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In situ evaluation of a persistent disinfectant provides continuous decontamination within the clinical environment

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Methodology/Study Design:

- Evaluation of two EPA-registered quaternary ammonium disinfectants and a trial disinfectant designed to provide persistent disinfection (Firebird F130 – disinfectant #1 - known as **Sani-24®**) to assess their ability to limit bioburden subsequent to application on the bedrails of patients in a medical intensive care unit.
- Two independent trials were conducted in which Firebird was tested separately against each of the EPA-registered quaternary ammonium disinfectants.
- Data was excluded for patients who were discharged during the 24-hour period of the study.
- Normal patient care activities and visitation continued for the study period.
- Healthcare workers and visitors were blinded to the intent of the study.

Experiment:

- Resident microbial bioburden on the upper surface of the bedrails for 132 occupied beds was assessed.
- Each disinfectant was equivalently applied separately according to the manufacturer's instructions to the upper surface of the bedrails and allowed to evaporate.
- Bioburden was recovered and enumerated immediately prior to application of the disinfectant and at 1, 6 and 24 hours subsequent to application.
- Bioburden was recovered from 65 beds disinfected with Firebird, 34 beds disinfected with quaternary ammonium #2 and 33 beds disinfected with quaternary ammonium #3.
- Difference of efficiency of disinfection among the agents were assessed using the Mann-Whitney test for pairwise comparisons with a significance level of $p < .05$.

Results:

- The continuous disinfection activity of Firebird was evident with bioburden significantly lower at 1, 6 and 24 hours post-disinfection.
- Disinfectant #2 – similar in composition to Firebird –exhibited significant population rebound at 6 hours post-application and continued to have waning antimicrobial activity at 24 hours.
- Disinfectant #3 was only able to maintain its disinfection activity for 1 hour after application.

Conclusions:

In comparing the efficiency of disinfectants #2 and #3 to the persistent activity of Firebird, it was found that Firebird was significantly better at limiting the re-establishment of bioburden on bedrails. The activity of Firebird was significantly better than disinfectant #3 for all time points, and was superior for 2 of the 3 time points evaluated for disinfectant #2.

The use of a disinfectant with persistent disinfection provides the infection control community with a product that limits the re-establishment of bacteria on critical high-touch surfaces.

Limitations:

- The heterogeneity of patient variables, e.g. microbial shedding and acuity of care, may have influenced the recovery of microbes from the bedrails and could not be controlled.
- Sampling methodology may have resulted in accidentally sampling a previously sampled location resulting in higher concentrations being recorded for Firebird as the action of sampling may have removed the disinfectant.