

Evaluation of the Efficacy of Disinfectant Footmats for the Reduction of Bacterial Contamination on Footwear in a Large Animal Veterinary Hospital

Hornig, K.J., Burgess, B.A., Saklou, N.T., Johnson, V., Malmlov, A., Van Metre, D.C., Morley, P.S., Byers, S.R.

ABSTRACT

Infection control is critical to providing high-quality patient care as well as maintaining a safe working environment for personnel in veterinary hospitals. Many North American veterinary teaching hospitals (VTHs) utilize footbaths and footmats at entrances and key control points throughout the veterinary hospital in an endeavor to decrease trafficking of pathogenic microorganisms throughout the facility via contaminated footwear. Studies have shown that disinfectant footmats and footbaths may be helpful, but are not absolute methods, for eliminating contamination on footwear in veterinary hospital environments. While disinfectant footmats may be considered reliable in decreasing footwear contamination, the magnitude of these decreases is limited. Disinfectant efficacy would likely be improved by the removal of organic debris before disinfection or increasing contact time, however, the study was designed to emulate common practice in livestock hospitals where footmats are utilized to decrease trafficking of microorganisms on footwear as personnel move throughout the facility.

STUDY

The purpose of this study was to assess the efficacy of footmats containing different popular disinfectants by standardized methods to evaluate the reduction of bacterial contamination on footwear in a natural setting. The disinfectant solutions included a 1.0% VIRKON solution (6.5 ounces of powder to 20 L of water), Intervention®, a 4.25% Accelerated Hydrogen Peroxide®

solution (40 ounces of concentrate to 20 L of water), a 1.56% QUAT solution (10 ounces of concentrate to 20 L of water), and a 0.39% PHENOLIC solution (2.5 ounces concentrate to 20 L of water). Four new disinfectant footmats were used for the project. New rubber overboots were purchased, and 4 standardized sampling zones were drawn on the sole using a template. Contaminated bedding and animal waste provided the source of microbial contamination, and was representative of typical conditions encountered in the animal housing and patient care areas of a livestock veterinary hospital. Study personnel wore the boots, followed a process to contaminate them, and then stepped on the randomly assigned, solution-saturated footmat for 3 seconds, before the boot was removed and allowed to rest for the 10-minute contact time, sole-side up. Samples were collected from the boot sole with a sterile swab moistened with neutralizing broth, then processed and diluted with buffered peptone water. Samples of each dilution were then plated on tryptic soy agar plates with 5% sheep blood to quantify total aerobic bacteria, and on MacConkey agar to quantify enteric bacteria (Gram-negative bacteria).

RESULTS

Reductions in colony-forming units (CFUs) on treated boots ranged from no detectable reduction to 0.45 log₁₀ and varied by disinfectant. Percentage reduction in total bacterial counts generally were larger for AHP® and QUAT disinfectants (range 37-45%) and smallest for the PHENOLIC (no detectable reduction).

CONCLUSION

The results suggest that disinfectant footmats could be used to decrease CFUs for total bacteria and Gram-negative bacteria on the soles of overboots under conditions that simulate use in a large animal veterinary hospital. In general, the greater reductions were seen with peroxygen disinfectants (AHP[®] and VIRKON), but neither of these treatments decreased contamination to levels that would be considered “sanitization” or “disinfection”.

IMPLICATIONS FOR INTERVENTION[®]

Footmats and footbaths can serve as visual indicators to personnel that they are entering or leaving areas of greater risk within a facility, and also can serve as a deterrent to unnecessary foot traffic, thereby decreasing the potential for spread of contamination. In this manner, footmats also may promote a culture of patient safety within veterinary hospitals, regardless of their microbiological efficacy. The use of Intervention[®] with footmats and footbaths is an effective way to decrease bacterial contamination of footwear.

REFERENCES

1. Hornig, K.J., Burgess, B.A., Saklou, N.T., Johnson, V., Malmlov, A., Van Metre, D.C., Morley, P.S., Byers, S.R. (2016). Evaluation of the Efficacy of Disinfectant Footmats for the Reduction of Bacterial Contamination on Footwear in a Large Animal Veterinary Hospital. *Journal of Veterinary Internal Medicine*. 30, 1882-1886.