot study were similar to those found previously on an acute ward in this, and unrelated, hospitals.^{11–13}

One hand-touch episode was recorded when the observer saw the fingertips and/or hand palm clearly touching a site; should the same person have continued to touch that particular site, then no further episodes were counted. If a person touched a site, moved away and touched something else, but then returned and retouched the original site, then a further hand-touch episode was documented.

Environmental screening

When the five most frequently handled surfaces had been chosen, an unannounced, standardized environmental screen was initiated. This occurred once per month for 10 months and was conducted during the morning (Monday to Saturday) before near-patient sites were cleaned.

Screening was performed using double-sided dipslides (Hygiene International, Watford, UK), coated with nutrient and staphylococcal selective (Baird–Parker) agars. Each slide was systematically placed on the chosen site for 10 s with no screening overlap between the different agars. Pressure applied (25 g/cm²) was pre-determined according to Griffith *et al.* and screening performed by the same two study personnel.¹⁴ After sampling all five sites around each of the 10 beds, dipslides were loosely capped and returned to the on-site laboratory for incubation (48–72 h) at 35°C in CO₂.

Growth on nutrient agar supplied total aerobic colony counts (ACC) per cm² which were classified as follows: no growth; scanty growth (<2.5 cfu/cm²); light growth (2.5–12 cfu/cm²); moderate growth (12–40 cfu/cm²); and heavy growth (>40 cfu/cm²) as previously defined.^{3,9,11} Selective agar highlighted potential coagulase-positive staphylococci, which were subcultured on to *Staphylococcus aureus* identification (SAID) agar (Oxoid Ltd, Basingstoke, UK), followed by automated susceptibility testing (Vitek) according to routine laboratory protocol. Hygiene standards have been proposed whereby ACC >5 cfu/cm² and/or presence of MSSA/MRSA at a hand-touch site indicates increased infection risk for patients.¹⁵

Download English Version:

<https://daneshyari.com/en/article/5668420>

Download Persian Version:

<https://daneshyari.com/article/5668420>

[Daneshyari.com](https://daneshyari.com)