

Impact of test protocols and material binding on the efficacy of antimicrobial wipes

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ABSTRACT

This study tested quaternary ammonium compound (QUAT)-based products, accelerated hydrogen peroxide (AHP®) and a neutral cleaner against *Staphylococcus aureus* (*S. aureus*) and *Pseudomonas aeruginosa* (*P. aeruginosa*) using a variety of wipe substrates. AHP achieved the greatest efficacy overall, though performed significantly better when applied with microfibre and non-woven material compared to cotton.

BACKGROUND

Until recently, wipes were not widely used in professional healthcare settings for routine cleaning and disinfection, though we now have evidence to show that the wipe format may be more effective at eliminating pathogens compared to liquid chemicals applied with some other substrate. Specifically, antimicrobial wipes have been shown to be more effective compared to bleach applied with cloth at reducing total bacterial bioburden. Test protocols have since been introduced to reflect the use of a wipe product rather than a formulation, which may enhance our ability to accurately evaluate the performance of these wipes. However, new concerns may arise as to whether ingredients from the liquid disinfectant bind to the wipe substrate, which may impair the microbicidal efficacy of the formulation. This study sought to evaluate the efficacy of disinfectant wipes using three standard test methods, and determine the effect of material binding on their performance.

STUDY

This study used *S. aureus* and *P. aeruginosa* as test organisms, as these represent the leading agents behind hospital-acquired infections. The formulations tested included two quaternary ammonium compound (Quat)-based products, an AHP®-based product, and a neutral cleaner. Two litres of each formulation was tested using standard test methods (ASTM2197 and EN13697) to determine their efficacy in liquid form without the interference of a wiping substrate. Researchers then used a microfibre cloth, a non-woven cloth and a cotton cloth to test the interaction of each formulation with the materials: each type of cloth was soaked in each formulation for 10 seconds and tested against the bacteria using the wipe-specific ASTM269 and EN16615 test methods. In a separate test, liquid was absorbed and then extracted from each of the substrates, and tested again using the standard test methods to determine whether efficacy was impacted by material binding.

For the efficacy tests, stainless steel discs were inoculated with the test organisms, and a 5-minute contact time was allowed.

RESULTS

The cotton material absorbed the greatest amount of liquid, regardless of the product. The non-woven absorbed the least. The microfibre and cotton materials absorbed a larger quantity of Quat-based product compared to other products. The cotton retained more

liquid than the other materials after wringing, whereas the non-woven material released the most formulation.

In terms of efficacy, the Quat-based products were significantly less effective against the test bacteria when applied using the various materials. Overall, the AHP[®]-based product demonstrated the best efficacy against both bacteria overall. The neutral cleaner had limited efficacy both before and after substrate binding.

CONCLUSION

This study showed that although wiping substrate does affect the activity of disinfectant formulation, it's not clear how this impacts microbicidal efficacy. The relative quantity of formulation absorbed and subsequently released by the materials did not seem to affect microbicidal efficacy. The EN16615-15 test consistently shows better efficacy compared to the ASTM2697-15 test, highlighting that differences do exist in efficacy results between test methods.

IMPLICATIONS FOR AHP

The effect of substrate binding on disinfectant efficacy remains unclear. One conclusion that may be applied to AHP[®] is that greater efficacy was achieved using the microfibre and non-woven materials compared to the cotton. Future work should examine these relationships in more depth to characterize the interactions of the disinfectant with each material. As expected, AHP[®] demonstrated higher efficacy against both bacteria compared to QUAT-based products.

REFERENCE

Wesgate R, Robertson A, Barrell M, Teska P, Maillard JY. (2018). Impact of test protocols and material binding on the efficacy of antimicrobial wipes. *Journal of Hospital Infection*. (In Press).