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Effectiveness and Bioburden of Microfiber Mops Used to Clean Hospital High-Touch Environmental Surfaces

Clean counts most

CLINICAL FINDINGS

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Introduction

Traditional cleaning procedures for healthcare environments used laundered cotton string mops and cleaning cloths. Twenty years ago, environmental services departments began transitioning to cleaning with laundered or disposable microfiber floor mopping pads and cloths. While studies have shown the migration to microfiber textiles has improved cleaning and disinfection techniques and effectiveness (1-3), results of further research summarized below support the additional benefits from using disposable (single-use) microfiber products versus laundered (re-usable) products.

Methods

Microfiber mopping pads were examined before and after laundering using microscopy to visualize the impact of laundry processes (mechanical agitation, high temperatures and chemicals) on the microfiber structures.

Bioburden (bacteria and fungi) on laundered and disposable microfiber mops and wipes was determined using standard microbiological techniques based on USP <61>. Numbers of viable aerobic microbes (growth on TSA) were calculated on a per sample basis and compared to values for "hygienically clean" textiles (≤20 CFU/dm^2) normalized to standard sizes of mops and wipes.

The concentration of a quaternary ammonia disinfectant (DDAC/ADBAC) was measured after exposure to a disposable versus laundered mop pad.

The efficacy of disposable vs. laundered microfiber products used to clean hospital patient room floors with a detergent cleaner was quantified using ATP analysis.

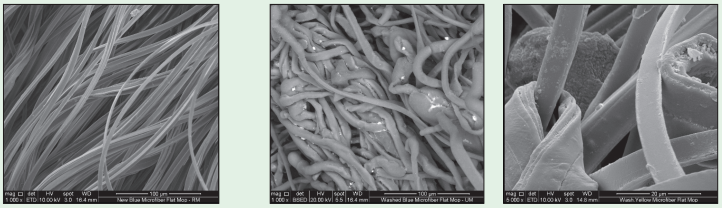
Results

Examples of laundered mop pads

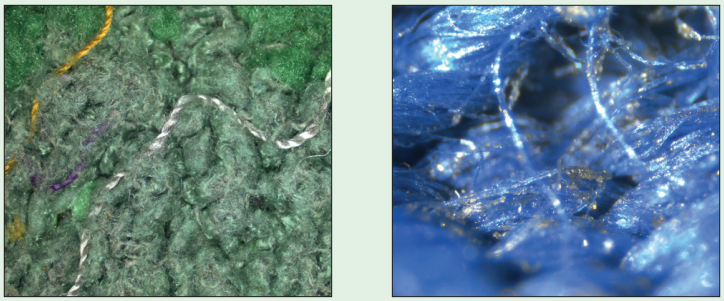
Scanning electron micrographs of microfiber flat mops

Before laundering

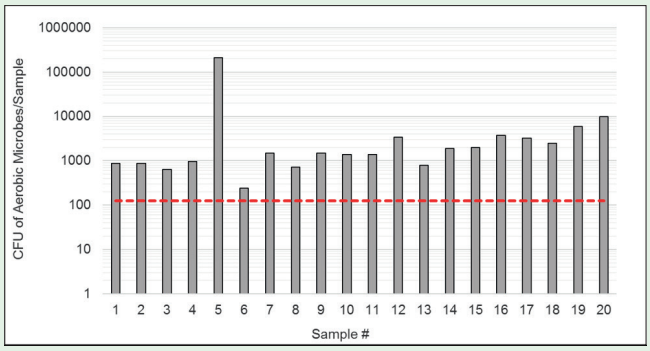
After laundering



Dirt and debris entrapped in laundered microfiber mops

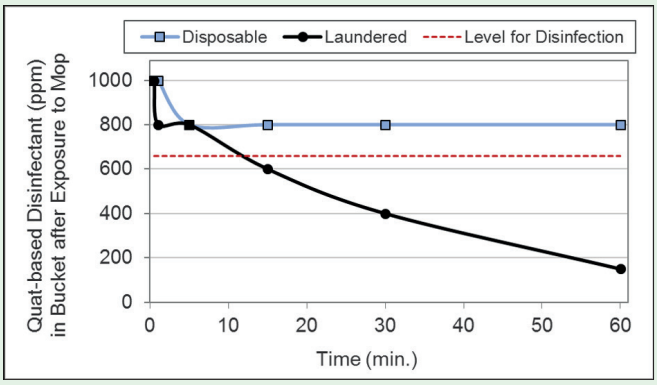


Bioburden recovered from mops and wipes after laundering



With laundered mops and wipes, 56% (20/36) of samples tested had bioburden levels exceeding the standard for "hygienically clean" (dashed line). Of those 20, numbers of microbes ranged from 240-210,000 CFU/sample. No microbes were recovered from unused disposable mops.

Stability of quat-based disinfectant when exposed to a relaundered or disposable mop

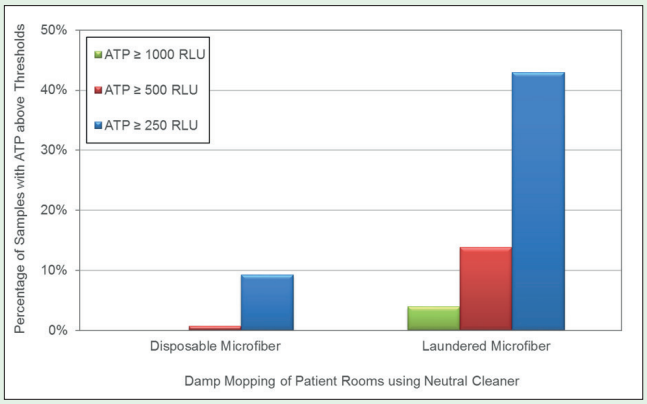


Levels of disinfectant decreased initially after exposure to either mop but continued to decline when exposed to a laundered mop. After 15 mins. of exposure to a laundered mop, the concentration dropped below the level needed for disinfection.

References

1. Rutala, W. A., *et. al.* (2007) Microbiologic evaluation of microfiber mops for surface disinfection. AJIC, 35(9), 569-573.
2. Wren, M. W. D., *et. al.* (2008) Removing bacteria from hospital surfaces: a laboratory comparison of ultramicrofibre and standard cloths. Journal of Hospital Infection, 70(3), 265-271.
3. Trajtman, A. N., *et. al.* (2015) Microfiber cloths reduce the transfer of *Clostridium difficile* spores to environmental surfaces compared with cotton cloths. AJIC, 43(7), 686-689.

ATP on floors after cleaning with laundered microfiber vs. disposable microfiber mops



Data were analyzed for the number of ATP readings (in Relative Light Units) that exceed various thresholds often used to delineate clean from dirty surfaces. Regardless of the RLU threshold, the frequencies of "dirty" samples were substantially higher on floors cleaned with laundered microfiber mops than floors cleaned with disposable microfiber mops.

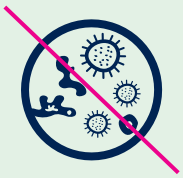
Conclusions

Laundry processes can cause irreversible damage to the delicate microfiber structures that are essential for cleaning.

- **Retention and accumulation of microbes and debris can occur** during repeated use, laundering, transport and storage of healthcare cleaning textiles, **leading to deactivation of disinfectants** such as quaternary ammonium compounds and **increased risk of cross-contamination**.
- **The combination of damaged microfiber and contaminated textiles may lead to poor outcomes** after cleaning with laundered mops as measured by methods like surface ATP.
- Evidence from these studies indicate that laundering of mops and wipes can result in products with unreliable quality. **A viable alternative is to use disposable microfiber cleaning products for more consistent cleaning outcomes with no risk of cross-contamination.**

Conclusions

Laundry processes can cause irreversible damage to microfiber structures that are essential for cleaning



Retention and accumulation of microbes and debris can occur during repeated use, leading to deactivation of disinfectants and increased risk of cross-contamination

The combination of damaged microfiber and contaminated textiles may lead to poor outcomes after cleaning with laundered mops per ATP results

A viable alternate is to use disposable microfiber cleaning products for more consistent cleaning outcomes with no risk of cross-contamination

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