The role of surface disinfection in infection prevention

M. Exner
Topic

• The change of risk assessment
• The situation now and in the future
• The new risk assessment on the environment and HAI
• Aspects of Surface disinfection
• The German Guideline on Hospital Hygiene
• The real life of cleaning and disinfection
• New problems in surface disinfection systems
• Environmental monitoring
• Testing of surface disinfection
More than 20 years ago, Dr Robert Weinstein estimated that the source of pathogens causing a healthcare-associated infection in the intensive care unit was as follows:

- patients’ endogenous flora, 40%–60%;
- cross infection via the hands of personnel, 20%–40%;
- antibiotic-driven changes in flora, 20%–25%;
- other (including contamination of the environment), 20%.
Routinemäßige Flächen- 
desinfektionen sind überflüssig“

Flächen- 
desinfektion im Kreis
Eine unverantwortliche Verschwendung

Viele Hygienerituale sind überflüssig
Kosteneinsparungen durch Reduzierung unnötiger Maßnahmen

Bundesumweltministerin Jutta Dreyer.

Deutscher Umweltpreis 2006
mit einer Grundaussetzung von 100.000 € DM

Herrn Prof. Dr. med. Franz Daschker
zu vergeben.

Die Auszeichnung des Bundespräsidenten zeigt sich in seiner Formulierung deutlich: „Routinemäßige Flächen- 
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desinfektionen sind überflüssig.“

Das Urkunde mit der Unterschrift des Bundesumweltministers.
In conclusion, there are insufficient scientific data to support the strong recommendation to routinely disinfect environmental surfaces in health care facilities except in certain high-risk areas (e.g., isolation units) or possibly to prevent transmission of high-risk organisms (e.g., MRSA, VRE).
Divergent opinions on surface disinfection: myths or prevention? A review of the literature

Die Auseinandersetzung zur Flächendesinfektion: Mythos oder Prävention? Ein Rückblick auf ein Lehrstück

Abstract

Virtually no prevention strategy in hospital hygiene has been the focus of such a fundamental and heated discussion as the role of surface disinfection. Against this background, the Commission on Hospital Hygiene and Infection Prevention at the Robert-Koch Institute founded a working group comprising members with divergent views on risk medicati-
on as regards the role of disinfection. This working group produced a carefullycrafted guideline on how to deal with various risk areas and adapted incorporated a new provision into the guidelines stating that "Cleaning and disinfection procedures must be organized and implemented in such a way that there is no increase in the transmission or spread of transmissibly pathogenic or pathogenic microorganisms on surfaces."

Numerous studies have come to the conclusion that surface disinfection constitutes a tool in infection control measures with which the spread of pathogens can be controlled. Conversely, when using only detergents, such a form of control is not possible, something that must be taken into account when selecting the appropriate cleaning and disinfection control measures. In view of the frequent trend in, for example, nosocomial outbreaks in hospitals and nursing homes, each hospital or unit must ensure that it observes the need for disinfection of surfaces and of areas with frequent hand and skin contact. This discussion about the need for surface disinfection led in addition to causing confusion among users, led to a decline in the willingness to accept manual practices, thus increasing the risk of occurrence of nosocomial infections as well as of antibiotic-resistant microorganisms.
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- Environmental monitoring
- Testing of surface disinfection
Trends in MRSA in % in different European Countries reported by EARSS

Exner- DGHM Kongress 2009
Trends in Gram-negative Bacteria in Germany
Prof. Otto cars
Chairman
The Swedish Strategic programme
against antibiotic resistance (Strama)

Modern medicine is depending on
effective antibiotics....
FDA-Zulassungen neuer antimikrobieller Substanzen

The Current Paradox:

Antibiotic Resistance → Morbidity
Mortality Costs → Drug Development
S. Aureus / MRSA

Infektionsreservoir

Hygienekaskade - MRSA

Mund- Nasen- Rachenaum, Haut Wunden

Freisetzung
über direkten und indirekten Kontakt

Übertragung
Direkte Übertragung:
Kontakt

Indirekte Übertragung:
Hände

Aufnahme

Immunologische Auseinandersetzung

Erkrankung

Hohe Persistenz im Staub bis 6 Monate
Hygienekaskade MRSA - Maßnahmen der Hygiene

Martin Exner

Reservoir

Freisetzung

Übertragung

Aufnahme des Erregers

Screening/ Sanierung

Erkrankung / Therapie

Isolierung

Schutz vor Kontamination
- Mund- Nasen-Schutz
- Handschuhe
- Schutzkittel
- Ggfls. Haarschutz

Händedesinfektion

Flächendesinfektion

Sanierung
Hand disinfection
Renewed interest in nonepathogen-specific approaches to infection prevention L.F. Chen / American Journal of Infection Control 41 (2013) 448-51

- enhancing hand hygiene performance,
- Improved cleanliness of health care environment,
- adherence to practices and bundles that reduce device-related infections, and
- optimal measures to reduce surgical site infections.
- Furthermore, there are modeling studies that indicate that nonepathogen-specific infection prevention measures could effectively reduce more HAIs with less cost compared with traditional pathogen-specific interventions
- the role of MRSA transmission via contaminated environmental or non-human surfaces is becoming better appreciated
- Although antibiotic resistance will continue, we can look toward nonantibiotic measures to control the problem of MRSA infections, such as antibiotic stewardship and improved technologies for cleaning and disinfecting patient rooms
Infektionsreservoir

Freisetzung

über direkten und indirekten Kontakt

Übertragung

Direkte Übertragung:
Kontakt Wasser, Lösungen, Reinigungsmittel
Infusionslösung

Indirekte Übertragung:
Hände

Aufnahme

Hygienekaskade
gram-negative Stäbchenbakterien

Immunologische Auseinandersetzung

Keine Sanierung wie bei MRSA möglich

Erkrankung
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TABLE 1. Evidence Supporting the Role of the Contaminated Surface Environment in the Transmission of Several Key Healthcare-Associated Pathogens

- The surface environment in rooms of colonized or infected patients is frequently contaminated with the pathogen.
- The pathogen is capable of surviving on hospital room surfaces and medical equipment for a prolonged period of time.
- Contact with hospital room surfaces or medical equipment by healthcare personnel frequently leads to contamination of hands and/or gloves.
- The frequency with which room surfaces are contaminated correlates with the frequency of hand and/or glove contamination of healthcare personnel.
- Clonal outbreaks of pathogens contaminating the room surfaces of colonized or infected patients are demonstrated to be due to person-to-person transmission or shared medical equipment.
- The patient admitted to a room previously occupied by a patient colonized or infected with a pathogen (e.g., methicillin-resistant Staphylococcus aureus, vancomycin-resistant Enterococcus, Clostridium difficile, and Acinetobacter) has an increased likelihood of developing colonization or infection with that pathogen.
- Improved terminal cleaning of rooms leads to a decreased rate of infections.
- Improved terminal disinfection (e.g., with vaporized hydrogen peroxide) leads to a decreased rate of infection in patients subsequently admitted to the room in which the prior occupant was colonized or infected.
Weber et al. 2013, Otter et al. 2013

- Hospitalization in a room in which the previous patient had been colonized or infected with MRSA, VRE, *C. difficile*, multidrug-resistant *Acinetobacter*, or multidrug-resistant *Pseudomonas* has been shown to be a risk factor for colonization or infection with the same pathogen for the next patient admitted to the room.

- Recent studies show that admission to a room previously occupied by a patient with *Clostridium difficile*, vancomycin-resistant enterococci (VRE), meticillin-resistant *Staphylococcus aureus* (MRSA), *Acinetobacter baumannii* and *Pseudomonas aeruginosa* increases the risk of acquiring these pathogens for subsequent occupants of the same room by a factor of two or more.

- Multiple studies have demonstrated that less than 50% of hospital room surfaces are adequately cleaned and disinfected when chemical germicides are used.
Environmental contamination is important

- Evidence accumulating that contaminated surfaces contribute to transmission of major hospital pathogens and improved environmental decontamination contributes to the control of outbreaks.
  - ◦ Clostridium difficile (Cdiff)
  - ◦ Vancomycin-resistant enterococci (VRE)
  - ◦ Methicillin-resistant Staph. aureus (MRSA)
  - ◦ Acinetobacter baumannii, Pseudomonas aeruginosa
  - ◦ Norovirus
• Survival of nosocomial pathogens on surfaces has been reviewed by Kramer et al.
• Under certain conditions, Cdiff spores, VRE, MRSA, Acinetobacter can survive for ≥4–5 months on dry surfaces; norovirus for ≥ a week.
Colonized /infected patients are more contaminated than their surrounding surfaces.

- VRE: around 103 CFUs/50 cm² on patient skin
- Cdiff, VRE, MRSA stool concentration 10³ - 10⁹ CFUs/g
- Norovirus >10¹² /g stool, >10⁷ /vomit bolus
- Surface concentrations of pathogens usually <1 - 100 CFUs/cm², often detected only by broth enrichment
- But sometimes much higher.
• <15 S. aureus cells cause infection in experimental lesions
• <CFU/cm² C. diff sufficient to cause C. difficile infection (CDI) in mice
• A single norovirus particle can cause infection.
• Touching a VRE-contaminated surface carries the same risk for acquisition of VRE on hands as touching an affected patient.
• C. diff. found in 17% of samples from rooms of patients without known C. diff infection.
• MRSA cultured from 43% of beds of patients not known to be MRSA positive.
• VRE cultured from 13% of surfaces of rooms of patients with unknown VRE status.
• Most likely due to continued viability of organisms shed by previous occupants.
• Previous presence of a colonized/infected patient in a side room as a risk factor for acquisition of the same pathogen by new occupant, presumably because of residual room contamination not removed by terminal cleaning/disinfection.

• Shown for VRE, MRSA, Cdiff, Ps. aeruginosa, A. baumannii.
• Patients and contaminated surfaces transfer VRE to the hands of HCWs at similar frequencies.
• Hand hygiene compliance was 80% after patient contact, compared with 50% after environmental contact, suggesting that environmental hand contamination is partly due to poor hand hygiene.
• Surfaces in vicinity of patients that are touched frequently by HCWs and patients—termed “hightouch surfaces”—have the highest frequency of contamination

• bed rails, bed surface, keyboards, taps, door handles etc
Nosocomial pathogens and the environment

- Dry surfaces:
  - MRSA
  - VRE
  - Acinetobacter spp.
  - Clostridium perfringens
  - Norovirus
  - Molds

- Wet areas (sink, sink drain, toilettes, tap water etc.):
  - P. aeruginosa
  - Klebsiella spp., Serratia spp.
  - Enterobacter cloacae
  - Acinetobacter
The Inanimate Environment Can Facilitate Transmission

~ Contaminated surfaces increase cross-transmission ~

Outbreak of Extended-Spectrum β-Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks

Christopher Lake, Barton Valley, Ains O'Shaughnigh, Wayne Lee, Bing Liu, Karen Bate, Mindy Loehr, Vivian Tilman, Christine Bisset, Allison McLean, and the Mount Sinai Hospital Infection Control Team

*Klebsiella oxytoca* is a non-fermentative, gram-negative, aerobic bacterium that can cause a variety of infections in humans, including urinary tract infections, pneumonia, and bloodstream infections. In recent years, *K. oxytoca* has been associated with increased prevalence of extended-spectrum β-lactamase (ESBL) enzymes, making it a significant clinical concern.

Methods

We conducted a prospective study at a large, tertiary care hospital in Toronto, Ontario, Canada, to investigate the sources of ESBL-producing *K. oxytoca* isolates. We collected surveillance cultures from patients with suspected infections and performed molecular epidemiology studies, including whole-genome sequencing, to identify the source of the outbreak. Our findings suggest that contaminated handwashing sinks were a major source of transmission, leading to an outbreak of ESBL-producing *K. oxytoca* in multiple patient units.

Figure 1. Flow of extended-spectrum β-lactamase (ESBL)-producing *Klebsiella oxytoca* infection and colonization in patients at a hospital in Toronto, Ontario, Canada, October 2006–March 2011. ICU, intensive care unit.

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87 ESBL-producing *K. oxytoca* isolates

79 hospital-acquired isolates

13 nonoutbreak hospital-acquired isolates

66 hospital-acquired outbreak cases

49 ICU-associated cases

17 non-ICU–associated cases

21 infections

28 colonizations

3 infections

14 colonizations

---

1042

Institut für Rheumatologie und Musculoskelettale Medizin

Universität Bonn

IHPh
Many of the ICU sinks had old patented opening drains (a pipe connecting the sink basin to the sink trap), a design that allowed drainage from the overflow hole to mix with the regular drainage water, potentially impairing adequate drainage. During February–June 2010, all drains were changed, eliminating the connection with the overflow drain; the overflow holes were decommissioned; the strainers in the sink basin were replaced by strainers containing a larger number of smaller holes to reduce backsplash; and sink traps were replaced.
A Quantitative Approach to Defining “High-Touch” Surfaces in Hospitals

Kirk Huslage, RN, BSN, MSNH;
William A. Rutala, PhD, MPH;
Emily Sickbert-Bennett, PhD; David J. Weber, MD, MPH

Fifty interactions between healthcare workers and patients were observed to obtain a quantifiable definition of “high-touch” (i.e., frequently touched) surfaces based on frequency of contact. Five surfaces were defined as high-touch surfaces: the bed rails, the bed surface, the supply cart, the over-bed table, and the intravenous pump.

Figure 2. Mean frequency of healthcare worker contact for 24 surfaces on a general medical-surgical floor. ABHR, alcohol-based hand rub; IV, intravenous; SCD, sequential compression device.
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Definition of Surface disinfection

- Surface disinfection is defined according to prEN 14885 (draft 2012) *Chemical disinfectants and antiseptics – Application of European Standards for chemical disinfectants and antiseptics*,
- as chemical disinfection of a solid surface, excluding those of certain medical and veterinary instruments, by the application of a product with or without mechanical action.
- Application methods include circulation, dipping, flooding, immersion, spraying, fogging, wiping
Purpose of surface disinfection

- The purpose of routine or targeted disinfection of inanimate surfaces is the killing or irreversible inactivation of pathogens to an extent which prevents subsequent infection transmission.
Situations:

1. “high-touch” (i.e. frequently touched) surfaces near patients
2. surfaces where contamination is assumed
3. surfaces with visible contamination (blood, pus, excrements)
4. terminal disinfection in rooms or areas where infected or colonized patients were treated or nursed, or in outbreak situations.
Efficacy testing of disinfectants in Europe

- disinfectant testing is conducted
- at an international level by the Organisation for Economic Co-operation and Development (OECD),
- At a European level by the Centre Européen de Normalisation (CEN) and
- at a national level by various professional societies and institutions.
• Since 1989, methods for efficacy testing of disinfectants in Europe have been developed by the Technical Committee 216 (TC 216) “Chemical disinfectants and antiseptics” of CEN.
• Working Group 1 (WG 1) of TC 216 focuses on human medicine and has been allocated to the Deutsches Institut für Normung (DIN) in Berlin
Developing standardised test methods in three phases.

1. **Phase 1** tests are quantitative suspension tests to establish that active substances or products under development have bactericidal, fungicidal or sporicidal activity without regard to specific areas of application.

2. **Phase 2** comprises two steps.
   - **Phase 2, step 1 tests** are quantitative suspension tests to establish that a product has bactericidal, fungicidal, yeasticidal, mycobactericidal, tuberculocidal, sporicidal or virucidal activity under simulated practical conditions appropriate to its intended use.
   - **Phase 2, step 2 tests** are quantitative laboratory tests to establish that a product has bactericidal, fungicidal, yeasticidal, mycobactericidal, tuberculocidal, sporicidal or virucidal activity when applied to a surface or skin under simulated practical conditions (surface, instrument, handwash and handrub tests).

3. **Phase 3** tests are field tests under practical conditions. Applicable methodology for this type of test is not yet available but may be developed in the future.
Efficacy testing at a national level

• The German Disinfectants Commission of the Association of Applied Hygiene (VAH) is an independent expert panel founded in 1959, initially as a Commission of the German Society for Hygiene and Microbiology (DGHM).

• Its tasks include the development of guidelines and standards for efficacy tests, and all valid European standards are integrated in the DGHM/VAH test methods.
National List for Disinfectants

• The VAH Disinfectants Commission compiles a list of effective disinfectants tested according to the DGHM Standard Methods

• This list provides the end-user with a choice of reliably effective disinfectants for routine applications tested under conditions simulating practical use.
Use of pre-soaked wipes

• Pre-prepared wipes are increasingly being used in clinical situations for the cleaning or disinfection of low risk equipment and the near-patient environment.

• Despite their growing popularity, however, there is a poor level of evidence to support the efficacy of disinfectant wipes in real life use.

• This is particularly important when wipes are used to support a reduction in the transmission of micro-organisms via the environment, including spores such as Clostridium difficile ("C. diff").
Terminal disinfection

- Terminal disinfection is performed in areas or rooms previously used for nursing or treating patients infected and/or colonised with pathogens.
- This disinfection aims to ensure that the room/area can be re-used safely for other patients without posing an infectious hazard.
- Terminal disinfection is applied to all potentially contaminated surfaces and objects.
- Vapour/aerosolized hydrogen peroxide
Biocides and antimicrobial resistance

• the present scientific data does not suggest that resistance problems will emerge, provided there is proper use of efficacious surface disinfectants.

• Actions to reduce the potential impact of biocides on antimicrobial resistance include some aspects
• Design and use biocidal products which rapidly reach lethal concentrations
• Identify sublethal concentrations which may trigger resistance
• Avoid repeated, widespread use of biocides at sublethal concentrations
• Carefully assess the risk/benefit profile for triclosan, QACs and other substances suspected of triggering resistance
• Provide clear, intelligible instructions and training on the proper use of disinfectants
• Use antimicrobial substances properly
Ensure compliance with standard principles

- adequate training and (continuing) education of both in-house and external staff,
- consultation with the infection control team,
- written Standard Operating Procedures,
- appropriate choice of disinfectant and other utensils needed for cleaning and disinfection,
- implementation of external and/or internal audits.
Evaluate and establish monitoring techniques

- fluorescent markers,
- Adenosine triphosphate (ATP) bioluminescense to measure residual organic matter on surfaces,
- Microbiological tests such as swab cultures and Agar Slide Cultures
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Hand contact areas
Other Areas
A Quantitative Approach to Defining "High-Touch" Surfaces in Hospitals

Kirk Hussey, RN, BSN, MPH;
William A. Rutala, PhD, MHI;
Emily Sickbers-Rice, PhE; David J. Weber, MD, MPH

Daily interactions between healthcare workers and patients were observed to obtain a quantifiable definition of "high-touch" or frequently touched surfaces based on frequency of contact. Five surfaces were defined as high-touch surfaces: the bed rail, the bed surface, the supply cart, the IV stand, and the intravenous pump.

![Bar chart showing the mean number of surface contacts per interaction observed for 28 surfaces in an intensive care unit. ABHR, alcohol-based hand rub; IV, intravenous; SCD, sequential compression device.]  

**Figure 1.** Mean frequency of healthcare worker contact for 28 surfaces in an intensive care unit. ABHR, alcohol-based hand rub; IV, intravenous; SCD, sequential compression device.
# German Hospital Hygiene Guideline

## Table 1: Risk areas with regard to the specification of cleaning and disinfection measures

<table>
<thead>
<tr>
<th>Areas without infection risk</th>
<th>Areas with possible infection risk</th>
<th>Areas with special infection risk</th>
<th>Areas with patients harboring microbes in or on their body such that there could be a risk of transmission</th>
<th>Areas where infection risk posed to personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stairways, corridors, administrative areas, offices, dining rooms, lecture/teaching rooms, engineering rooms</td>
<td>General wards, outpatient departments, radiology, physiotherapy, sanitary areas, dialysis, obstetrics, intensive care, neonatology</td>
<td>OR department, surgical procedures rooms, areas used for special intensive care (long-term ventilated patients (&gt;24 h); patients suffering from extensive burns, transplants (BMT, stem cells); hematology- oncology (e.g. patients undergoing aggressive chemotherapy, preterm babies)</td>
<td>Isolation wings, nursing functional units where aforementioned patients are treated</td>
<td>Microbiology laboratories, pathology, disposal</td>
</tr>
</tbody>
</table>

*Based on the general risk in the population*

*More information on risk evaluation can be consulted in the Technical Regulations on Biological Substances e.g. TRBA 260 “Biological Substances in the Health Services and Welfare Services” (79)*
# German Hospital Hygiene Guideline

Table 2: Cleaning and disinfection measures in different risk areas

<table>
<thead>
<tr>
<th>Areas without infection risk&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Areas with possible infection risk</th>
<th>Areas with special infection risk</th>
<th>Areas with patients harboring microbes in or on their body such that there could be a risk of transmission</th>
<th>Areas where infection risk posed to patients&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cleaning</strong></td>
<td><strong>Disinfection (Cat. II)</strong></td>
<td><strong>Disinfection (Cat. IB)</strong></td>
<td><strong>Disinfection (Cat. IB)</strong></td>
<td>See Technical Regulation on Biological Substances (TRBA) (Cat. IV)</td>
</tr>
<tr>
<td>All surfaces:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cleaning</td>
<td>Disinfection (Cat. II)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Floors: cleaning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other surfaces: cleaning</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When deciding whether routine cleaning or detergent surface disinfection is to be carried out, practicability and safe conductance must also be taken into account.

<sup>1</sup> Based on the general risk in the population

<sup>2</sup> More information on risk evaluation can be consulted in the Technical Regulations on Biological Substances e.g. TREA 250 “Biological Substances in the Health Services and Welfare Services” (75)
Routine disinfection

10.3 Schematische Darstellung des Umfangs der desinfizierenden Reinigung [28]

Abb. 1: Tägliche Aufbereitung ohne Patientenwechsel - rot = erforderliche desinfizierende Reinigung
Terminal disinfection

Abb. 2: Aufbereitung bei Entlassung oder Verlegung - rot = erforderliche desinfizierende Reinigung
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Close the toillette lid, when you flush
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Environmental Monitoring
Recovery rate of culture methods for nosocomial pathogens from environmental surfaces is low

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number of environmental sites studied</th>
<th>% Recovery</th>
<th>Sampling method</th>
<th>Methods</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancomycin resistant Enterococcus spp.</td>
<td>40²</td>
<td>15%</td>
<td>Contact plate (tryptone soya agar + 5% niccolon + VACC²)</td>
<td>Premoistened swab, Brain-Heart Infusion broth</td>
<td>Hecok, 2009⁵⁹</td>
</tr>
<tr>
<td></td>
<td>10² (before cleaning)</td>
<td>7.3%</td>
<td></td>
<td>Premoistened swab, Brain-Heart Infusion broth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>102 (after cleaning)</td>
<td>10%</td>
<td></td>
<td>Cotton-tipped moistened swabs, Enterococcus agar and broth + vancomycin (20 µg/mL)</td>
<td>Cusumano, 2007⁶⁰</td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>7.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metillin-resistant Staphylococcus aureus (MRSA)</td>
<td>673</td>
<td>10.7%</td>
<td>Cotton-tipped moistened swabs</td>
<td>7% Salt broth</td>
<td>Rampling, 2001⁸¹</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>10.5%</td>
<td>Contact plate (blood agar)</td>
<td></td>
<td>Behr, 2009⁶¹</td>
</tr>
<tr>
<td></td>
<td>132</td>
<td>3.8%</td>
<td>Cotton-tipped moistened swabs</td>
<td>Brain-Heart Infusion broth + MRSA agar (Staphylococcus)</td>
<td>Otter, 2011¹¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Brain-Heart Infusion broth + MRSA agar (Brilliance MRSA)</td>
<td>Hardy, 2007⁵³</td>
</tr>
<tr>
<td></td>
<td>302</td>
<td>2.9%</td>
<td></td>
<td>Contact plate (non-necrotic, salt agar)</td>
<td>Sextus, 2009⁶⁰</td>
</tr>
<tr>
<td>Gram-negative bacilli, extended-spectrum beta-lactamase producers</td>
<td>176</td>
<td>26%</td>
<td></td>
<td>Cotton-tipped moistened swabs, Dirigalski agar² + ceftazidime (0.5 µg/mL)</td>
<td>Kac, 2004⁵</td>
</tr>
<tr>
<td></td>
<td>428</td>
<td>14.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>19.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Footnotes:
²: Not defined in publication
³: Not defined in publication
⁴: By direct plating
⁵: By colony purification
⁶: By selective plating and antibiotic disc sensitivity
⁷: By direct plating and antibiotic disc sensitivity
Topic

• The change of risk assessment
• The situation now and in the future
• The new risk assessment on the environment and HAI
• The German Guideline on Hospital Hygiene
• The real life of cleaning and disinfection
• New problems in surface disinfection systems
• Environmental monitoring
• Testing of surface disinfection
Use of pre-soaked wipes
Use of pre-soaked wipes
Empfehlung zur Kontrolle kritischer Punkte bei der Anwendung von Tuchspender- systemen im Votranüramsystem für die Flächendesinfektion

1. Hintergrund


2. Empfehlungen

Zur Vermeidung von Infektions- risiken sind die folgenden Maßnahmen zu empfehlen:

Überprüfung der Wirksamkeit der Kombination von einem spezifizierten Wischtuch und einem Desinfektionsmittel im praktischen 4-Felder-Test (z. B. Tuchtrinkwasser)<br><br>Empfehlung zur Kontrolle kritischer Punkte bei dezentralen Desinfektionsmittel-Dispensergeräten

1. Hygienegrundlagen und Begriffsbildung
2. Empfehlungen zur Hygiene und Krankenhaushygiene
3. Empfehlungen zur Hygiene und Krankenhaushygiene
4. Empfehlungen zur Hygiene und Krankenhaushygiene
Topic

• The change of risk assessment
• The situation now and in the future
• The new risk assessment on the environment and HAI
• Aspects of Surface disinfection
• The German Guideline on Hospital Hygiene
• The real life of cleaning and disinfection
• New problems in surface disinfection systems
• Environmental monitoring
• Testing of surface disinfection
Schematische Darstellung des Wischverfahrens
Vergleichende Untersuchung zur Wirksamkeit von Reinigungs- und Desinfektionsverfahren auf S. aureus

Wasser

Tenside

Glykol Derivate & Quats

Alkylamine

Aldehydes

Peroxides

KBE / 25 cm²

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The role of surface disinfection in infection prevention

Die Rolle der Flächenhygiene in der Infekionsprävention

Abstract

Background: The WHO recommends that health care facilities adopt comprehensive policies and procedures to promote hand hygiene, infection control interventions, and patient care. The role of surface disinfection in infection prevention is well documented in the literature. This study aimed to review the current evidence for the role of surface disinfection in infection prevention.

Methods: A literature review was conducted using electronic databases and searching for relevant articles on surface disinfection and infection prevention.

Results: The review identified several studies that supported the role of surface disinfection in infection prevention. These studies emphasized the importance of routine disinfection of surfaces in healthcare settings to prevent the transmission of pathogens. The studies also highlighted the need for the development and implementation of effective disinfection strategies.

Conclusions: Surface disinfection is an important component of infection prevention strategies. This study underscores the need for further research to evaluate the effectiveness of different disinfection methods.

Zusammenfassung


Ergebnisse: Die Literaturrecherche identifizierte mehrere Studien, die die Rolle der Flächenhygiene in der Infekionsprävention unterstützt. Diese Studien betonen die Bedeutung der Routinehygiene von Oberflächen in klinischen Einrichtungen zur Verhinderung der Übertragung von Erregern.

Concluding remarks I

• There is now good evidence that contaminated dry surfaces contribute to the spread of nosocomial pathogens.
• It is undisputed that environmental disinfection is necessary in certain risk areas and in outbreak situations.
• It is widely acknowledged that proper use of disinfectants contributes to the control of pathogens in outbreak situations as part of a bundle strategy.
Concluding remarks II

• There is an urgent need to harmonize test procedures in order to demonstrate the efficacy of disinfectants including new application methods such as pre-soaked wipes for surface disinfection.

• Current understanding of toxicity and resistance mechanisms confirms that prudent implementation of surface disinfection regimens can prevent or minimize adverse effects.
Concluding remarks III

• There are many reports of insufficient and inadequate implementation of existing environmental cleaning and disinfection regimens.
• Therefore, future activities should focus on improving the quality of and the compliance with environmental disinfection procedures in accordance with a carefully designed set of standards.
The role of surface disinfection in infection prevention

Die Rolle der Flächendesinfektion in der Infektionsprävention

Abstract

Background: The Rudolf Scheden Foundation addressed topics related to hygiene, infection prevention, and public health. In this context, a panel of scientists from various European countries discussed "The Role of Surface Disinfection in Infection Prevention." The most important findings and conclusions of this meeting are summarized in the present consensus paper.

Aims: Although the relevance of surface disinfection is increasingly being accepted, there are still a number of issues which remain controversial. In particular, the following topics were addressed: Transfer of microorganisms from surface to patients as a cause of infections, requirements for surface disinfectants, biological resistance and toxicity, future challenges.

Methods and findings: After discussion and review of current scientific literature, the authors agreed that contaminated surfaces contribute to the transmission of pathogens and may thus pose an infection hazard. Targeted surface disinfection based on risk profiles is seen as an indispensable component of a multidisciplinary approach to universal infection control precautions. Resistance and cross-resistance depend on the disinfectant agent as well as on the microbial species. Prudent implementation of surface disinfection regimens tested to be effective can prevent or minimize unnecessary efforts.

Conclusions: Disinfection must be viewed as a holistic process. There is a need for defining standard principles for cleaning and disinfection, for ensuring compliance with these principles by measures such as written standard operating procedures, adequate training, and suitable audit systems. Also, cost-benefit analyses must be set up in order to demonstrate the efficacy of disinfectants including novel application methods such as pulse-activated rinses for surface disinfection.

Keywords: hygiene, infection prevention, surface disinfection, biofilm, resistance, cross-resistance

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The role of surface disinfection in infection prevention

Thank you