Latest Research and Best Practices for Environmental Hygiene

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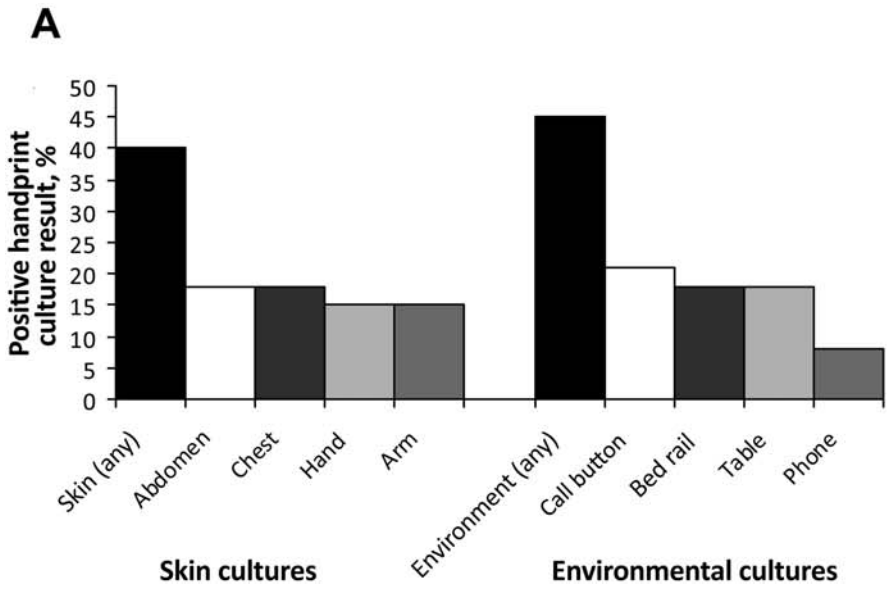
Disclosure: Linda Homan is an employee of Ecolab Healthcare Division

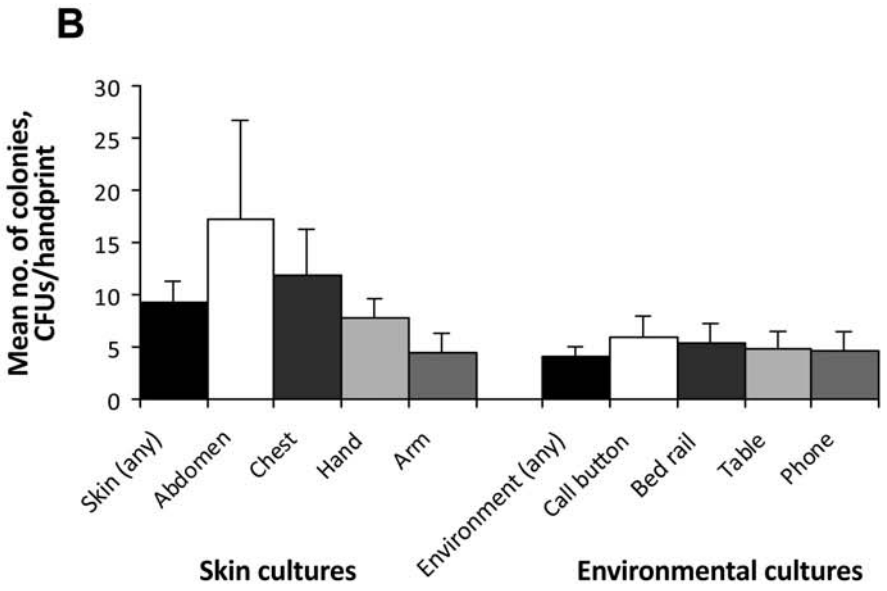
Agenda

- Latest Research
  - Role of the Environment
  - Latest Research
  - Monitoring the Environment
  - Quat Absorption
  - New Technologies and Programs
- Best Practices – Pilot Study Results
  - Process Optimization
  - Outcomes, Data Analysis and Reporting
  - Continuous Improvement, Reporting and Documentation

Role of the Environment

Contamination of Hands with Methicillin-Resistant *Staphylococcus aureus* after Contact with Environmental Surfaces and after Contact with the Skin of Colonized Patients



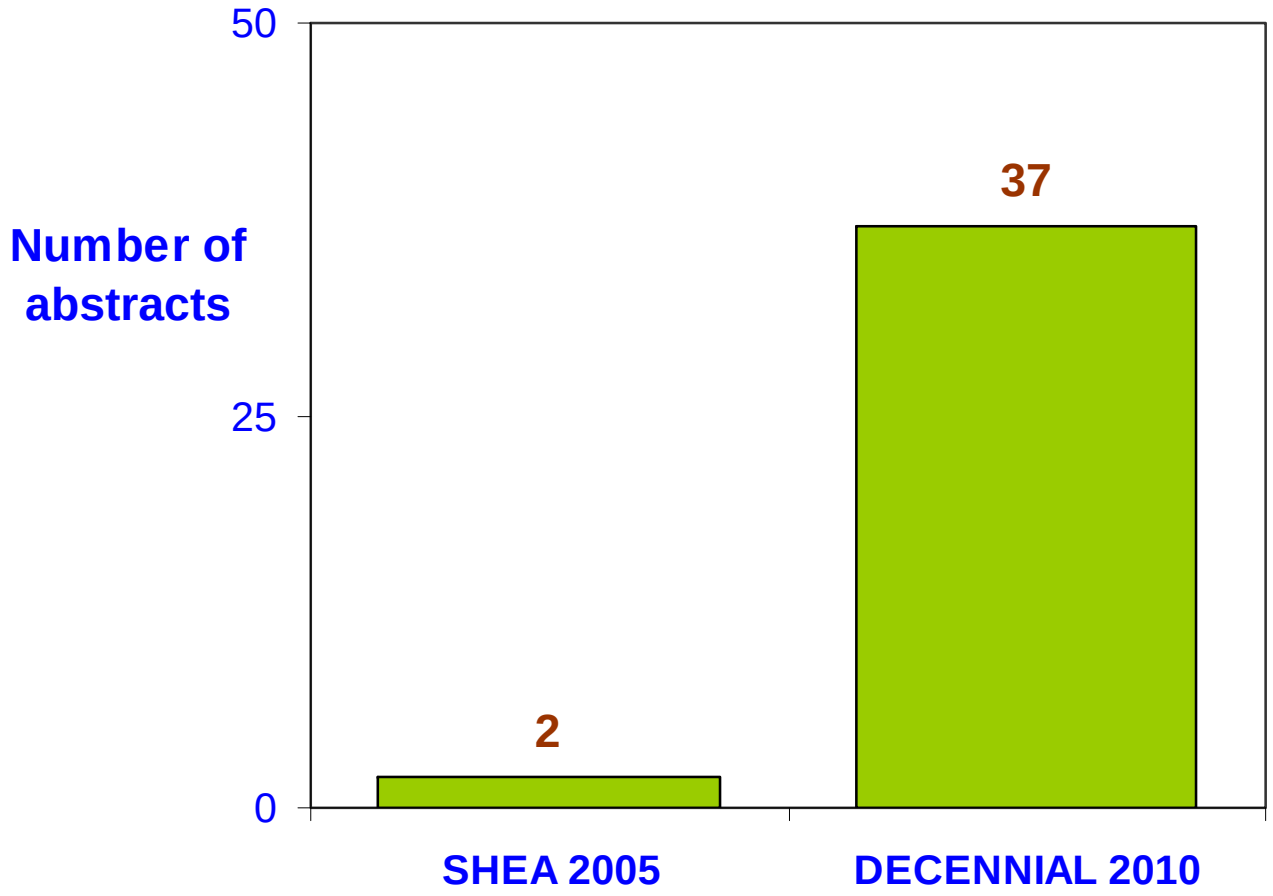


Hand contamination was equally likely after contact with touched environmental surfaces and skin sites

No significant difference in mean number of CFU's per gloved hand after contact with skin and environmental sites

Stiefel et al. Infect Cont Hospital Epidemiol. 2011;32:185

SHEA Abstracts Related to Surface Environmental Hygiene Issues



P. Carling, Boston University School of Medicine

Survival of Pathogens on Environmental Surfaces

Pathogen	Presence on Surfaces
C. difficile	> 5 months
Staphylococci	7 months
VRE	4 months
Acinetobacter	5 months
Norovirus	3 weeks
Adenovirus	3 months
Rotavirus	3 months
SARS, HIV	Days to week

Hota B Clinical Infectious Diseases 2004; 39:1182-9

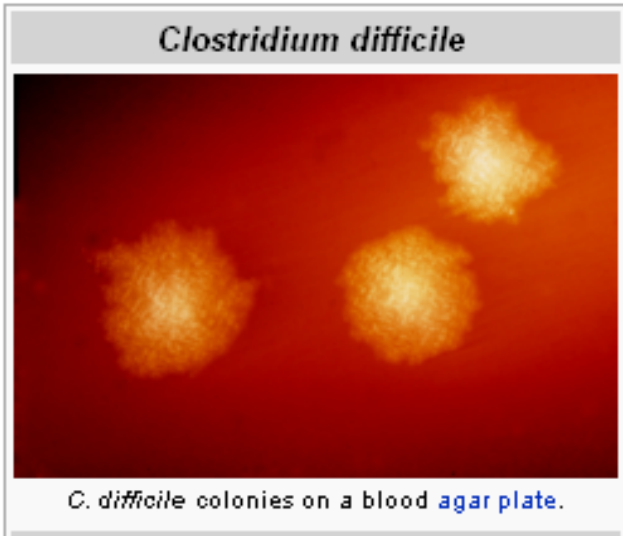
Survival of Vancomycin-Resistant Enterococci (VRE) in the Environment

- VRE can survive for prolonged periods in the environment
  - 1 week to 2 months on countertops
  - ≥ 7 days on fabric chairs
  - 7 days to 4 months on dry polyvinyl chloride surfaces
  - 1 day to > 3 months on cloth and plastic surfaces

Noskin GA et al. Infect Control Hospital Epidemiol 1995; 16:577
Bonilla HF et al. Infect Control Hospital Epidemiol 1996; 17:770
Wendt C et al. J Clin Microbiol 1998; 36:1998
Neely AN et al. J Clin Microbiol 2000; 38:724
Noskin GA et al. Am J Infect Control 2000; 28:311

Survival of *Clostridium difficile* Spores in the Environment

- Incidence and severity of *C. difficile* disease, including pseudomembranous colitis, has increased dramatically
- Mulligan et al. found *C. difficile* on environmental surfaces 40 days after an affected patient left the room
- *C. difficile* spores can survive on uncleaned floors for up to 5 months



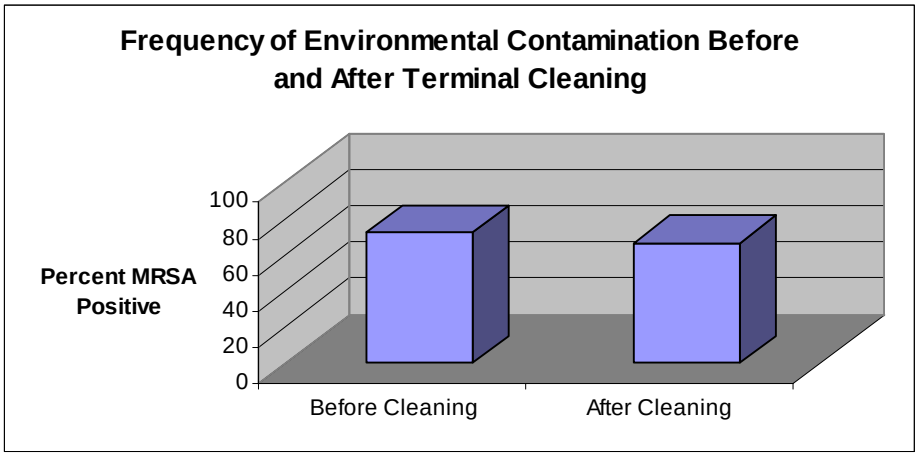
C. difficile colonies on a blood agar plate.

Mulligan ME et al. Curr Microbiol 1979; 3:173

Fekety R et al. Am J Med 1981; 70:906
http://en.wikipedia.org/wiki/Clostridium_difficile

Survival of Methicillin-Resistant Staphylococcus aureus (MRSA) in the Environment

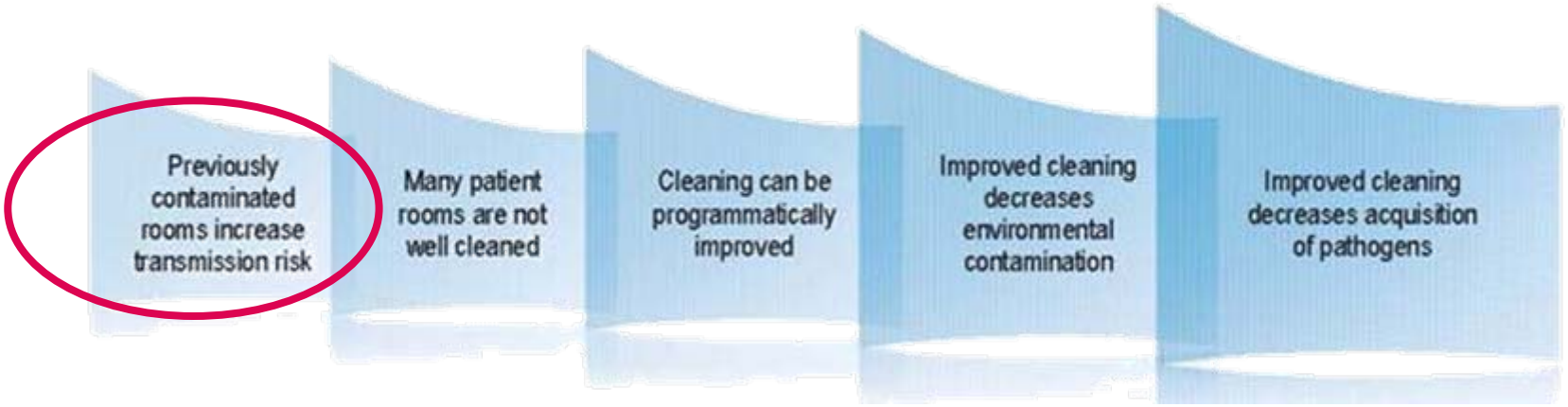
- Strains of MRSA can survive for prolonged time periods in the environment
  - 14 days on Formica surfaces
  - 6 to 8 weeks on cotton-blanket material
- Epidemic strains may persist longer
- *S. aureus* remain virulent for at least 10 days after exposure to dry surfaces



Beard-Pegler et al. J Med Microbiol 1988; 26:251
Duckworth GJ et al. J Med Microbiol 1990; 32:195
Farrington M et al. J Med Microbiol 1992; 36:56
Colbeck JC Am J Public Health 1960; 50:468

Latest Research

Peer Reviewed Studies Supporting Programmatic Approach to Improved Environmental Hygiene in Healthcare



Hayden MK (2006)
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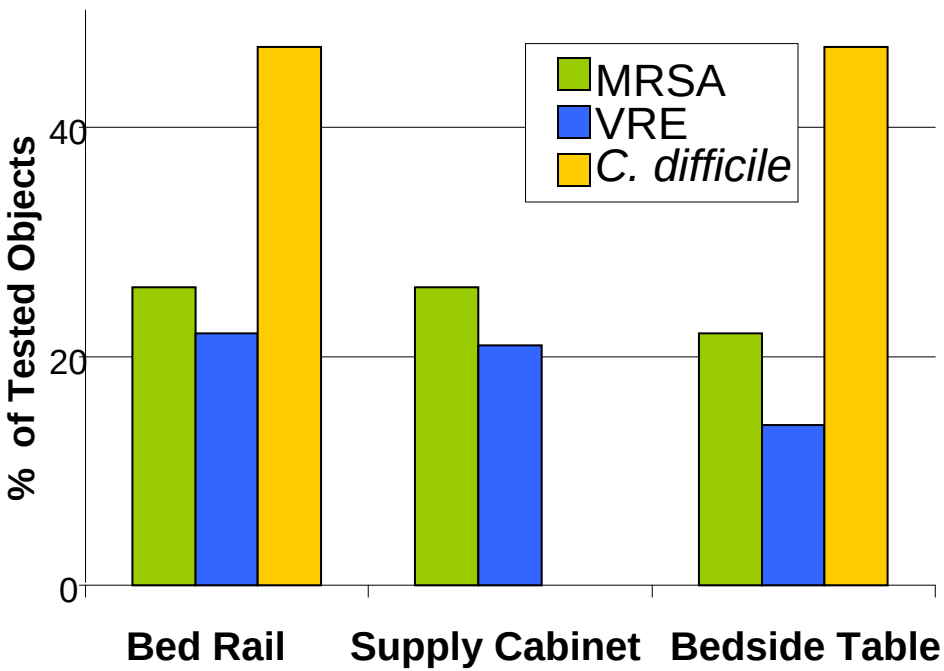
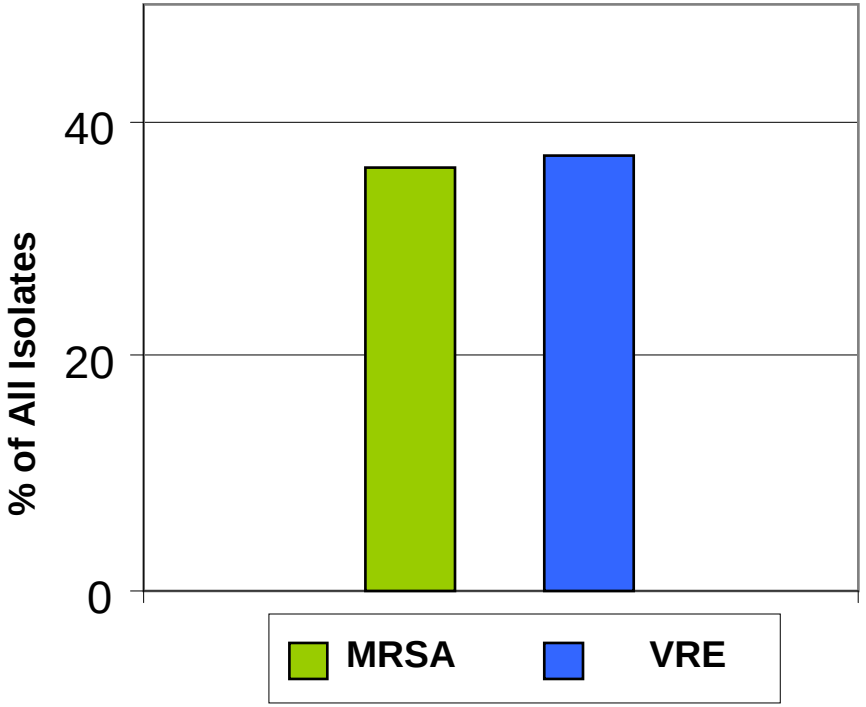
Many studies published within the last five years

Slide courtesy of Dr. Philip Carling, Boston University School of Medicine

Previously Contaminated Rooms Increase Transmission Risk

Environmental Contamination with Antimicrobial Resistant Organisms (MDROs)





Positive cultures from objects touched only by staff were contaminated with different isolates than those for which the patient was being isolated 39% of the time.

Adopted from – Speck SHEA Abstract 167, Baltimore, April 2007

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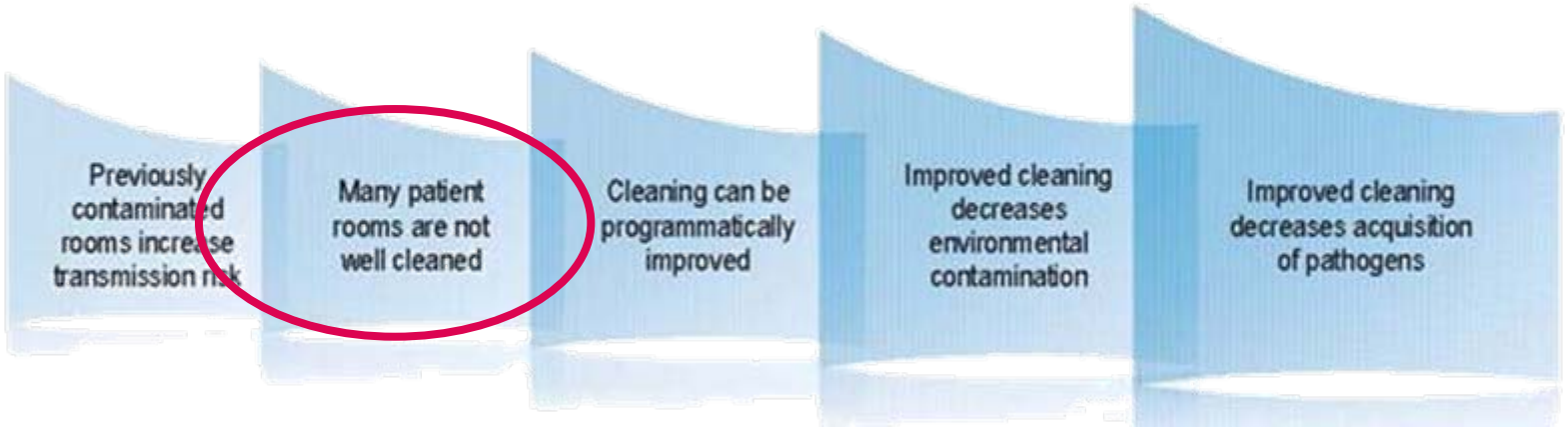

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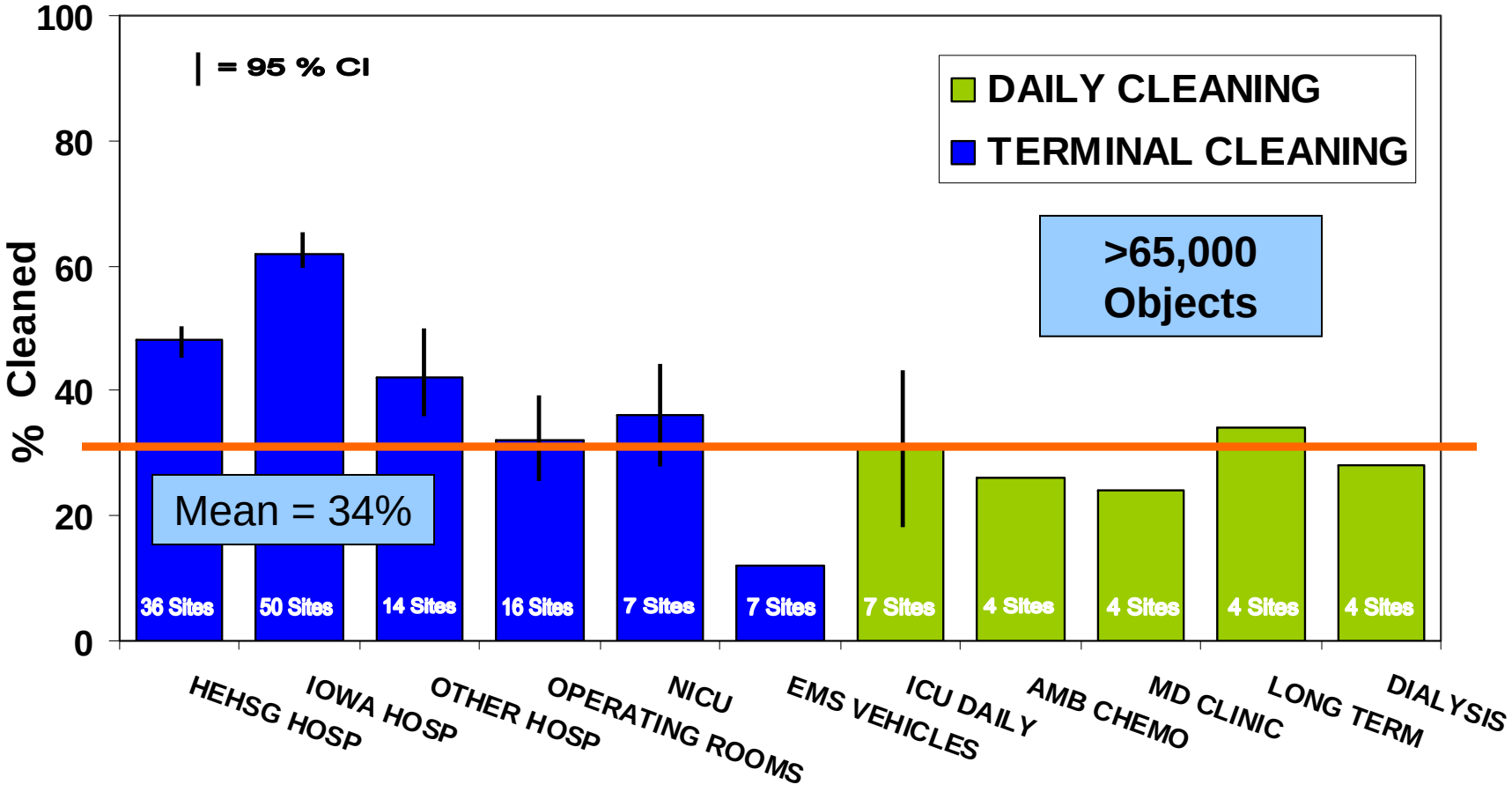
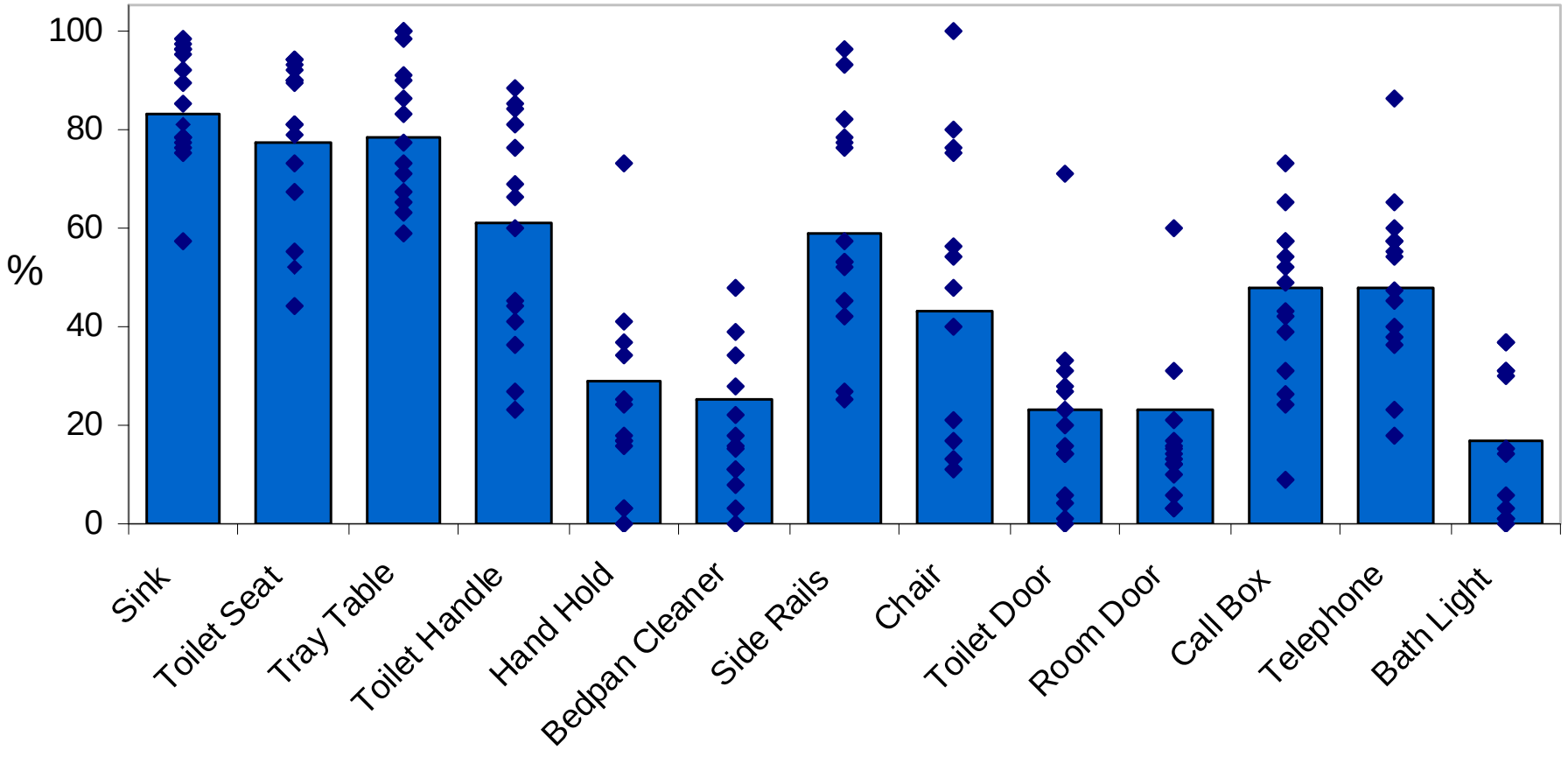
Many Patient Rooms Are Not Well Cleaned

Identifying Opportunities to Improve Environmental Hygiene in Multiple Healthcare Settings.



Carling PC, Po JL, Bartley J, Herwaldt L. SHEA Fifth Decennial Meeting 2010

Proportion of Objects Cleaned as Part of Terminal Room Cleaning in 20 Acute Care Hospitals



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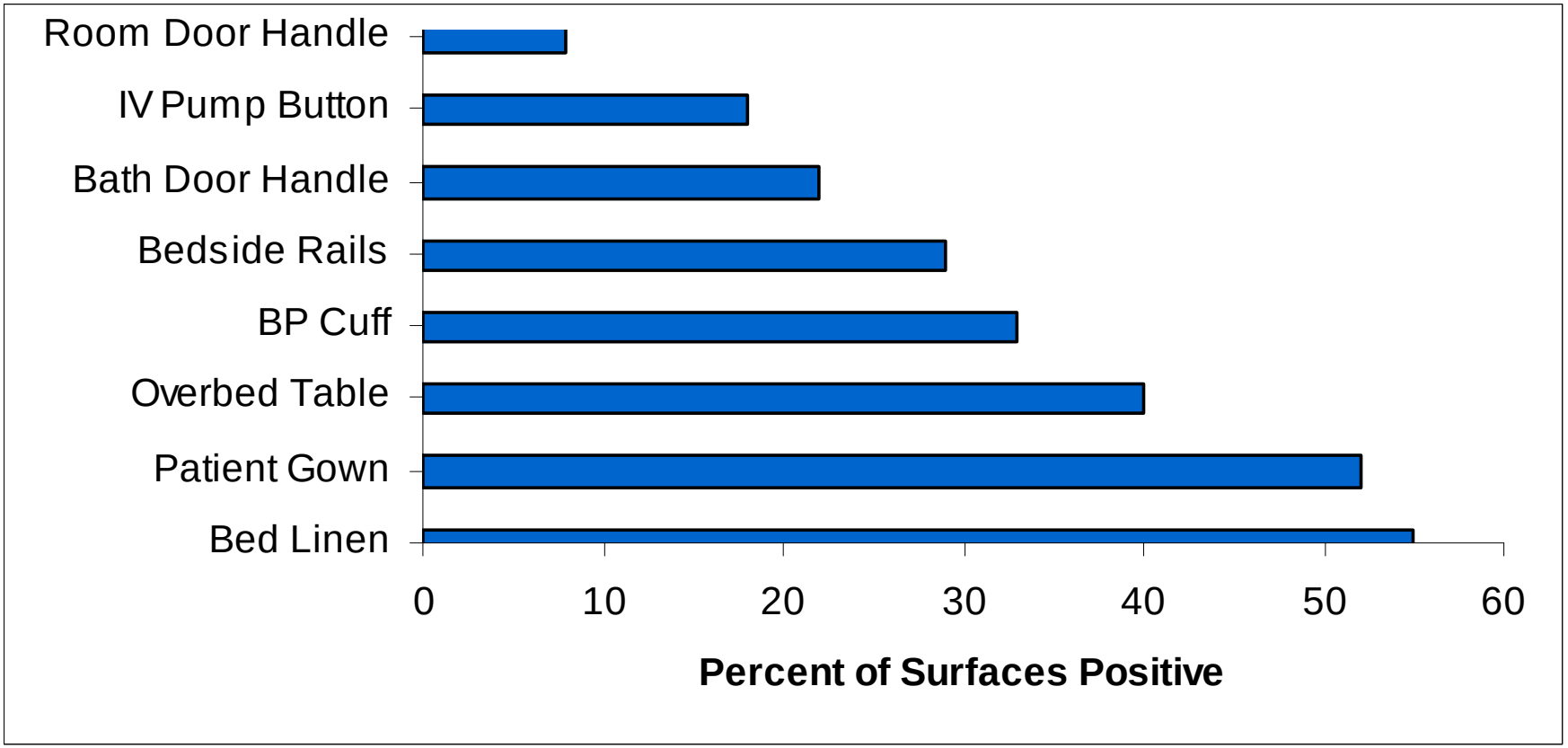
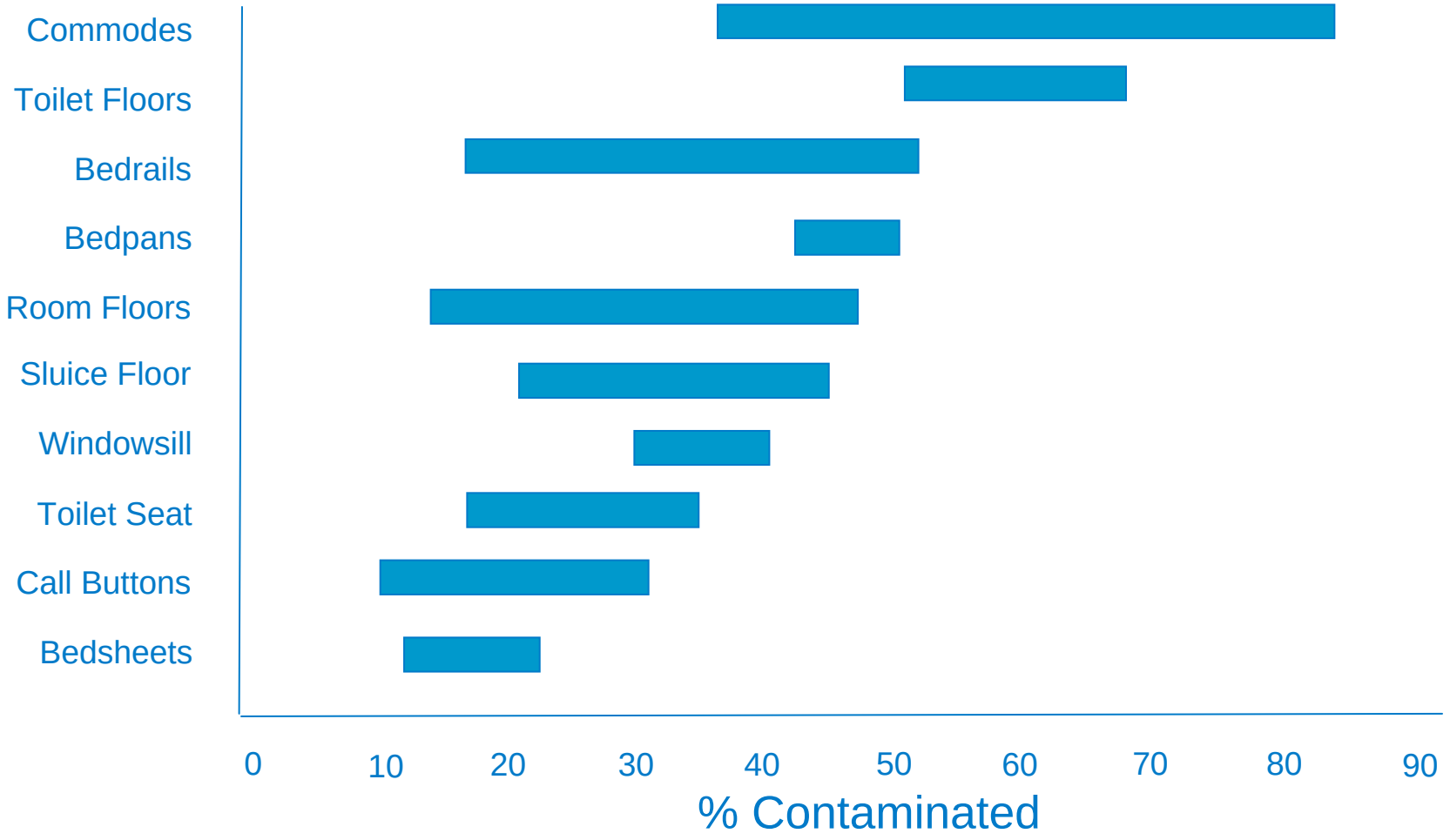
Frequency of Environmental Contamination in Rooms of Patients with MRSA in Wound or Urine



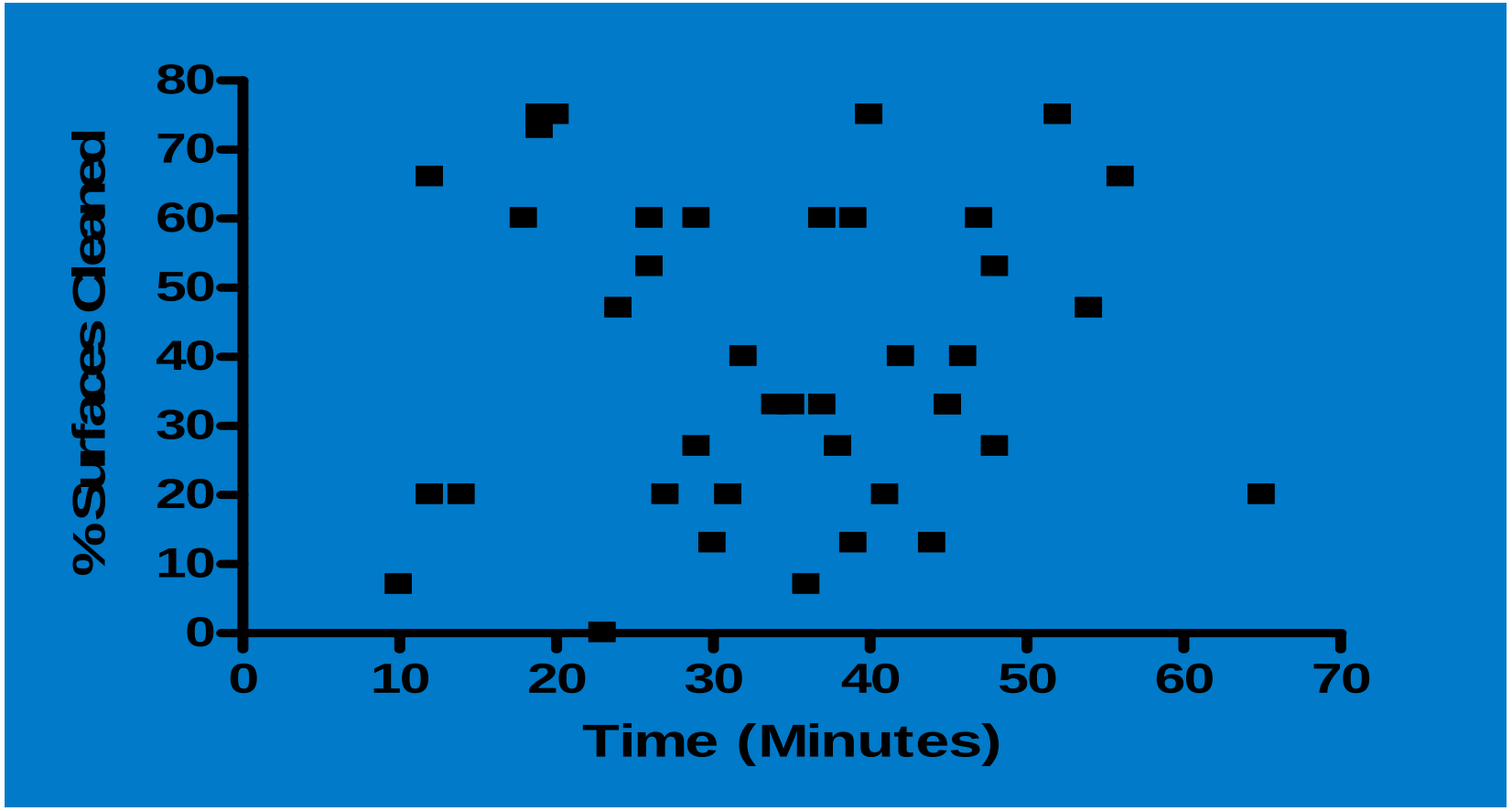
Boyce JM et al. Infect Control Hosp Epidemiol 1997; 18:622

Range of *C. difficile* Contamination of Surfaces in 7 Studies



Boyce JM, Role of Environmental Contamination in Transmission of Healthcare-Associated Pathogens and How CSPA Can Help

Time as a Measure of Thoroughness of Cleaning



Little correlation between time spent cleaning and thoroughness of cleaning

Rupp ME, Adler A, Schellen M, Abstract 203 Fifth Decennial

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Cleaning Can be Programmatically Improved

- Several published studies using a fluorescent gel marking system
  - Percentage of high touch objects cleaned increased from 39% to 81% following programmatic interventions, Environmental Services education/training and objective performance feedback.
- In a culture based study, Eckstein found that when routine cleaning was supplanted by trained research staff
  - VRE environmental contamination decreased from 71% to 23%
  - *C. difficile* environmental contamination decreased from 71% to11%

Carling PC, Parry MM, Rupp ME, Po JL, Dick B, Von Beheren S; Healthcare Environmental Hygiene Study Group. *Improving cleaning of the environment surrounding patients in 36 acute care hospitals.* Infect Control Hosp Epidemiol. 2008 Nov;29(11):1035-41.

Carling PC, Parry MF, Bruno-Murtha LA, Dick B. *Improving environmental hygiene in 27 ICUs to decrease multidrug-resistant bacterial transmission.* Crit Care Med. 2010.

Po JL, Burke R, Sulis C, Carling PC. *Dangerous cows: an analysis of disinfection cleaning of computer keyboards on wheels.* Am J Infect Control. 2009 Nov;37(9):778-80. Epub 2009 May 19.

Carling PC, Eck EK. *Achieving sustained improvement in environmental hygiene using coordinated benchmarking in 12 hospitals.* SHEA Fifth Decennial Meeting; Atlanta, GA; March 18 22, 2010.

Eckstein BC, Adams DA, Eckstein EC, Rao A, Sethi AK, Yadavalli GK, Donskey CJ. *Reduction of Clostridium difficile and vancomycin resistant enterococcus contamination of environmental surfaces after an intervention to improve cleaning methods.* BMC Infect Dis. 2007 Jun 21;7:61.