

## Evaluation of disinfectants and wiping substrates combinations to inactivate *Staphylococcus aureus* on Formica coupons

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### ABSTRACT

Three disinfectants were each paired with three wiping substrates to compare their relative efficacies against *S. aureus* on Formica surfaces such as those common in hospitals. Sodium hypochlorite and accelerated hydrogen peroxide (AHP®)-based products applied with the cotton or microfiber cloths, respectively, demonstrated the greatest antimicrobial efficacy overall.

### BACKGROUND

When undergoing testing for EPA approval, disinfectants are tested using a stainless-steel substrate. Results from these tests may not be applicable to Formica surfaces in hospital rooms. The objective of this study was to evaluate the efficacy of three disinfectants, using three different wiping substrates, against *Staphylococcus aureus* on Formica surfaces.

### STUDY

Sterile Formica squares (1 in x 1 in) were each inoculated with 10 µL of *S. aureus* culture solution, and dried in a desiccator. Five disinfectant products were tested using three different wiping substrates: cotton, microfiber and nonwoven). Products included a quaternary ammonium compound (Virex II 256), sodium hypochlorite (Avert), accelerated hydrogen peroxide (Oxivir), a non-disinfectant detergent (Prominence) and phosphate-buffered saline. Once dry, the cloths were submerged in

250 mL of each disinfectant for 10 seconds, wrung to dry, and used to wipe the inoculated Formica squares. The squares were then placed in a sterile jar and treated with a neutralizing buffer. The used cloths were also treated with the buffer, and liquid from the squares and cloths was cultured onto Tryptic Soy Agar.

### RESULTS

Only the AHP® product and the sodium hypochlorite were successful in reducing bacteria on the Formica coupons to undetectable levels. With cotton, the quaternary ammonium compound-based product was least effective. AHP and sodium hypochlorite were significantly more effective than all other treatments when the nonwoven cloth was used. Similarly, the use of sodium hypochlorite and AHP® resulted in a significantly reduced concentration of *S. aureus* on the cloth following the experiments.

### CONCLUSION

Quaternary ammonium compound-based disinfectants are not the optimal choice for Formica surfaces. Cotton and nonwoven cloths are particularly problematic when coupled with these compounds, due to binding of the ammonium compounds to the cotton, impairing disinfectant action. AHP® and sodium hypochlorite do not react with textiles in this way, and thus were much more effective against *S. aureus* on Formica. The pairing on an AHP®-based disinfectant with a microfiber cloth

would provide the ideal solution for disinfection of Formica surfaces in healthcare settings.

#### IMPLICATIONS FOR AHP

This study explores the value of AHP<sup>®</sup> in terms of efficacy and compatibility. The results indicate that from an efficacy standpoint, AHP<sup>®</sup> is clearly superior to other chemistries. A possible reason for this, as outlined by the article, is the lack of reactivity between AHP<sup>®</sup> and the textiles tested. This provides AHP<sup>®</sup>-based products with a major advantage over quaternary ammonium compound-based alternatives.

While sodium hypochlorite demonstrated equal efficacy against *S. aureus* compared to AHP<sup>®</sup>, the safety and environmental profile of AHP<sup>®</sup> help reduce some current issues associated with the use of bleach. For instance, chlorine-based products have been known to cause respiratory irritation, as well as irritation to eyes and skin. In addition to this, these products may react with

other chemicals in waste-water in potentially dangerous ways. With AHP<sup>®</sup>, there is no compromise between environmental and human safety and efficacy against *S. aureus*, making it the ideal choice for Formica surfaces.

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#### REFERENCES

Brown E, Dhanireddy K, Waldron C, Teska P, Eifert J, Boyer R. (2018). Evaluation of disinfectants and wiping substrates combinations to inactivate *Staphylococcus aureus* on Formica coupons. *American Journal of Infection Control*. (In Press).