The elimination of microbial hotspots: A potential tactic in the war against healthcare-associated infections

Healthcare-associated infections result in increased morbidity and mortality, and elevated healthcare costs. With the rise of multidrug resistance, extensive drug resistance and even pan-drug resistance in nosocomial organisms, the war against nosocomial infections has become a matter of even greater concern. Nowhere is this concern greater than in the intensive care unit (ICU), where patients are particularly vulnerable to infection, and drug-resistant organisms are common.[1,2]

The war against nosocomial infections needs to be fought on many fronts. Much emphasis is placed on the arms race to develop new antibiotics to fight these increasingly resistant organisms. Novel (or newly reimagined) therapies such as phage therapy, vaccination and newly discovered antimicrobial compounds are particularly likely to grab the headlines. As we head towards a potential post-antibiotic era, these approaches are brave rear-guard actions, but are likely to be losing battles.

Victory, or at least a prolonged ceasefire, is most likely to result from successful prevention strategies. Hand hygiene and head-of-bed elevation are well-established (and often poorly adhered to) preventative strategies. The Spaulding classification has historically divided medical devices into critical, semi-critical and non-critical devices.[3] Critical devices enter sterile tissue, including the vasculature, and require sterilisation prior to use. Semi-critical devices come into contact with mucous membranes, and require high-level disinfection. Non-critical devices come into contact only with intact skin, and require only low-level disinfection. Critical and semi-critical devices have received much attention, have well-established procedures for sterilisation and high-level disinfection and have protocols for insertion and for managing these devices (including catheter-related bloodstream infection bundles, and urinary catheter insertion and care bundles). Non-critical items are frequently contaminated with pathogenic micro-organisms (microbial hotspots) and are documented sources of nosocomial infection; however, they receive less attention in the scientific literature and among clinical practitioners.[4,5]

In this edition of the *SAJCC*, Desai *et al.*[6] report that the internal surfaces of pulse oximeter probes are commonly contaminated with pathogenic micro-organisms. After a simple, standardised decontamination protocol, 81% of the contaminated pulse oximeter probes exhibited no microbiological growth. This may seem comforting, but is the residual microbial contamination of 19% of probes acceptable? It could be argued that the clinical significance of this contamination is questionable, as in two-thirds of cases, the remaining micro-organisms were skin commensals, and the authors did not show (and, it must be said, never set out to show) that these contaminated probes led or could lead to cross-colonisation/cross-infection. These arguments are, however, untenable given the consequences of nosocomial infections in the ICU, and prevention of possible pathogen transmission from non-critical devices is clear low-hanging fruit in the war against nosocomial infections. The question is, then, what is to be done?

The authors note that all probes that remained contaminated after decontamination had been in use on patients' fingers prior to decontamination. In addition, 50% of these probes were soiled with blood, and one-third had visible cracks on the internal surface. From these findings, it would be reasonable to suggest that probes with visible cracks on the internal surface should be removed from service. This raises obvious issues in the resource-constrained environment. It would also be reasonable to investigate and employ enhanced decontamination techniques in probes that are clearly soiled. Although a more speculative idea, would as simple an intervention as having a patient-free period for each pulse oximeter probe reduce probe contamination? Even if this turned out to be an effective strategy, however, it would require a surplus of probes in units with high patient turnover.

An obvious consideration, given the authors' findings, would be the use of either disposable pulse oximeter probes or probe covers. The clear concern would be increased healthcare costs in terms of disposable devices. If their use was associated with a reduction in healthcare-associated infections, however, the cost-saving from this might more than offset the cost of disposable probes. This is hypothetical, however, as there is a lack of evidence that disposable probes reduce infections.[7]

Overall, Desai *et al.*[6] must be congratulated on a well-designed study. Given the resource limitations (both human and financial) in the South African setting, the study was small and limited to two ICUs, which raises questions over the generalisability of the results. Owing to the sound methodology, and the fact that the results are largely concordant with those of other international studies, the findings deserve attention, and highlight the potential role of non-critical items as microbial hotspots.

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