



KEY POINT SUMMARY

OBJECTIVES

The objective of this study was to determine whether the single-patient rooms in a newly designed ward contributed to lower rates of HAIs and three AROs - Methicillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant *Enterococci* (VRE), and *Clostridium difficile* (C diff).

Hospital ward design and prevention of hospital-acquired infections: A prospective clinical trial

Ellison, J., Southern, D., Holton, D., Henderson, E., Wallace, J., Faris, P., ... & Conly, J. 2014 | *Canadian Journal of Infectious Diseases and Medical Microbiology*. Volume 25, Issue 5, Pages 265-270

Key Concepts/Context

The authors note the growing recognition of the relevance of facility design as a significant factor contributing to patient safety. They point to several factors in the environment of a hospital that may be potentially conducive for the transmission of hospital-acquired infections (HAIs), antibiotic-resistant organisms (AROs), in particular. When a new ward was designed in a medical teaching hospital, a study was carried out to study the impact of the design on HAIs and on the colonization of AROs. HAI-related outcomes were investigated in patients admitted to the new design ward and the old design ward. No significant differences were found in the incidences of HAI and ARO colonization between patients in both wards. On analyzing incidences data in single-bed as compared to multi-bed, the authors conclude that ward design needs further investigation in connection with HAI incidences.

Methods

The research involved a prospective, controlled trial. Patients were admitted by a computer-generated randomization sequence to one of two study sites – the newly designed ward or one of the older wards. Over 80% of the new design ward had single-patient rooms, private bathrooms, greater space, a sink in the room, and one sink in the hallway between two rooms. Over 80% of the historic design wards had four-bed rooms, common bathrooms, less space, one sink in the room, and none in the hallway. Other variables remained the same for both wards – alcohol rubs at room entrance, acuity of care, medical staff, nursing staff and skills, education levels, housekeeping, and awareness about practices pertaining to infection control. Patients recruited for the study were those whose length of stay was >48 hours, were not transferred from another facility or ICU or ward, did not require telemetry, and were older than 18 years. These criteria resulted in a final



participant number of 1,514 (new ward: 910; old ward: 604). Information pertaining to incidences of HAIs was obtained from the hospital's computer-based clinical information system and database of infection control and prevention unit. The primary outcome was analyzed using chi-square and student's t tests, and Poisson regression analyses. A secondary analysis, which included the number of outbreaks of AROs on the wards, was also conducted.

Findings

The study yielded the following findings:

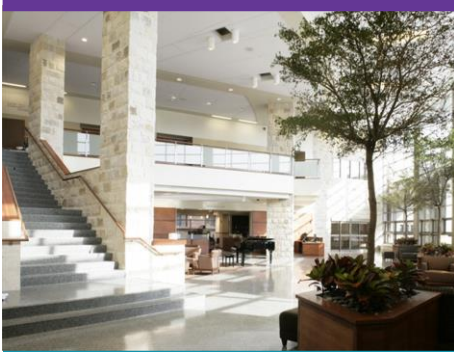
- The patients in the new wards were younger, had fewer comorbidities, and were more likely to be transferred. They were significantly more likely to be discharged home, require isolation, stay in a single-patient room, and have a longer period of antibiotic therapy.
- On analyzing the primary outcomes, the authors found that there were more incidences of HAIs and AROs on the new ward than the old ward, but these differences were not significant.
- A secondary analysis was conducted comparing the incidences in a single-bed room versus a multi-bed wing (and not the wards) – this analysis found that the number of HAI incidences or events were between 1.4 to 2 times more frequent in the multi-bed wings than in the single-bed rooms. This difference was not significant.

Limitations

The authors identified the following limitations to their study:

- The incidence of only three HAI pathogens were studied; there are other pathogens whose presence was not investigated.
- The active screening to identify individuals colonized with MRSA started after the study was initiated, implying that prior colonization may have been missed.
- Active screening for VRE was not conducted, making it probable that five VRE cases on the new ward had been acquired at other locations.
- This patient population consisted of general medical patients, because of which the findings cannot be generalizable.

The authors also mention the following administrative decisions that may have contributed to compromising the study findings:



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- Because of capacity issues, some single rooms were converted to multi-bed rooms – this may be the reason why the differences in the data analyses were not significant.
- Although every effort was made to maintain random patient recruitment for the study, a selection bias led to the more ill patients being admitted to the new ward.

Design Implications

Although analyses of the data showed that there were more incidences of HAI in the multi-bed ward versus the single bed wards, the authors indicated the need for more studies.

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