The role of cleaning in the manual reprocessing of medical devices and quality assessment of different cleaners

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Instrument Cleaning

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Introduction

Influence on reprocessing success

- Cleaner
- Appearance of instruments and soiling
- Disinfectant
- Method of reprocessing
Introduction

Influence on reprocessing success

- Cleaner
- Method of reprocessing
- Disinfectant
- Appearance of instruments and soiling
National guidelines and recommendations differ

- Switzerland
- France
- USA
- Germany
- Europe
Introduction

In recent years, national guidelines have started to acknowledge the importance of thorough cleaning before the use of disinfectants.

SFED-recommendation on reprocessing flexible endoscopes (06/2002)

- First cleaning: 10 min
- Second cleaning: 5 min

RKI-recommendation on hygienic reprocessing of medical devices (11/2001)

- Surely effective sterilization takes place only with clean medical devices.
Construction of the interior endoscope channel system

- Distal End
- Instrument Channel Inlet
- Control Body
- Air-Nozzle
- Water-Nozzle

Channels:
- Air-/Water-Channel
- Instrumental-Channel
- Water-Jet-Channel

- Light Guide Connector
- Suction Tube
Residues on instruments

**Insufficient cleaning:** Coloscope, air-channel very heavy soiling

BODE-internal investigation of different channels from endoscopes in maintenance 1999

Thorough pre-cleaning is indispensable!
Residue of X-ray contrast media

IDEAL nutrient base!
Residues on instruments

Dilemma in cleaning:

• no standardized / required tests
• no defined cleaning power
• no European standard protocol for cleaning (e.g. brushing)
• no European norms for cleaners
The simple fact that a product is called "cleaner" does not have any significance.

What kind of cleaner is really inside?

- no tests
- no norms
- no standards

...a question that merits closer examination....
Requirements

- Optimisation of cleaning of biofilms
- Optimisation of cleaning of proteins
- Tests in clinical practice
- Compatibility tests with suppliers of instruments
Cleaning results: Proteins

External in vitro investigation with different products, test on metal plates, contaminated with a standardised blood contamination (dried blood)

aldehydic and peracetic acid products left remarkable protein soil!
HBV-contamination: Success (failure) in disinfection
Study with angioscopes after contamination with duck-HBV

Disinfection: GDA, 2% ig
Sterilization: Ethylenoxid, 6h

Cleaning results: Proteins

Proving the Fixation

15 minutes in a disinfectant (DGHM-conc.)

immerse in dist. water

Results 1

5 minutes in a agitator (200 rds/min)
in a alcaline cleaner 1%

immerse in dist. water

Results 2
Cleaning results: Proteins

Fixation of blood on metalplates

ALDEHYDES

PERACETIC ACID

Both active ingredients are not suitable for cleaning!
Cleaning results: biofilm

Interaction of biofilm with cleaner and disinfectant

Bacteria in biofilms are very resistant to disinfectants!
A good pre-cleaning is important!
Cleaning results: biofilm

There is a huge difference in reduction of biofilms!
Cleaning results in clinical practice

Duodenoscopes

Significantly better!

Source: Endopraxis, 2000, 02: 18 - 20
Microbicidal efficacy incl. cleaning performance

Interaction of blood with cleaner and disinfectant

Glass capillary:
left: cleaned with cleaner based on non-ionic and aphoteric tensides, disinfected with a glutaraldehyde containing disinfectant and rinsed with water

right: cleaned and disinfected with a glutaraldehyde containing disinfectant and rinsed with water

Working without cleaner, blood coagulates and cannot removed from channel systems
Microbicidal efficacy incl. cleaning performance

Product based on aldehyde-free aliphatic amines

- sheep blood
- B. subtilis
- Staph. aureus
- metal plate

→ disinfection 15 min.
→ thorough rinsing
→ tap water
→ final rinse
→ sterile water

→ grounding with sterile quartz sand
→ microbial activity

Product based on glutaraldehyde 2%
Microbicidal efficacy incl. cleaning performance

**Staph. aureus - results**

<table>
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<tr>
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<th>Control (mean of 4)</th>
<th>Product based on aliphatic amines (mean of 4)</th>
<th>Product based on glutaraldehyde 2%* (mean of 4)</th>
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<td>reduction factor</td>
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Product based on aliphatic amines with good cleaning power confirms microbiobial efficacy, aldehydic product without cleaning power fails.

* This test design is not relevant in case of clean instruments
### Microbicidal efficacy incl. cleaning performance

**B. subtilis - results**

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<th></th>
<th>Control (mean of 4)</th>
<th>Product based on aliphatic amines (mean of 6)</th>
<th>Product based on glutaraldehyde 2%* (mean of 6)</th>
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Product with good cleaning power and no sporicidal activity shows better performance than the sporicidal aldehydic without cleaning power.

* This test design is not relevant in case of clean instruments.
Outlook

Cleaning

Disinfection

Safety by careful cleaning