Environmental Sampling of Air and Hospital Surfaces. What does it tell us?

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BACKGROUNG

Contamination of air and surfaces by healthcare-associated bacteria has been reported but with different outcomes in terms of levels of contamination and transmission. This study assessed environmental contamination of air and inanimate surfaces before and after cleaning in two wards (one medical and one surgical) in a tertiary referral hospital and evaluated the cleanliness of each of the surfaces sampled.

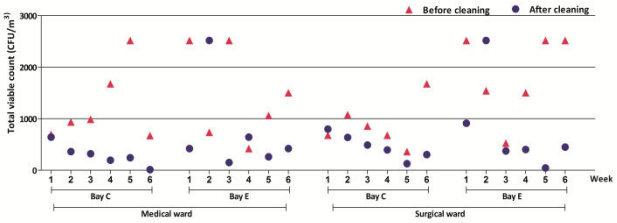
MATERIAL & METHODS

Microbiological sampling of air and inanimate surfaces around hospitalised patients was carried out twice a day (before and after cleaning) over a seven week period. Air contamination was assessed using the Sampl'air lite system and tryptic soy agar for bacterial enumeration of the total viable count (TVC). Surface sampling was assessed using contact plates and petrifilms on four high-touch surfaces including the toilet-door handle, the bedside locker, the tray table and the call button. The cleaning assessment was carried out by applying a fluorescent dye (Dazo dye) to each of the surfaces on the day prior to sampling and assessed if it was present just before sampling.

RESULTS

AIR SAMPLING

Fig 1. Levels of air contamination before and after cleaning.



The levels of air contamination varied during the screening period (Fig. 1) independently of the ward or bay. However, the overall mean TVC detected in air before cleaning was 1363 CFU/m^3 significantly higher than after cleaning 569 CFU/m^3 ($P \leq 0.05$).

SURFACE SAMPLING

Fig 2. Surface contamination in a medical and a surgical ward before and after cleaning over a 7-week period using petrifilms.

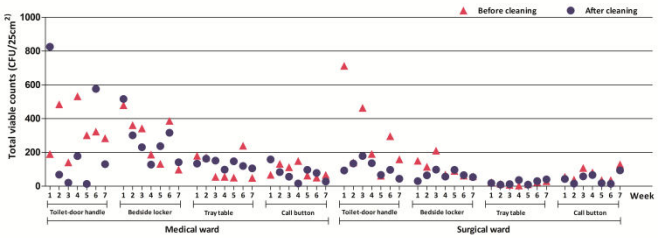


Fig 3. Assessment of surface cleaning in a medical and a surgical ward over a 7-week period.

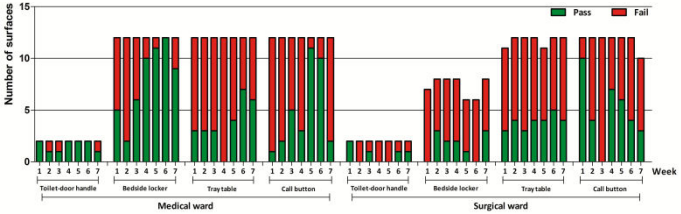


Fig 4. Contact-plate versus petrifilm for detection of surface contamination.

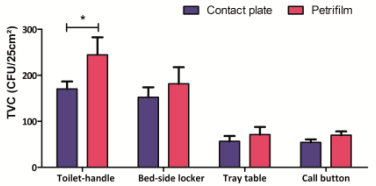
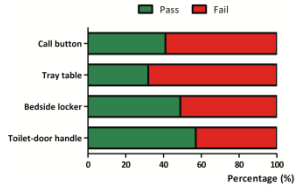


Fig 5. Overall Surfaces passing and failing the cleaning assessment.



Surface contamination varied independently of the of the ward or time of the day (Fig. 2). Numbers of bacteria were highest from the toilet-door handle, followed by the bed-side locker and were least from the tray-table and call-button (Fig. 2&4). Moreover, the levels of contamination did not relate directly with the outcome of cleaning, i.e., sometimes surfaces were more contaminated but deemed clean (Fig. 2&3). Contact-plates and petrifilms detected similar numbers of bacteria but petrifilms detected higher numbers (CFU/25cm^2) from the toilet door-handle than the contact-plates (*P<0.05) (Fig. 4). The tray-table (68.1%) followed by the call button (59%) were more often inadequately cleaned, followed by the bedside locker and the toilet-door handle (Fig 5). The overall rate for adequate cleaning ('pass') was 41%.

CONCLUSIONS

Routine cleaning may play a role in the reduction of air contamination. Bacterial contamination of the toilet-door handle and bedside locker adjacent to patients was above the range of >62.5 to 125 CFU/25cm^2, currently accepted by many as a measure of poor hygiene. Furthermore, the 'pass' rate for cleaning was only 41%. There is a urgent need for improved cleaning standards and better decontamination techniques in hospitals.

ACKNOWLEDGEMENTS

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