Cleaning for Health and Infection Control

It's more than just spray and wipe!

Basic Facts

Today, we know:

- All buildings are complex environments that contain a large diversity of microbial flora
- Microbial flora can constitute a risk to employees, patrons, students, patients and visitors
- Transmission of microorganisms is intricate and complex
- Transmission within health care facilities can be more severe than non-health care facilities

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Is this the cost of doing business?

HAI Stats

- Account for nearly 2 million infections
- Cause almost 100,000 deaths each year
- Add more that **$20 BILLION** to the nation's healthcare tab

Top 10 leading cause of death

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Sick Days Erode Bottom Line

- Last-minute absenteeism can cost employers in direct payroll losses, lost productivity, and staff morale
- A 2005 survey found that while the rate of unscheduled absenteeism barely budged since last year, the average per-employee cost has risen to **$660 per employee**

Sick Days can cost large employers over $1 Million

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School Funding Losses

- Absenteeism, even as little as 1% – 2% can cost school districts hundreds of thousands of dollars in state revenue
- Reimbursement numbers vary by district, generally $25 - $30 per day
  - Population of 50,000 @ $30/day can lose $15,000/day in funding with just 1% absenteeism
  - Pandemic @ 35% = $525,000

>3% Absenteeism

1 Day

2 Salaries

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Chicago Tribune (2000)

- 2000, 75% of an estimated 103 000 patient deaths linked to HAIs
- Due to unsanitary facilities, unwashed hands & dirty instruments
- Cleaning staff were inadequately trained & cleaning budgets had been steadily cut

Chicago Tribune

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Trends & Implications

Trends	Implications
Infection Prevention Is Moving Mainstream.	Service providers must be ready with products and protocols.
Consumption of disinfection chemistry is increasing dramatically.	Safer , Greener products will prevail (favorable in use and post use profiles).
The “bug of the week club” will continue to gain new members.	Infection Prevention products will grow exponentially in relevance and consumption.
Resistance of organisms to legacy chemistries will continue to grow in concern.	Infection Control experts will seek products that will not contribute to this phenomenon (Oxidizers).
End Users are looking to appear responsible in their infection prevention plans	Service providers who provide this comfort will win.

The Environment

What have we learned since the 16th century?

Evidence for Cleaning

Environmental cleaning is important because:

- Reduces the number and amount of infectious agents present in the environment
- Environment has been shown to be a reservoir for infectious agents – bacteria, viruses, fungi and spores
- Eliminates routes of transfer both direct and indirect
- Contributes towards controlling health care-associated infection and associated costs

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The Environment

- People shed microorganisms into the environment through coughing, sneezing, diarrhea
- Animals shed microorganisms into the environment
- Diseases can be spread from insects

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The Role of the Environment

- Nosocomial pathogens can persist for long periods of times on inanimate surfaces
- Association between reservoirs and outbreaks
  - Faucet aerators, Shower Heads, Sinks, Drains
  - Flower Vase Water
  - Ice Machines, Hydrotherapy Tubs
  - Sports Equipment
- Protocols should include careful cleaning of wet surfaces and equipment to prevent the build up of Biofilms
- There is a rather low compliance with hand hygiene

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Environmental Contamination

Examples of environmental items that have been shown to harbour microorganisms such as MRSA, VRE, *C.difficile*, *A. baumannii*, RSV, influenza virus and others

Bed	Infusion equipment
Bed frame	Light switch
Bed linen	Overbed table
Bedpan/bedpan cleaner	Patient bathroom
Bed rail	Patient hoist/lift and sling
Bedside table	Pen
Blood pressure cuff	Phlebotomy tourniquet
Call bell	Pillow/mattress
Chair	Sink
Clean gloves that have touched room surfaces only	Stethoscope
Computer keyboard	Suctioning and resuscitation equipment
Couch	Table, staff work table /charting area
Door handle	Telephone, mobile phones
Electronic thermometer	Television
Faucet handle	Therapeutic and fluidized bed
Floor around bed	Toilet/commode
Haemodialysis machine	Tourniquet
Hydrotherapy equipment	Ventilator

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Literature Review

Use science to build best practices, policies and procedures

Survival of the Fittest!

Studies showing :

1) Microorganisms can survive after inoculation onto surfaces/items
2) The organism can be cultured from in-use fomites
3) The organism can proliferate in or on the fomite

Survival of the Fittest!

Year	Principle Author	Highlights of Study
2006	Van der Mee-Marquet	An epidemiological link was found between clinical outbreak strains of Enterobacter cloacae & strains isolated from **therapeutic beds** in an outbreak.
2005	Jenkins	*Staphylococcus aureus* survived more than four hours on various **cot mattress materials**.
2003	Bridges	Influenza virus survived up to **48 hours** on nonporous surfaces.
2000	Neely	Gram-negative bacteria survived on a number of hospital fabrics and plastics for up to **60 days**
2000	Rogers	Reported an outbreak of Rotavirus on a paediatric oncology floor possible related to **shared toys** which had not been included in routine cleaning regimens.

I don't want your cooties!

Studies showing:

1) There is a direct means for microorganisms from contaminated items/surfaces in the environment can be transferred to hands

I don't want your cooties!

Year	Principle Author	Highlights of Study
2005	Duckro	Showed relative frequency of **transfer of VRE** from items in the environment and patient skin to clean items and health care provider hands.
2004	Bhalla	The hospital environment contributes significantly to contamination of health care providers' **hands, the major source of transmission** of nosocomial pathogens from patient-to-patient.
1997	Boyce	It was shown **that inanimate surfaces near affected patients** commonly become contaminated with MRSA and the frequency of contamination is affected by the body site at which patients are colonized or infected; staff may contaminate their gloves (or possibly their hands) by touching such surfaces which suggested that contaminated environmental surfaces may serve as a reservoir of MRSA in hospitals.
1981	Kim	A correlation was demonstrated between the degree of environmental contamination and health care provider hand contamination.

You touch it, You get it!

Studies showing:

1) That exposure to contaminated items/surfaces in the environment is associated with acquisition of colonization of infection

You touch it, You get it!

Year	Principle Author	Highlights of Study
2006	Huang	As association was shown between admission to an **ICU room previously** occupied by an MRSA-positive patient or a VRE-positive patient and an elevated risk of acquiring MRSA or VRE, respectively.
2004	Denton	Authors found a significant correlation between **environmental contamination** with *A. baumannii* and recovery of the bacterium from patients.
2003	Martinez	A link was shown between the **placement of patients** in a particular room and acquisition of VRE, supporting the role of environmental contamination on VRE transmission
1994	Orr	Sampled 'clean' therapeutic bed mattress covers on receipt from a manufacturer and found VRE contamination to be prevalent on the covers; since each of the VRE-positive patients has used a therapeutic bed, it was postulated that the **VRE was introduced into the facility via the beds**.

Just Clean It!!!

Studies showing:

1) That decontamination of items/surfaces results in elimination of infection transmission, e.g., lower rates of colonization or infection

Just Clean It!!!

Year	Principle Author	Highlights of Study
2008	Gallimore	**Reduced level of environmental contamination** with gastroenteric viruses due to changes in cleaning protocols.
2006	Hayden	Demonstrated **lower rates of VRE** acquisition related to enforcement of routine environmental cleaning.
2004	Denton	**Failure to follow strict cleaning protocols** resulted in higher levels of environmental contamination with *A. baumannii,* which were significantly correlated with an increase in patient colonization with *A. baumannii.*
2004	Wright	Decreases in acquisition of MRSA and VRE were observed following aggressive control measures that included **supervised cleaning of rooms**.
2000	Fitzpatrick	Measure the effect of a **detailed daily cleaning regimen** on an MRSA unit; environmental contamination with MRSA remained low and there was no new staff acquisition of MRSA following the implementation of this cleaning protocol.

Key Take Home Message

Scientific evidence to prove:

- Microbes can survive on fomites
- Microbes can proliferate in or on fomites
- Association between exposure to the fomite and infection
- Decontamination of fomites results in elimination of infection transmission

Key Take Home Message

- PREVENTION is the key to minimizing pathogen transmission
- Collaboration is a key component to a successful Infection Control Program
  - Between Environmental Services and Infection Control
  - Between Custodial Staff and School Districts
  - Between Building Management and Occupants
- The development of a robust Environmental Services Program including appropriate allocation of resources is a necessity

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Disinfectants: Desired Traits & Limiting Factors

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Disinfectant History

- Over 8000 disinfectants registered in North America
- 95% are formulations based on chemistries that are over half a century old
  - Phenols
  - Quats
  - Chlorine
  - Alcohols
  - Aldehydes

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Disinfectant Future

- Emerging technologies are focusing on Non-Halogen based oxidizers
  - Hydrogen Peroxide
  - Paracetic Acid
  - Organic Peroxides
  - Potassium or Sodium Percarbonate

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Product Efficacy

- Requires broad-spectrum germicidal efficacy
  - Requires more than just Gram –ve and Gram +ve
  - Does not equate to long list of irrelevant microbes
  - Need to avoid the "Bug of the Week" mentality
  - Avoid the claims washing trap of "our product kills "X" bugs while the closest competitor only kills "X"
  - Keep in mind that what a product kills is meaningless if staff cannot tolerate using it

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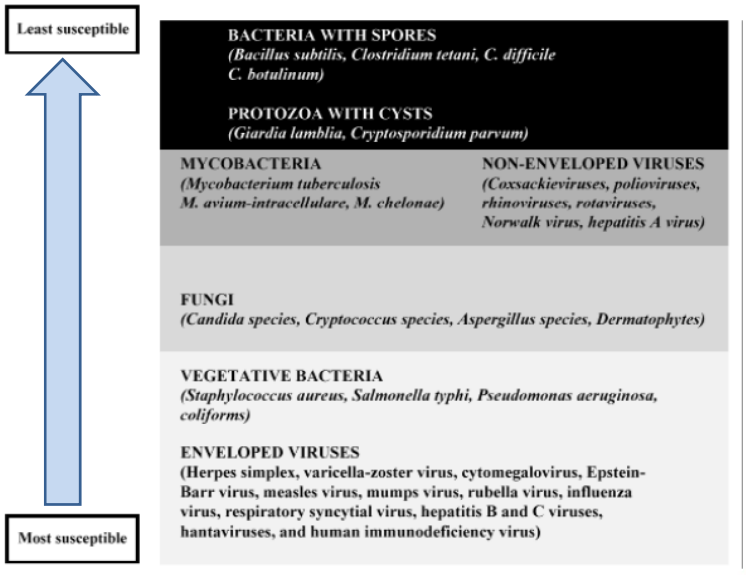

Taken from: Infection Control Guidelines: Handwashing, Cleaning, Disinfection and Sterilization in Health Care, Health Canada, December 1998

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Contact Times

- Product efficacy needs to be achieved in rapid and realistic contact times
  - Many products have contact times on the label that are too long for field use
  - Consideration of dwell time vs drying time must be given
  - Ensure the contact times for specific organisms are suitable for your facility
  - Be cognizant that while researchers and guidelines may state that contact times for products are faster than that listed on the label, the EPA label takes precedence

Organic Matter

- Products should remain active in the presence of organic matter
  - 5% serum is the approved standard
  - Provides ability to make 1-Step Cleaning-Disinfection claims
  - Labels will state that “Heavily Soiled Surfaces Require Cleaning Prior to Disinfection”
  - Products not tested using a soil challenge must state that “Pre-cleaning” is required.

Cleaning Ability

- Products need to have good cleaning properties
  - The importance of cleaning through physical friction and the removal of soils cannot be underestimated
  - 1-Step claims, do not provide any association with a products cleaning efficiency
  - Surfactants (detergents) are an important part of a formulation to ensure cleaning ability
  - Standardized test methods exist and are used by many to verify a products cleaning capabilities

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Hidden Hazards….Shiny Suds

http://www.youtube.com/watch?v=-4MecNtkI2s

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Safety Profile

- Products should be non-toxic and have low irritancy and allergenic properties
  - Preference should be given to products that do not contain VOCs, Endocrine Disruptors or Carcinogens
  - HMIS ratings at Use Dilutions of 0/0/0 and Category IV EPA ratings should be given preference
  - Review of the MSDS for PPE requirements and risks associated with exposure to the product
  - Review MSDS for both Concentrate and Use Dilution
  - Preference for concentrated products with automated dilution systems should be given

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Environmental Sustainability

- Product should be environmentally preferable and should not damage the environment on disposal
  - Be wary of Green-Washing, the EPA does not currently allow for 3rd party Green Endorsements nor claims for environmental preference on labels or advertising
  - DfE pilot program in place, H2O2, citric and lactic acid are the ONLY identified “green” actives
  - Chose product with chemicals that have known biodegradability profiles and do not bio-accumulate
  - Preference should be given to products that do not leave active residuals on surfaces

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Odor Profile

- Products that have pleasant or ideally no odor should be chosen
  - Fragrances that give “pleasant” odors generally contain VOCs and contribute to air quality concerns
  - Fragrances are most commonly the cause for chemical sensitivity, hence the movement to Scent-Free facilities
  - Clean is NOT the smell of lemon, pine or bleach. Clean is the ABSENCE of any odor

Compatibility

- Products should carry wide material compatibility
  - We must grasp the reality that NO SINGLE DISINFECTANT ACTIVE will be compatible with 100% of the surfaces
  - Task oriented products are designed for specific reasons to improve the compatibility profile and longevity
  - Time and budget constraints must be reviewed and weighed against the decision to not follow recommended cleaning protocols
  - Implementation of distinct protocols for specific surfaces will reduce compatibility concerns

Chemistry Comparisons

	Product A	Product B	Product C
Product Efficacy			
Contact Times			
Organic Matter			
Cleaning Ability			
Safety Profile			
Environmental Sustainability			
Odor Profile			
Compatibility			
Cost			

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Best Practices

For cleaning and disinfection of the health care environment

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Cleaning Best Practices

"Just because it looks clean doesn't mean it isn't contaminated by bacteria or viruses!!"

- Frequency of cleaning and disinfection of items or surfaces in a particular area or department depends on:
  a) Frequency of contact – high touch or low touch surfaces
  b) Vulnerability of the clients/patients/residents housed in the area;
  c) Type of activity taking place in the area and the risk of infection associated (ie. Critical care areas, isolation environments);
  d) Probability of contamination of the area

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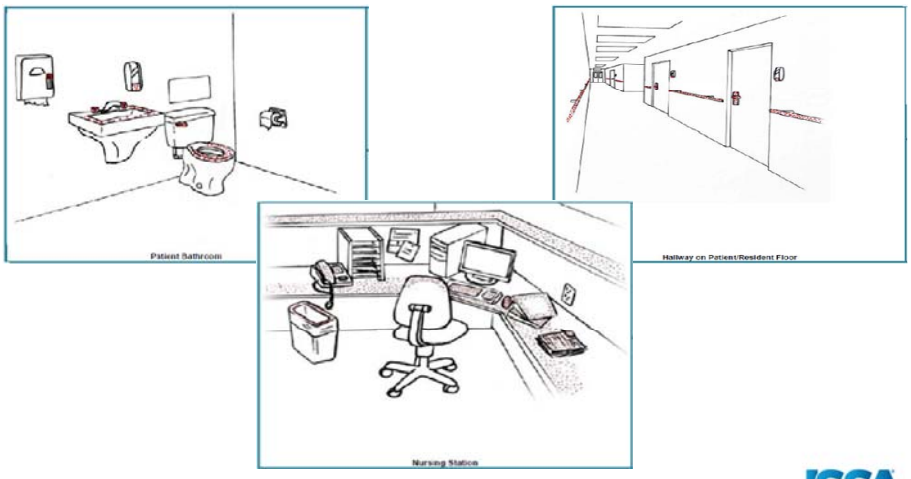
Come out, Come out where ever you are....



Taken from: Best Practices for Environmental Cleaning for Prevention and Control of Infections in All Health Care Settings, PIDAC, December 2009

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The Inanimate Environment Can Facilitate Transmission

~ Contaminated surfaces increase cross-transmission ~

Abstract: The Risk of Hand and Glove Contamination after Contact with a VRE (+) Patient Environment. Hayden M, ICAAC, 2001, Chicago, IL.

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Verification of Cleaning

Average Cleaning score:
Semi-quantitative assessment of cleaning based on UV marker removal → 0 indicates complete cleaning, 3 indicates no cleaning

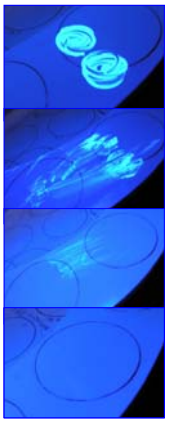
"UV water soluble mark"

100% (3+)

~75% (2+)

~25% (1+)

0% (0)



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Verification of Cleaning

- Microbial contamination contains *Adenosine triphosphate* (ATP)
- After cleaning, all sources of ATP should be significantly reduced
- The ATP luminometer measures the amount of light generated and provides information on the level of contamination in just seconds
- The higher the reading, the more contamination present

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In Conclusion...

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Today?

- Maintaining a clean environment undeniably plays a roll in containing the spread of infection including:
  - Providing a clean care environment
  - Providing clean medical equipment

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Prevention vs Cure

- It has become clear that the greatest potential for improvement within our healthcare system lies in preventing HAIs rather than finding new ways to cure them
- Cleaning & Disinfection of surfaces helps to minimize the risk of transmission

ENVIRONMENTAL SERVICES CAN IMPROVE THE BOTTOM LINE

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Comparing Products

- Make sure you are comparing apples to apples
- An evaluation questionnaire helps to ensure that products are compared equally
- Developing an evaluation questionnaire helps to ensure that you look at all of the information relevant and important for your facility
- Getting the facts and support data is important in ensuring you have the information needed to successfully choose a product

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Questions?

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