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Missing a trick? Response to: 'Disinfectant wipes are appropriate to control microbial bioburden from surfaces'

Sir,

I wish to comment on the recent paper examining the efficacy of disinfectant wipes by Sattar *et al.*[1]

The authors state in the summary that, 'Disinfectant pre-soaked wipes are rarely tested using conditions simulating their field use, and the label claims of environmental surface disinfectants seldom include wiping action.' This is absolutely correct, but while the paper goes on to demonstrate the kill potency of different commercial wipes using rigorous methodology, it does not adequately explore the data presumed attributable to the wiping action alone (see control values in Figure 1). Indeed, there is no discussion of the effect from physical wiping *without* disinfectant. The authors can correct me if I am wrong but it seems that wiping alone with control cloths reduced *Staphylococcus aureus* and *Acinetobacter baumannii* inocula by 3 $\log_{10}$ colony-forming units after 10 s of wiping. It is possible that the authors have 'missed a trick' here, as they say.

Why is mechanical removal of microbial soil important? Perhaps the most pertinent point to make is that routine cleaning of healthcare surfaces with a range of wipes and cloths in the UK National Health Service is performed with detergent only, and this doesn't appear to have done too much harm given the situation described worldwide.[2] Basic data justifying current cleaning specifications practised in UK hospitals and elsewhere are in short supply and are more than welcome. Furthermore, the reduced toxicity of environmentally friendly cleaning deserves support from such studies. This evidence may encourage other hospitals and healthcare regions to discard routine use of disinfectants and adopt a more 'green' (and exceedingly cheaper) approach.

It is true to say that environmental surface screening, whether during an outbreak or non-outbreak situation, often fails to detect healthcare pathogens of interest despite targeting known reservoirs. There are several reasons for this, but even resilient pathogens are surprisingly few in number on high-risk near-patient surfaces.[3,4] Rarely do screening programmes actually quantify cfu values on these surfaces, but, when they do, organisms such as *S. aureus* and *Clostridium difficile* are <1 $\log_{10}$.[3,4] If that is the case, then for these organisms at least, a physical wipe that reduces microbial contamination by 3 $\log_{10}$ is more than sufficient to deal with scanty survivors.[3,4]

There are a few other issues to take into account. This was an in-vitro study with artificial inoculation of standardized steel carriers, not real-life hospital surfaces. The inoculum itself ($>10^4$ cfu) was likely to be grossly inflated compared with the quantity of microbial pathogens normally present in the healthcare environment. Furthermore, there is the pressure of physical action (thoughtfully included); wipe direction (ditto); total surface cleaned with one wipe or cloth; in-use time; clinical setting; management of cleaning cloths, fluids and equipment; as well as unexpected heavy soil to consider in hospital settings. Indeed, the study showed that the control wipe aptly transferred both bacteria between all tested carriers.[1] However, if wipes are appropriately managed ('one site, one direction, one use'), the cleaning specification followed by UK healthcare staff could potentially achieve the 'hygienic clean' sought by those responsible for infection prevention.

Shouldn't the in-vitro impact of physical wiping alone have been explored further? Perhaps the authors missed this particular trick but, on the other hand, they have produced a truly excellent paper, which offers a standard for disinfectant *and detergent* wipe testing, now and for the future.[1] The comments here should not be seen as criticism; the data are there for all to see. However, it is entirely possible that detergent wipes alone might be sufficient to control microbial bioburden on healthcare surfaces as part of the routine domestic specification. There is some support for this.[2,4–6] More work on the cleaning process is urgently required.

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Missing a trick? Response to: 'Disinfectant wipes are appropriate to control microbial bioburden from surfaces'

Sir,

It is with interest that we read the comments from Dr Dancer. The article by Sattar *et al*. describes a control test method to measure the efficacy of pre-wetted wipes.[1] The method, which is now an ASTM standard (ASTM E2967-15), was used to measure the efficacy of a number of pre-wetted antimicrobial wipes. The innovation of this method is that it strictly controls the wiping action, which is crucial for the activity of the product.[2] We are in full agreement with Dr Dancer that multiple parameters may affect the efficacy of the wipes in healthcare settings.[2]

In terms of experimental set-up, it is difficult to obtain wipe fabric on its own. Furthermore, formulations are often tailored to the fabric to improve wipe performance. In addition the ASTM 2967-15 test uses a high microbial inoculum on surfaces to ensure that >4 $\log_{10}$ reduction is achieved. This is the case for other efficacy standard tests measuring biocidal product activity.

We agree with Dr Dancer that the fabric itself with no formulation will contribute to the ability of the wipe to remove bioburden from the surface, and this has been reported in several studies using the same methodology principle.[1,3,4] However, often the non-formulated control wipes did not perform as well as formulated pre-wetted wipes. This was the case in our study in which pre-wetted antimicrobial wipes achieved ≥ 2 $\log_{10}$ reduction from surfaces compared with J-cloth used as the control wipe.[1] In the study from Siani *et al*. non-medicated wipes removed 1.13 ± 0.36 and 0.97 ± 0.22 *Clostridium difficile* NCTC12727 and R20291 ribotype 027, respectively.[3] The removal of endospores from a stainless steel surface with the non-medicated wipe was much lower than with some of the pre-wetted antimicrobial wipes tested (the best one achieving 4 $\log_{10}$ reduction from surfaces against the NCTC12727 spores). Williams *et al*. tested a non-medicated (control) wipe and a pre-wetted 'antimicrobial' wipe against a number of *Staphylococcus aureus* isolates including meticillin-resistant ones, and for the majority of the isolates the control wipe performed less well than the formulated wipe; differences of 1–2 $\log_{10}$ in dirty conditions and 2–4 $\log_{10}$ in clean conditions were recorded.[4] Dr Dancer raised the interesting point that detergent wipes may be sufficient to remove bioburden from surfaces. Detergent wipes are formulated wipes that contain a number of anionic and non-ionic surfactants and other excipients that one would argue are not necessarily eco-friendly. As for their ability to remove microbial bioburden from surfaces, a recent comprehensive study using the ASTM 2967-15 methodology showed that there was an important variability in the efficacy of commercially available detergent wipes to remove microbial bioburden from surfaces. In addition, all these wipes transferred bacteria or spores between surfaces.[5] As Dr Dancer mentioned, if wipes are used appropriately, the capability of removing 3 $\log_{10}$ microbial contamination from surfaces may be sufficient. However, the evidence is that pre-wetted wipes are not used properly and often they are used on multiple surfaces despite the 'one wipe–one surface–one direction' message that we launched back in 2007. With this in mind, the addition of disinfectant might provide an additional safety net that could compensate for product misuse.

Manufacturers and end-users now have a dedicated pre-wetted wipe test that they can rely on to improve product performance and demonstrate product efficacy. Part of improving product performance will undoubtedly include the choice of the correct material-formulation combination to ensure maximum efficacy. Finally, product efficacy also requires the appropriate education of the end-users, for which manufacturers can play a role, notably with clear wipe-usage instructions.

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