Disinfection and Sterilization: Current Issues and New Technologies

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Disinfection and Sterilization: Current Issues and New Technologies

- Current Issues and New Technologies
  - Sterilization of critical items
  - High-level disinfection for semi-critical items
  - Low-level disinfection of non-critical items
• EH Spaulding believed that how an object will be disinfected depended on the object’s intended use

- **CRITICAL** - objects which enter normally sterile tissue or the vascular system or through which blood flows should be sterile
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Disinfection and Sterilization: Current Issues and New Technologies

- Current Issues and New Technologies
  - Sterilization of critical items
    - Low-temperature sterilization technology
    - Biological indicators
  - High-level disinfection for semi-critical items
  - Low-level disinfection of non-critical items
Low Temperature Sterilization Technology
Newer Trends in Sterilization of Patient Equipment

• Alternatives to ETO-CFC
  ETO-CO₂, ETO-HCFC, 100% ETO

• New Low Temperature Sterilization Technology
  Hydrogen Peroxide Gas Plasma-most common
  Vaporized hydrogen peroxide-limited clinical use
  Ozone and hydrogen peroxide-not FDA cleared
  Nitrogen dioxide-not FDA cleared
Rapid Readout BLs for Steam Now Require a 1-3h Readout Compared to 24-48h

COMPARISON OF A RAPID READOUT BIOLOGICAL INDICATOR FOR STEAM STERILIZATION WITH FOUR CONVENTIONAL BIOLOGICAL INDICATORS AND FIVE CHEMICAL INDICATORS

William A. Rutala, PhD, MPH; Suzanne M. Jones, MPH; David J. Weber, MD, MPH
Attest™ Super Rapid Readout Biological Indicators
Commercially available in early 2013

1491 BI (blue cap)
• Monitors 270°F and 275°F gravity –displacement steam sterilization cycles
• 30 minute result (from 1 hour)

1492V BI (brown cap)
• Monitors 270°F and 275°F dynamic-air-removal (pre-vacuum) steam sterilization cycles
• 1 hour result (from 3 hours)
Super Rapid Readout Biological Indicators and Challenge Packs

Rapid Attest technology has been optimized to produce a readout in 30-60 minutes. This technology will be commercialized in early 2013.
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Disinfection and Sterilization: Current Issues and New Technologies

- Current Issues and New Technologies
  - Sterilization of critical items
  - High-level disinfection for semi-critical items
    - New high-level disinfectants
    - Reprocessing endoscopes-manual and automated
  - Low-level disinfection of non-critical items
High-Level Disinfection of “Semicritical Objects”

Exposure Time ≥ 8m-45m (US), 20°C

<table>
<thead>
<tr>
<th>Germicide</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glutaraldehyde</td>
<td>&gt; 2.0%</td>
</tr>
<tr>
<td>Ortho-phthalaldehyde</td>
<td>0.55%</td>
</tr>
<tr>
<td>Hydrogen peroxide*</td>
<td>7.5%</td>
</tr>
<tr>
<td>Hydrogen peroxide and peracetic acid*</td>
<td>1.0%/0.08%</td>
</tr>
<tr>
<td>Hypochlorite (free chlorine)*</td>
<td>650-675 ppm</td>
</tr>
<tr>
<td>Accelerated hydrogen peroxide</td>
<td>2.0%</td>
</tr>
<tr>
<td>Peracetic acid</td>
<td>0.2%</td>
</tr>
<tr>
<td>Glut and isopropanol</td>
<td>3.4%/26%</td>
</tr>
<tr>
<td>Glut and phenol/phenate**</td>
<td>1.21%/1.93%</td>
</tr>
</tbody>
</table>

*May cause cosmetic and functional damage; **efficacy not verified
Semicritical Equipment

- Reprocessing semicritical items has been shown to have a narrow margin of safety
- Generally, the narrow margin of safety attributed to high microbial load and complex instruments with lumens
- Any deviation from the recommended reprocessing protocol can lead to the survival of microorganisms and an increased risk of infection
- Problems encountered with reprocessing semicritical equipment often related to improper cleaning
Reprocessing Semicritical Items

• New Developments in Reprocessing
  ■ Endoscopes
  ■ Laryngoscopes
  ■ Infrared coagulation device
  ■ Nasopharyngoscopes
  ■ Endocavitary probe
  ■ Prostate biopsy probes
  ■ Tonometers
Reprocessing Semicritical Items

• New Developments in Reprocessing
  ■ Endoscopes
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  ■ Tonometers
FEATURES OF ENDOSCOPES THAT PREDISPOSE TO DISINFECTION FAILURES

- Require low temperature disinfection
- Long narrow lumens
- Right angle turns
- Blind lumens
- May be heavily contaminated with pathogens
- Use of AERs has led to a new set of problems
Endoscope Reprocessing Methods

Ofstead, Wetzler, Snyder, Horton, Gastro Nursing 2010; 33:204

Endoscope Reprocessing Methods
A Prospective Study on the Impact of Human Factors and Automation

ABSTRACT
The main cause of endoscopy-associated infections is failure to adhere to reprocessing guidelines. More information about factors impacting compliance is needed to support the development of effective interventions. The purpose of this multilevel observational study was to evaluate reprocessing practices, employee perceptions, and occupational health issues. Data were collected utilizing interviews, surveys, and direct observation. Written reprocessing policies and procedures were in place at all five sites, and employees affirmed the importance of most recommended steps. Nevertheless, observers documented guideline adherence, with only 1.4% of endoscopes reprocessed using manual cleaning methods with automated high-level disinfection versus 75.4% of those reprocessed using an automated endoscope cleaner and reprocessor. The majority reported health problems (i.e., pain, decreased flexibility, numbness, or tingling). Physical discomfort was associated with time spent reprocessing (p = .041). Discomfort diminished after installation of automated endoscope cleaners and reprocessors (p = .001). Enhanced training and accountability, combined with increased automation, may ensure guideline adherence and patient safety while improving employee satisfaction and health.
Endoscope Reprocessing Methods
Ofstead, Wetzler, Snyder, Horton; Gastro Nursing 2010; 33:204

Performed all 12 steps for 1.4% (1/69) endoscopes using manual and 75.4% (86/114) endoscopes using AER

<table>
<thead>
<tr>
<th>Observed Activity</th>
<th>Steps Completed (%) (n = 29)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leak test performed in clear water</td>
<td>77</td>
</tr>
<tr>
<td>Disassemble endoscope completely</td>
<td>100</td>
</tr>
<tr>
<td>Brush all endoscope channels and components</td>
<td>43</td>
</tr>
<tr>
<td>Immerse endoscope completely in detergent</td>
<td>99</td>
</tr>
<tr>
<td>Immerse components completely in detergent</td>
<td>99</td>
</tr>
<tr>
<td>Flush endoscope with detergent</td>
<td>99</td>
</tr>
<tr>
<td>Rinse endoscope with water</td>
<td>96</td>
</tr>
<tr>
<td>Purge endoscope with air</td>
<td>84</td>
</tr>
<tr>
<td>Load and complete automated cycle for high-level disinfection</td>
<td>100</td>
</tr>
<tr>
<td>Flush endoscope with alcohol</td>
<td>86</td>
</tr>
<tr>
<td>Use forced air to dry endoscope</td>
<td>45</td>
</tr>
<tr>
<td>Wipe down external surfaces before hanging to dry</td>
<td>90</td>
</tr>
</tbody>
</table>
Effectiveness of Endoscope Reprocessing
Infect Control Hosp Epidemiol 2013;34:309

- Practice of reprocessing endoscopes and effectiveness evaluated in 37 services (Brazil)
  - Contamination of at least 1 scope identified in 34 (92%) of 37 services
  - Bacteria, fungi and/or mycobacteria isolated from 84.6% (33/39) of the colonoscopes (110-32,000 CFU/ml) and from 80.6% (50/62) of the gastroscopes (100-33,000 CFU/ml)
  - Not all services followed guidelines; patients were exposed to diverse pathogens
Automated Endoscope Reprocessors (AER)

- Manual cleaning of endoscopes is prone to error. AERs can enhance efficiency and reliability of HLD by replacing some manual reprocessing steps.
- AER Advantages: automate and standardize reprocessing steps, reduce personnel exposure to chemicals, filtered tap water.
- AER Disadvantages: failure of AERs linked to outbreaks, does not eliminate precleaning (until now-EvoTech) BMC Infect Dis 2010;10:200
- Problems: incompatible AER (side-viewing duodenoscope); biofilm buildup; contaminated AER; inadequate channel connectors; used wrong set-up or connector MMWR 1999;48:557
- Must ensure exposure of internal surfaces with HLD/sterilant
Automated Endoscope Reprocessors with Cleaning Claim

- **Product Definition:**
  - Integrated double-bay AER
  - Eliminates manual cleaning
  - Uses New High-Level Disinfectant (HLD) with IP protection
  - Single-shot HLD
  - Automated testing of endoscope channels and minimum effective concentration of HLD
  - Incorporates additional features (LAN, LCD display)
  - Eliminates soil and microbes equivalent to optimal manual cleaning. BMC ID 2010; 10:200
Multisociety Guideline on Reprocessing Flexible GI Endoscopes: 2011

Bret T. Petersen, MD, FASGE; Jennifer Chennat, MD; Jonathan Cohen, MD, FASGE; Peter B. Cotton, MD, FASGE; David A. Greenwald, MD, FASGE; Thomas E. Kowalski, MD; Mary L. Krinsky, DO; Walter G. Park, MD; Irving M. Pike, MD, FASGE; Joseph Romagnuolo, MD, FASGE; for the ASGE Quality Assurance in Endoscopy Committee; and William A. Rutala, PhD, MPH; for the Society for Healthcare Epidemiology of America

The beneficial role of GI endoscopy for the prevention, diagnosis, and treatment of many digestive diseases and cancer is well established. Like many sophisticated medical devices, the endoscope is a complex, reusable instrument that requires reprocessing before being used on subsequent patients. The most commonly used methods for reprocessing endoscopes result in high-level disinfection. To date, all published occurrences of pathogen transmission related to GI endoscopy have been associated with failure to follow established cleaning and disinfection/sterilization guidelines or use of defective equipment. Despite the strong published data regarding the safety of endoscope reprocessing, concern over the potential spread gaps in infection prevention practices. Given the ongoing occurrences of endoscopy-associated infections attributed to lapses in infection prevention, an update of the multisociety guideline is warranted.

This document provides an update of the previous guideline, with additional discussion of new or evolving reprocessing issues and updated literature citations, where appropriate. Specific additions or changes include review of expanded details related to critical reprocessing steps (including cleaning and drying), reprocessing issues for various endoscope attachments such as flushing catheters, discussion of risks related to selected periprocedural practices including...
ENDOSCOPE REPROCESSING
Multi-Society Guideline on Endoscope Reprocessing, 2011

- PRECLEAN-point-of-use (bedside) remove debris by wiping exterior and aspiration of detergent through air/water and biopsy channels
- CLEAN-mechanically cleaned with water and enzymatic cleaner
- HLD/STERILIZE-immers scope and perfuse HLD/sterilant through all channels for exposure time (>2% glut at 20m at 20°C). If AER used, review model-specific reprocessing protocols from both the endoscope and AER manufacturer
- RINSE-scope and channels rinsed with sterile water, filtered water, or tap water. Flush channels with alcohol and dry
- DRY-use forced air to dry insertion tube and channels
- STORE-hang in vertical position to facilitate drying; stored in a manner to protect from contamination
Disinfection and Sterilization: Current Issues and New Technologies

- Current Issues and New Technologies
  - Sterilization of critical items
  - High-level disinfection for semi-critical items
  - Low-level disinfection of non-critical items
    - New low-level disinfectants (improved hydrogen peroxide)
    - Surface disinfection
    - Transmission via environmental surfaces
    - Inactivation of *C. difficile*
EH Spaulding believed that how an object will be disinfected depended on the object’s intended use

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**LOW-LEVEL DISINFECTION FOR NONCRITICAL EQUIPMENT AND SURFACES**

Exposure time > 1 min

<table>
<thead>
<tr>
<th>Germicide</th>
<th>Use Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl or isopropyl alcohol</td>
<td>70-90%</td>
</tr>
<tr>
<td>Chlorine</td>
<td>100ppm (1:500 dilution)</td>
</tr>
<tr>
<td>Phenolic</td>
<td>UD</td>
</tr>
<tr>
<td>Iodophor</td>
<td>UD</td>
</tr>
<tr>
<td>Quaternary ammonium</td>
<td>UD</td>
</tr>
<tr>
<td>Improved hydrogen peroxide (HP)</td>
<td>0.5%, 1.4%</td>
</tr>
</tbody>
</table>

UD=Manufacturer’s recommended use dilution
IMPROVED HYDROGEN PEROXIDE (HP) SURFACE DISINFECTANT

• Advantages
  ■ 30 sec -1 min bactericidal and virucidal claim (fastest non-bleach contact time)
  ■ 5 min mycobactericidal claim
  ■ Safe for workers (lowest EPA toxicity category, IV)
  ■ Benign for the environment; noncorrosive; surface compatible
  ■ One step cleaner-disinfectant
  ■ No harsh chemical odor
  ■ EPA registered (0.5% RTU, 1.4% RTU, wet wipe)

• Disadvantages
  ■ More expensive than QUAT
**BACTERICIDAL ACTIVITY OF DISINFECTANTS** \( (\log_{10} \text{ reduction}) \) WITH A CONTACT TIME OF 1m WITH/WITHOUT FCS. Rutala et al. ICHE. In press

Improved hydrogen peroxide is significantly superior to standard HP at same concentration and superior or similar to the QUAT tested

<table>
<thead>
<tr>
<th>Organism</th>
<th>Oxivir-0.5%</th>
<th>0.5% HP</th>
<th>Clorox HC HP Cleaner-Dis 1.4%</th>
<th>1.4% HP</th>
<th>3.0% HP</th>
<th>QUAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSA</td>
<td>&gt;6.6</td>
<td>&lt;4.0</td>
<td>&gt;6.5</td>
<td>&lt;4.0</td>
<td>&lt;4.0</td>
<td>5.5</td>
</tr>
<tr>
<td>VRE</td>
<td>&gt;6.3</td>
<td>&lt;3.6</td>
<td>&gt;6.1</td>
<td>&lt;3.6</td>
<td>&lt;3.6</td>
<td>4.6</td>
</tr>
<tr>
<td>MDR-Ab</td>
<td>&gt;6.8</td>
<td>&lt;4.3</td>
<td>&gt;6.7</td>
<td>&lt;4.3</td>
<td>&lt;4.3</td>
<td>&gt;6.8</td>
</tr>
<tr>
<td>MRSA, FCS</td>
<td>&gt;6.7</td>
<td>NT</td>
<td>&gt;6.7</td>
<td>NT</td>
<td>&lt;4.2</td>
<td>&lt;4.2</td>
</tr>
<tr>
<td>VRE, FCS</td>
<td>&gt;6.3</td>
<td>NT</td>
<td>&gt;6.3</td>
<td>NT</td>
<td>&lt;3.8</td>
<td>&lt;3.8</td>
</tr>
<tr>
<td>MDR-Ab, FCS</td>
<td>&gt;6.6</td>
<td>NT</td>
<td>&gt;6.6</td>
<td>NT</td>
<td>&lt;4.1</td>
<td>&gt;6.6</td>
</tr>
</tbody>
</table>
Wipes
Cotton, Disposable, Microfiber

Wipe should have sufficient wetness to achieve the disinfectant contact time. Discontinue use of a disposable wipe if it no longer leaves the surface visibly wet for $\geq 1$ minutes.
Low Level disinfectants
Non-critical surfaces and Objects

- Quaternary ammonium
- Chlorine
- Improved hydrogen peroxide
- Phenolic
Surface Disinfection

• Wipe all “touchable” or “hand contact” surfaces with sufficient wetness to achieve the disinfectant contact time (≥ 1 minute).

• Daily disinfection of surfaces (vs cleaned when soiled) with disinfectant in rooms of patients with CDI and MRSA reduced acquisition of pathogens on hands after contact with surfaces and of hands caring for the patient.
## SURFACE DISINFECTION

Effectiveness of Different Methods, Rutala et al. 2012

<table>
<thead>
<tr>
<th>Technique (with cotton)</th>
<th>MRSA Log$_{10}$ Reduction (QUAT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated cloth</td>
<td>4.41</td>
</tr>
<tr>
<td>Spray (10s) and wipe</td>
<td>4.41</td>
</tr>
<tr>
<td>Spray, wipe, spray (1m), wipe</td>
<td>4.41</td>
</tr>
<tr>
<td>Spray</td>
<td>4.41</td>
</tr>
<tr>
<td>Spray, wipe, spray (until dry)</td>
<td>4.41</td>
</tr>
<tr>
<td>Disposable wipe with QUAT</td>
<td>4.55</td>
</tr>
<tr>
<td>Control: detergent</td>
<td>2.88</td>
</tr>
</tbody>
</table>
Daily disinfection of high-touch surfaces (vs cleaned when soiled) with sporicidal disinfectant in rooms of patients with CDI and MRSA reduced acquisition of pathogens on hands after contact with surfaces and of hands caring for the patient.
Wipes
Cotton, Disposable, Microfiber
Blood Pressure Cuff
Non-Critical Patient Care Item
DECREASING ORDER OF RESISTANCE OF MICROORGANISMS TO DISINFECTANTS/STERILANTS

Most Resistant

- Prions
- Spores (*C. difficile*)
- Mycobacteria
- Non-Enveloped Viruses (*norovirus*)
- Fungi
- Bacteria (*MRSA, VRE, Acinetobacter*)

Most Susceptible

- Enveloped Viruses
DISINFECTANTS AND ANTISEPSIS

*C. difficile* spores at 10 and 20 min, Rutala et al, 2006

- ~4 log$_{10}$ reduction (3 *C. difficile* strains including BI-9)
  - Bleach, 1:10, ~6,000 ppm chlorine (but not 1:50)
  - Chlorine, ~19,100 ppm chlorine
  - Chlorine, ~25,000 ppm chlorine
  - 0.35% peracetic acid
  - 2.4% glutaraldehyde
  - OPA, 0.55% OPA
  - 2.65% glutaraldehyde
  - 3.4% glutaraldehyde and 26% alcohol
Disinfection and Sterilization: Current Issues and New Technologies

- Current Issues and New Technologies
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    - Inactivation of *C. difficile*
    - Transmission via environmental surfaces
KEY PATHOGENS WHERE ENVIRONMENTAL SURFACES PLAY A ROLE IN TRANSMISSION

- MRSA
- VRE
- *Acinetobacter* spp.
- *Clostridium difficile*
- Norovirus
- Rotavirus
- SARS
ENVIRONMENTAL CONTAMINATION LEADS TO HAIs
Weber, Rutala, Miller et al. AJIC 2010;38:S25

- Microbial persistence in the environment
- Frequent environmental contamination
- HCW hand contamination with the environment
- Prior room occupant with MRSA, VRE, CDI is a significant risk for acquisition of these pathogens.
TRANSMISSION MECHANISMS INVOLVING THE SURFACE ENVIRONMENT

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Survival Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{S. aureus} (including MRSA)</td>
<td>7 days to &gt;12 months</td>
</tr>
<tr>
<td>\textit{Enterococcus} spp. (including VRE)</td>
<td>5 days to &gt;46 months</td>
</tr>
<tr>
<td>\textit{Acinetobacter} spp.</td>
<td>3 days to 11 months</td>
</tr>
<tr>
<td>\textit{Clostridium difficile} (spores)</td>
<td>&gt;5 months</td>
</tr>
<tr>
<td>Norovirus (and feline calicivirus)</td>
<td>8 hours to &gt;2 weeks</td>
</tr>
<tr>
<td>\textit{Pseudomonas aeruginosa}</td>
<td>6 hours to 16 months</td>
</tr>
<tr>
<td>\textit{Klebsiella} spp.</td>
<td>2 hours to &gt;30 months</td>
</tr>
</tbody>
</table>

### Environmental Contamination: Endemic and Epidemic MRSA


<table>
<thead>
<tr>
<th>Surface</th>
<th>Outbreak</th>
<th>Endemic</th>
<th>Site estimated mean (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rampling et al.²*</td>
<td>Boyce et al.²**</td>
<td>Sexton et al.³†</td>
</tr>
<tr>
<td>Floor</td>
<td>9%</td>
<td>50-55%</td>
<td>44-60%</td>
</tr>
<tr>
<td>Bed linen</td>
<td>..</td>
<td>38-54%</td>
<td>44%</td>
</tr>
<tr>
<td>Patient gown</td>
<td>..</td>
<td>40-53%</td>
<td>..</td>
</tr>
<tr>
<td>Overbed table</td>
<td>..</td>
<td>18-42%</td>
<td>64-67%</td>
</tr>
<tr>
<td>Blood pressure cuff</td>
<td>13%</td>
<td>25-33%</td>
<td>..</td>
</tr>
<tr>
<td>Bed or siderails</td>
<td>5%</td>
<td>1-30%</td>
<td>44-60%</td>
</tr>
<tr>
<td>Bathroom door handle</td>
<td>..</td>
<td>8-24%</td>
<td>..</td>
</tr>
<tr>
<td>Infusion pump button</td>
<td>13%</td>
<td>7-18%</td>
<td>..</td>
</tr>
<tr>
<td>Room door handle</td>
<td>11%</td>
<td>4-8%</td>
<td>..</td>
</tr>
<tr>
<td>Furniture</td>
<td>11%</td>
<td>..</td>
<td>44-59%</td>
</tr>
<tr>
<td>Flat surfaces</td>
<td>7%</td>
<td>..</td>
<td>32-38%</td>
</tr>
<tr>
<td>Sink taps or basin fitting</td>
<td>..</td>
<td>..</td>
<td>14%</td>
</tr>
<tr>
<td>Average quoted**</td>
<td>11%</td>
<td>27%</td>
<td>49%</td>
</tr>
</tbody>
</table>
FREQUENCY OF ACQUISITION OF MRSA ON GLOVED HANDS AFTER CONTACT WITH SKIN AND ENVIRONMENTAL SITES

No significant difference on contamination rates of gloved hands after contact with skin or environmental surfaces (40% vs 45%; p=0.59)

ACQUISITION OF MRSA ON HANDS AFTER CONTACT WITH ENVIRONMENTAL SITES
TRANSFER OF MRSA FROM PATIENT OR ENVIRONMENT TO IV DEVICE AND TRANSMISSION OF PATHOGEN
TRANSMISSION MECHANISMS INVOLVING THE SURFACE ENVIRONMENT

ACQUISITION OF *C. difficile* ON PATIENT HANDS AFTER CONTACT WITH ENVIRONMENTAL SITES AND THEN INOCULATION OF MOUTH
Thoroughness of Environmental Cleaning
Carling et al. ECCMID, Milan, Italy, May 2011

- DAILY CLEANING
- TERMINAL CLEANING

Mean = 32%

>110,000 Objects
RELATIVE RISK OF PATHOGEN ACQUISITION IF PRIOR ROOM OCCUPANT INFECTED

- MRSA (Huang S, 2006)
- VRE* (Dress M, 2008)
- VRE (Huang S, 2006)
- MDR Pseudomonas (Nseir S, 2011)
- VRE^ (Drees M, 2008)
- C. diff (Shaughnessy M, 2011)
- MDR Acinetobacter (Nseir S, 2011)

* Prior room occupant infected; ^Any room occupant in prior 2 weeks infected
ENVIRONMENTAL CONTAMINATION LEADS TO HAIs
Suboptimal Cleaning

• There is increasing evidence to support the contribution of the environment to disease transmission

• This supports comprehensive disinfecting regimens (goal is not sterilization) to reduce the risk of acquiring a pathogen from the healthcare environment
MONITORING THE EFFECTIVENESS OF CLEANING
Cooper et al. AJIC 2007;35:338

• Visual assessment-not a reliable indicator of surface cleanliness
• ATP bioluminescence-measures organic debris (each unit has own reading scale, <250-500 RLU)
• Microbiological methods-<2.5CFUs/cm²-pass; can be costly and pathogen specific
• Fluorescent marker-transparent, easily cleaned, environmentally stable marking solution that fluoresces when exposed to an ultraviolet light (applied by Infection Preventionist unbeknown to EVS, after EVS cleaning, markings are reassessed)
DAZO Solution (AKA – Goo)
Target After Marking
Target Enhanced
SURFACE EVALUATION USING ATP BIOLUMINESCENCE

- Swab surface
- Luciferase tagging of ATP
- Hand held luminometer

Used in the commercial food preparation industry to evaluate surface cleaning before reuse and as an educational tool for more than 30 years.
TERMINAL ROOM CLEANING: DEMONSTRATION OF IMPROVED CLEANING

- Evaluated cleaning before and after an intervention to improve cleaning
- 36 US acute care hospitals
- Assessed cleaning using a fluorescent dye
- Interventions
  - Increased education of environmental service workers
  - Feedback to environmental service workers

†Regularly change “dotted” items to prevent targeting objects

Carling PC, et al. ICHE 2008;29:1035-41
NEW “NO TOUCH” APPROACHES TO ROOM DECONTAMINATION
Supplement Surface Disinfection
UV and HP systems have been demonstrated to be effective against various healthcare-associated pathogens.
Disinfection and Sterilization: Current Issues and New Technologies

• Current Issues and New Technologies
  ■ Sterilization of critical items
  ■ High-level disinfection for semi-critical items
  ■ Low-level disinfection of non-critical items
Summary

- New sterilization, high-level disinfection and low-level disinfection technologies/practices/products are effective.
- New technologies/practices/products integrated into guidelines/policies/practices can improve patient care.
- Effective surface disinfection essential to eliminate the environment as a source for transmission of healthcare-associated pathogens.
THANK YOU!