

Effective processing of reusable dispensers for surface disinfection tissues – the devil is in the details

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Background

Surface disinfectant solution based on surface-active ingredients such as quaternary ammonium compounds, alkylamines or glucoprotamin which are prepared in reusable tissue dispensers may contaminate heavily with gram-negative bacterial species such as *Achromobacter species 3*, *Achromobacter xylosoxidans* and *Serratia marcescens* [1]. Bacterial cell counts were as high as 10⁷ CFU per ml in the disinfectant solution of different manufacturers (mainly concentration of 0.5%, efficacy within 1 h) [1]. All the dispensers collected from healthcare facilities were not processed adequately. We determined the efficacy of various manual and automatic procedures on contaminated dispensers with the aim to prevent recontamination of a freshly prepared disinfectant solution over 28 days.

Methods

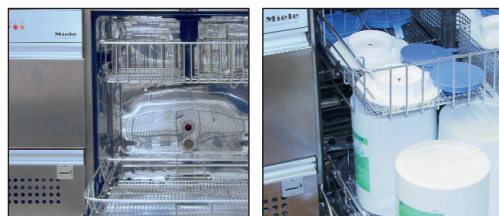
All procedures were evaluated with at least 3 dispensers per procedure. Experiments were done with two types of dispensers.

<ul style="list-style-type: none"> ■ "Contaminated clinic dispensers" <ul style="list-style-type: none"> – dispensers from clinics that proved to be contaminated ■ "Contaminated new dispensers" <ul style="list-style-type: none"> – new dispensers – artificial contamination of all accessible surfaces inside (3 days) with approx. 25 ml contaminated use-solution
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Each experiment was done in the same way.

<ul style="list-style-type: none"> ■ Emptying dispenser ■ Processing ■ Insertion of wipe roll and addition of Mikrobac forte 0.5% ■ Standing time of 28 days at room temperature ■ Tissue removal 3 times per week ■ Examination of disinfectant solution for microbial contamination

Automatic processes were performed in a washer disinfectant for glass ware (Miele G 7736 CD) using a program for operating theater shoes and using different procedures (without a cleaning agent, with an alkaline cleaning agent [0.3% Dismoclean 28 alka med, BODE Chemie, Hamburg, Germany] or with a mild cleaning agent [0.5% Dismoclean 21 clean, Bode Chemie, Hamburg, Germany]). A process was considered to be effective if it prevented recontamination of the surface disinfectant solution over 28 days.



Discussion

Especially gram-negative bacteria are known to be able to adapt to surface-active ingredients [2, 3], and they may form biofilm [4]. That is why effective cleaning seems a major prerequisite for processing reusable dispensers for surface disinfection tissues

Conclusion

Effective manual processing of reusable dispensers for surface disinfection tissues requires a thorough cleaning step with hot water or a biofilm-active cleaner, followed by a disinfection step with a fast-acting alcohol-based surface disinfectant or oxygen-releasing compound. Effective automatic processing requires a temperature of 60°C to 70°C for at least 5 min with or without the

use of a chemical cleaning agent. It becomes evident that processing of reusable dispensers for surface disinfectant tissues requires more effort than commonly thought if the real contamination found in clinical practice should be controlled and if the active ingredients of surface disinfectants are only surface-active substances.

Findings

New dispensers	7 days	14 days	21 days	28 days
1	0	0	0	0
2	0	0	10 ⁷	10 ⁷
3	0	0	0	0
4*	0	0	0	10 ⁷
5*	0	10 ²	10 ⁷	10 ⁷
6*	0	0	10 ²	10 ³

Clinic dispensers	7 days	14 days	21 days	28 days
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0

Clinic dispensers	7 days	14 days	21 days	28 days
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0

Clinic dispensers	7 days	14 days	21 days	28 days
1	0	0	0	0
2	0	0	0	0
3	0	0	0	10 ²
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0

Clinic dispensers	7 days	14 days	21 days	28 days
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0

Clinic dispensers	7 days	14 days	21 days	28 days
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0

Manual processing as follows:

- cleaning with **Bacillol AF** (at least 30 s)
- rinsing, drying
- disinfection with **Bacillol AF** (at least 30 s)
- allow air dry

* a hand disinfection was performed before the tissue roll was put into the dispenser

Manual processing as follows:

- rinse with hot water
- disinfection of all dried surfaces by wiping with **Bacillol AF** (at least 30 s)
- allow air dry

Manual processing as follows:

- rinse with hot water
- thorough cleaning using a wipe and a household cleaner
- rinse with hot water
- disinfection of all dried surfaces by wiping with **Bacillol AF** (at least 30 s)
- allow air dry

Manual processing as follows:

- cleaning with **Bodedex forte** (immersion of at least 10 min, thorough cleaning)
- rinsing, drying
- disinfection with **Bacillol AF** (at least 30 sec)
- allow air dry

Manual processing as follows:

- rinse with hot water
- cleaning and disinfection with 0.8 % **Dismozon plus** (thorough cleaning, immersion of at least 1 hour)
- rinse with hot water
- drying

Automatic processing

("programme for operating theatre shoes")

- rinse: 1 minute (warm water)
- cleaning: 5 minutes (63°C)
- rinse: 1 minute (warm water)
- rinse: 3 minutes (70°C)
- drying: 5 minutes (45°C – 52°C)

Data are shown for a thermal automatic procedure, other procedures with mild or alkaline cleaning agents revealed the same results.

References

1. Kampf G, von Baum H, Ostermeyer C: Poorly processed reusable surface disinfection tissue dispensers are a possible source of infection. ICPIC 2013, Geneva, oral presentation 067.
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4. Exner M, Tuschewitzki GJ, Scharnagel J: Influence of biofilms by chemical disinfectants and mechanical cleaning. *Zentralbl Bakteriol Mikrobiol Hyg B* 1987, 183(5-6):549-563.