



Infection Prevention & Control: What's New? What's Not...

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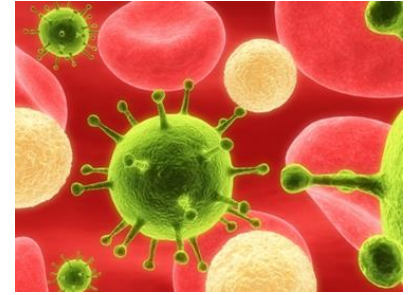
November 2015

A Stroll Down Memory Lane...

'No lepers, lunatics, or persons having the falling sickness or other contagious disease, and no pregnant women or sucking infants, and no intolerable persons, even though they be poor and infirm, are to be admitted in the house; and if any such be admitted by mistake, they are to be expelled as soon as possible'...

- *Medieval English Hospital, 1219*

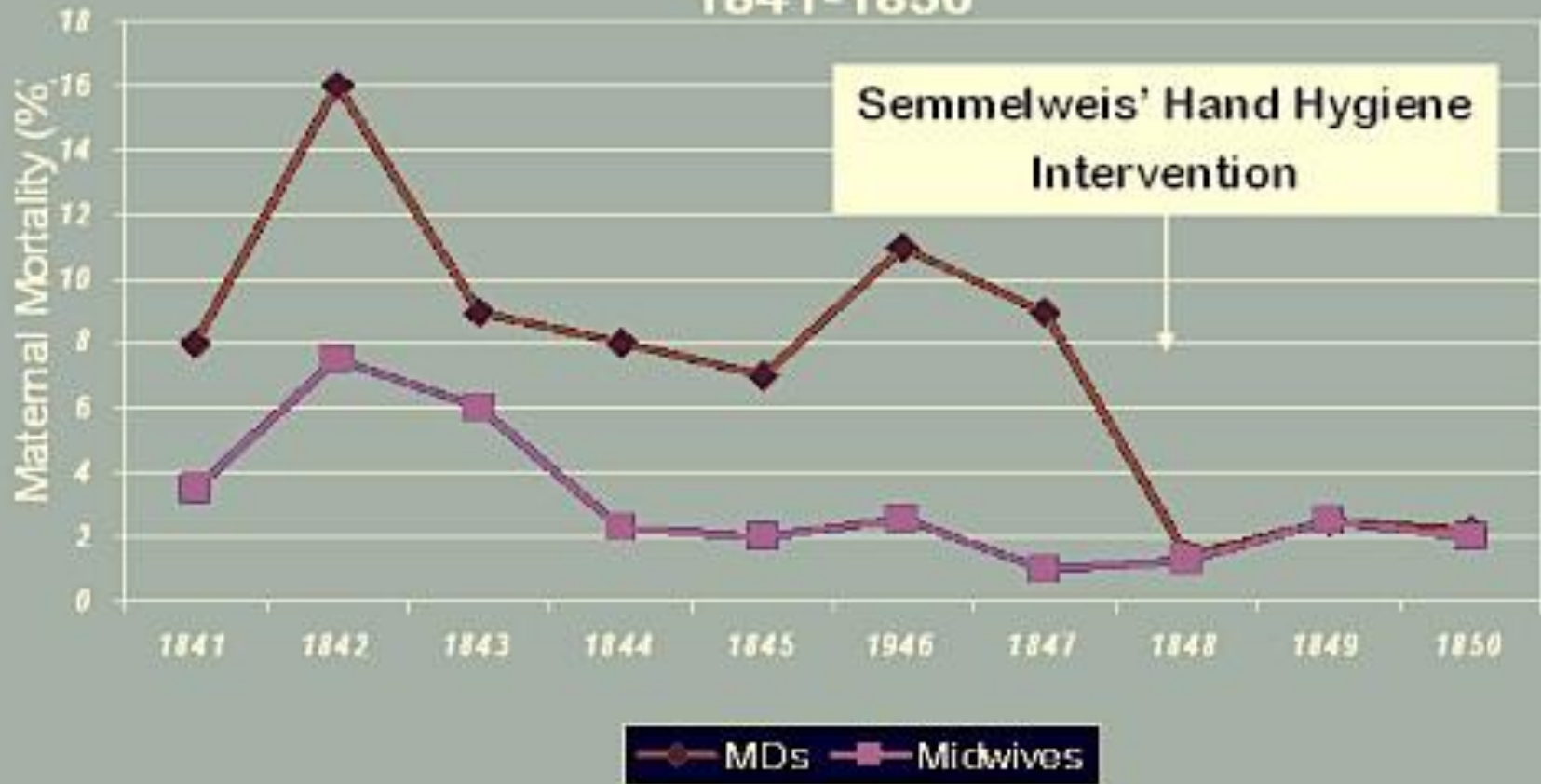
IP&C: The Evolution



1847: Semmelweis & Puerperal Fever

- Women whose babies born out of hospitals less likely to develop fever
- Ward A (medical students) vs Ward B (midwives) observations
- Autopsies pre-delivery on Ward A
- Hand washing implemented....

Maternal Mortality due to Postpartum Infection General Hospital, Vienna, Austria, 1841-1850



History...

- 1854- Florence Nightingale
 - Appropriate ventilation & sick patients isolated
- 1875- John Hopkins Hospital, Baltimore
 - Well-ventilated and isolations wards “for the occasional case so contagious ...or unpleasantly smelly that it cannot remain under the same roof with others”.
- 1920- Chicago's Presbyterian Hospital
 - Proposed all single rooms with a dedicated toilet....

Today...

- Healthcare facility design, infrastructure and IP&C practices are an integral part of how we do business to protect patients/residents
- Organizations dedicated to IP&C
- IP&C programs & standards: Accreditation Canada requirement
- Numerous guidelines available to help us deliver safe care in an safe environment
 - e.g. WHO, CDC, PHAC, CSA, CPSI, IPAC Canada, PIDAC

HAIs in Canada

- 200,000 Canadians acquire a healthcare-associated infection (HAI) each year and 8,000 of them die as a result
- About 8% of children and 10% of adults in Canadian hospitals have an HAI at any given time
- Mortality rates attributable to *Clostridium difficile* infection have more than tripled in Canada since 1997
- The healthcare-associated Methicillin-resistant *Staphylococcus aureus* infection rate increased more than 1,000% from 1995 to 2009

<http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2013/infections-eng.php>

Why it Matters?

- Vulnerable populations
- High-risk for severe health outcomes
- Infection most common reasons for transfer from LTC to acute care (33% in one study)
- Accessibility & access impacts (wait times)
- Staff health and safety
- Our responsibility!!

Infrastructure & Design Challenges

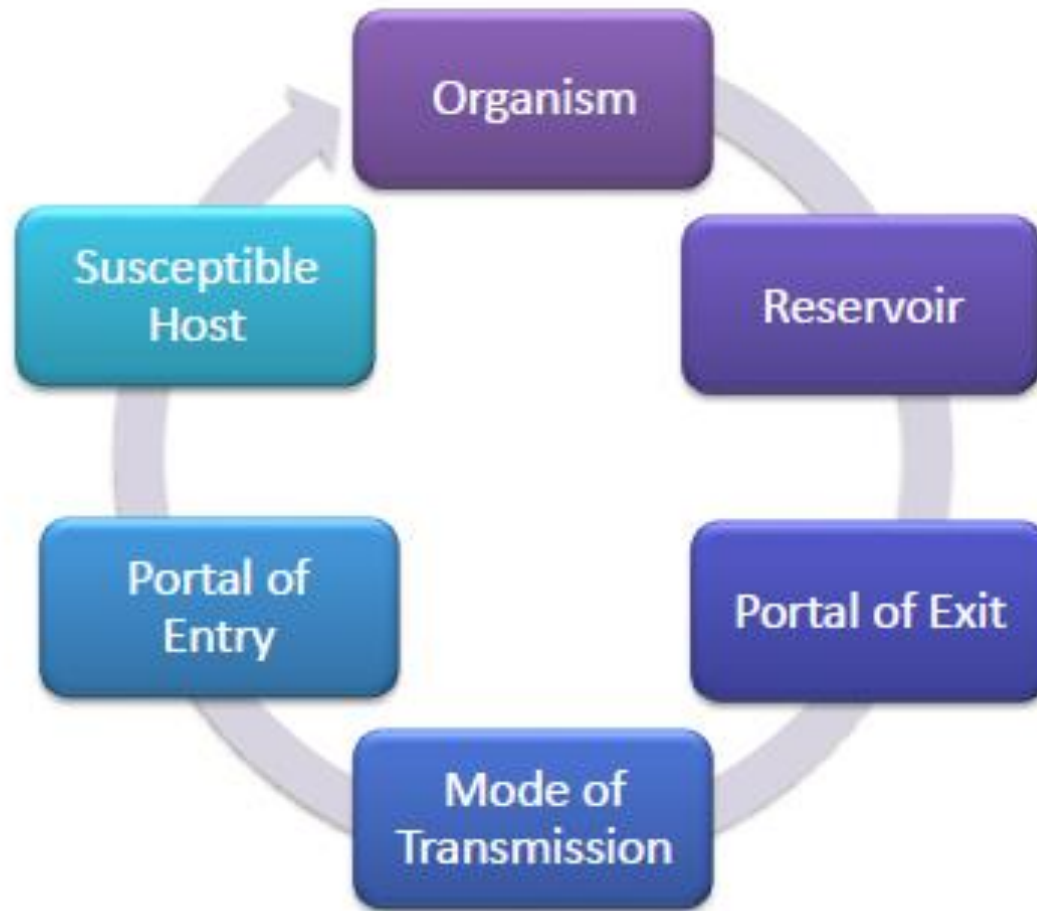
- Aging infrastructure
 - Most hospitals/LTCF are many decades old
- Buildings challenged to meet today's standards for design & renovation (best practices)
 - Aging plumbing
 - Ventilation systems
 - Poor layout
 - Surface selection (e.g. tile/grout)
 - Opportunities for mold growth, etc

Has Infection Prevention & Control been consulted??



What's Not New....

The Chain of Infection



What are Routine Practices?

- *Routine Practices are the Infection Prevention and Control practices for use in the routine care of all patients/residents, at all times, in all healthcare settings and are determined by the circumstances of the patient/resident, the environment and the task to be performed.*
- Source: Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Healthcare Settings, PHAC

Important Elements in IP&C



Hand Hygiene



Engineering Controls



Administrative Controls



Personal Protective Equipment



Point of Care Risk Assessment



Environmental Cleaning & Disinfection





Hand Hygiene

- Hand Hygiene encompasses:
 - ✓ Hand washing
 - ✓ Hand antiseptics (e.g. ABHR)
 - ✓ Actions taken to maintain healthy hands
- National and international guidelines on hand hygiene in health care settings

Provincial Significance

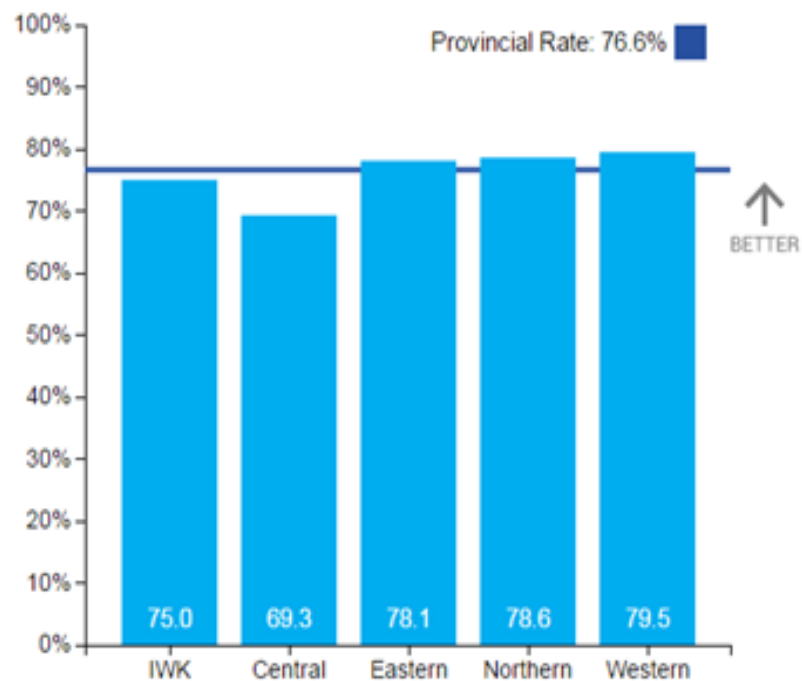
- Hand hygiene adherence rates by HCWs are a provincially monitored and publicly reported patient safety indicator in NS acute care facilities
 - *Patient Safety Act (2012)*
 - Accessible & appropriate sinks and ABHRs are necessary to facilitate and drive improvements

How often are healthcare workers cleaning their hands?

April-June 2015

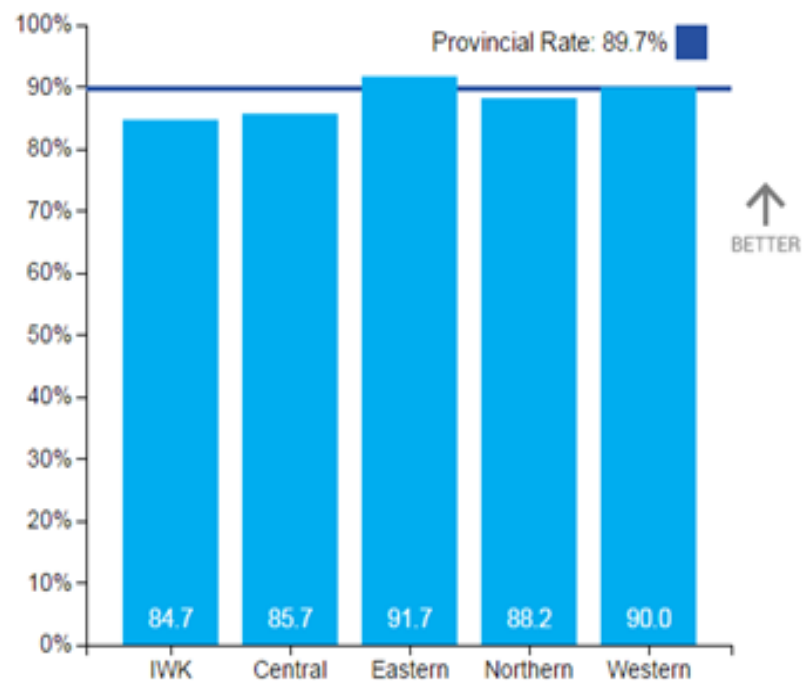
Before initial contact

Cleaned hands before initial patient/patient environment contact.



After contact

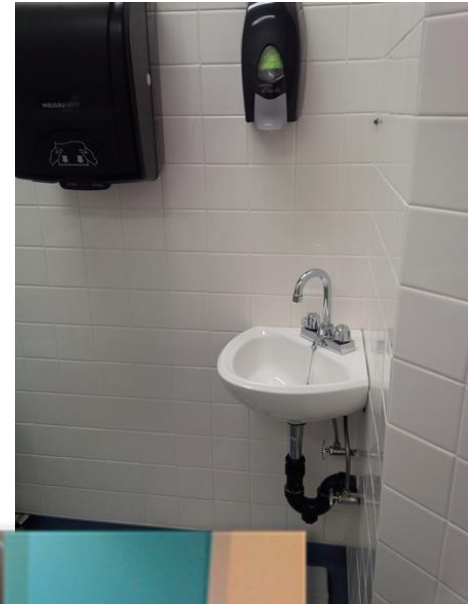
Cleaned hands after patient/patient environment contact.





Occupational Obsession?

- Sink specs/design
- Sink locations & access
- Dedicated staff hand hygiene sinks?
- AHBRs EVERYWHERE!!!!



Outbreak of Multidrug-Resistant *Pseudomonas aeruginosa* Colonization and Infection Secondary to Imperfect Intensive Care Unit Room Design

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Abstract

Background. *Pseudomonas aeruginosa* has been increasingly recognized for its ability to cause significant hospital-associated outbreaks, particularly since the emergence of multidrug-resistant strains. Biofilm formation allows the pathogen to persist in environmental reservoirs. Thus, multiple hospital room design elements, including sink placement and design, can impact nosocomial transmission of *P. aeruginosa* and other pathogens.

Methods. From December 2004 through March 2006, 36 patients exposed to the intensive care unit or transplant units of a tertiary care hospital were infected with a multidrug-resistant strain of *P. aeruginosa*. All phenotypically similar isolates were examined for genetic relatedness by means of pulsed-field gel electrophoresis. Clinical characteristics of the affected patients were collected, and a detailed epidemiological and environmental investigation of potential sources was carried out.

Results. Seventeen of the infected patients died within 3 months; for 12 (71%) of these patients, infection with the outbreak organism contributed to or directly caused death. The source of the outbreak was traced to hand hygiene sink drains, where biofilms containing viable organisms were found. Testing by use of a commercial fluorescent marker demonstrated that when the sink was used for handwashing, drain contents splashed at least 1 meter from the sink. Various attempts were made to disinfect the drains, but it was only when the sinks were renovated to prevent splashing onto surrounding areas that the outbreak was terminated.

Conclusion. This report highlights the importance of biofilms and of sink and patient room design in the propagation of an outbreak and suggests some strategies to reduce the risks associated with hospital sinks.

(Received April 10 2008)

- 2009 study where 36 patients infected in Toronto ICU
- 17 patients died
- Hand hygiene sink drains splashed at least 1 metre from the sink
- Importance of sink design and placement



(c) GiggleMed.com

HAND WASHING

Because C.diff Tastes Even Worse Than It Smells



Engineering Controls

- Built into the LTC facility and include elements such as structure, design and ventilation
- Reduce the opportunity for error or inconsistency in the application of IP&C practices by eliminating the individuals (e.g. HCW, visitor) choice about when or if to apply them

Examples of Engineering Controls

- Also called environmental controls
- Patient/resident single accommodation & dedicated bathroom
- Design and location of hand washing sinks
- Point-of-care ABHR and sharps containers
- Safety engineered sharps
- Ventilation/HVAC

Outbreak of Extended-Spectrum β -Lactamase-producing *Klebsiella oxytoca* Infections Associated with Contaminated Handwashing Sinks¹

Christopher Lowe, Barbara Willey, Anna O'Shaughnessy, Wayne Lee, Ming Lum, Karen Pike, Cindy Larocque, Helen Dedier, Lorraine Dales, Christine Moore, Allison McGeer, and the Mount Sinai Hospital Infection Control Team

Klebsiella oxytoca is primarily a health care-associated pathogen acquired from environmental sources. During October 2006–March 2011, a total of 66 patients in a hospital in Toronto, Ontario, Canada, acquired class A extended-spectrum β -lactamase-producing *K. oxytoca* with 1 of 2 related pulsed-field gel electrophoresis patterns. New cases continued to occur despite reinforcement of infection control practices, prevalence screening, and contact precautions for colonized/infected patients. Cultures from handwashing sinks in the intensive care unit yielded *K. oxytoca* with identical pulsed-field gel electrophoresis patterns to cultures from the clinical cases. No infections occurred after implementation of sink cleaning 3×/day, sink drain modifications, and an antimicrobial stewardship program. In contrast, a cluster of 4 patients infected with *K. oxytoca* in a geographically distant medical ward without contaminated sinks was contained with implementation of active screening and contact precautions. Sinks should be considered potential reservoirs for clusters of infection caused by *K. oxytoca*.

Klebsiella oxytoca is an opportunistic pathogen that causes primarily hospital-acquired infections, most often involving immunocompromised patients or those requiring intensive care. Reported outbreaks have most frequently involved environmental sources (1–4). *K. oxytoca*, like other *Enterobacteriaceae*, may acquire extended-

spectrum β -lactamases (ESBL) and carbapenemases (1,5); outbreaks of multidrug-resistant *K. oxytoca* infection pose an increasing risk to hospitalized patients.

We report an outbreak of infections caused by ESBL-producing *K. oxytoca* in the intensive care unit (ICU), step-down unit, and medical care unit at a hospital in Toronto, Ontario, Canada, during a 4-year period. Contributing to the ongoing difficulties in the containment of this outbreak has been the contamination of handwashing sinks in the ICU. We describe a retrospective review of all *K. oxytoca* isolates intermediate or resistant to third-generation cephalosporins identified from inpatients from April 1997 through December 2011, the investigation of the source of the *K. oxytoca* outbreak, and the interventions implemented to contain the outbreak.

Methods

The outbreak occurred at an acute tertiary-care facility in Toronto with 472 beds, including a 16 single-bed medical-surgical ICU, a 6-bed cardiac care unit, and two 4-bed step-down units. Outbreak cases of *K. oxytoca* were defined as hospital-acquired isolates with pulsed-field gel electrophoresis (PFGE) patterns belonging to 2 related clonal groups; all such isolates produced an Ambler class A ESBL. Isolates were considered hospital acquired if the first specimen (clinical culture or rectal swab) yielding resistant *K. oxytoca* was obtained ≥ 3 days after the admission date or if the specimen was obtained < 3 days after admis-

- 66 patients infected (no deaths) in Toronto
- Transplant unit
- Organism found in the sinks
- Outbreak emphasized challenges with limited space, body fluid management and sinks in older hospitals





Administrative Controls

- Policies, procedures and patient/resident care practices intended to prevent exposure and transmission of microorganisms during the provision of care
- Require organizational commitment and resources for their implementation and sustainability

Examples of Administrative Controls

- IP&C Committee and all components of the IP&C program
- Employee health, healthy workplace policies
- Employee education
- Audits of practice (e.g. environmental services, hand hygiene)
- SOPs
- Equipment/preventative maintenance



Personal Protective Equipment

- Minimize exposure to and subsequent transmission of infectious agents
- Provides a barrier between you from the source patient/resident or contaminated environmental surfaces/medical equipment
- PPE is highly dependent on the user's adherence and is for this reason, the *weakest tier* in the hierarchy of controls

Weakest Tier?

- Depends on 'choice' on whether to wear it
- Needs to be accessible
 - It is visible to staff/visitors?
 - Taken out only when an outbreak happens?
- Gloves most frequently used but often overused and unnecessary
 - NOT a substitute for hand hygiene



Point of Care Risk Assessment

HCWs evaluate the likelihood of exposure to infectious agents and identify the strategies to decrease or eliminate exposure.

HCWs should perform a PCRA prior to each patient/resident interaction.

In conducting a PCRA, a HCW should ask themselves the following 7 questions.....

Point of Care Risk Assessment

SEVEN QUESTIONS TO ASK YOURSELF

What is my **skill level** for this task?

What are the patient's **symptoms**?

What **actions** do I need to take?

What is the **environment** where I will be performing this task?

What is my risk of **exposure**?

What **task** am I doing?

How **cooperative** is the patient?



Environmental Cleaning & Disinfection

- IP&C education/ training for housekeeping staff
- Written protocols and procedures (e.g. schedule for cleaning/disinfection, record keeping, monitoring the cleaning/disinfection process)
- Ensuring surfaces in the facility are able to withstand cleaning and disinfection processes
 - Intact, non-porous...
- System for enhanced cleaning during outbreaks

The Challenge of Surfaces

- Keeping up with wear and tear



Also not new...Additional Precautions

Additional Precautions are enhanced IP&C interventions used in addition to Routine Practices when Routine Practices alone may not interrupt transmission of an infectious agent.

Additional Precautions are based on the method of transmission and applied for specific clinical presentations or syndromes and pathogens.

Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Healthcare Settings, PHAC

Based on Mode of Transmission



Contact

- Direct and Indirect



Droplet



Airborne

Impact for Additional Precautions

- Anterooms, putting on and removing PPE
- Negative & positive pressure rooms; protective environment rooms
 - Monitoring and documentation
- Availability of private rooms
- Hand hygiene sinks?
- Location of soiled utility rooms
- Strategies to reduce the risk of spread



KEEP
CALM
AND
LET INFECTION CONTROL
FREAK OUT

What's (sort of) New...

Evolution continues...

- Global impact of novel/rare infectious agents
- Best practices in facility design
- IP&C during construction/renovation/maint.
- Human waste management
- Human factors engineering
- NEW IP&C and design guidelines

Global impacts





Design in Healthcare

- CSA Z8000-11
- Can and should help guide decision-making in all renovation activities and building of new health care facilities
- Room specs, assistance in layouts, selection of materials etc
- Private rooms with washroom
 - 1 bum per toilet!!

Renovation and Construction

- CSA Standard Z317.13- *Infection Control during Renovation, Construction and Maintenance of Health Care Facilities*
- Training for key staff crucial
- Involving IP&C staff beginning at design
- Inclusion of training requirement e.g. tenders, trades
- Preventative Measures Analysis!!

A Case for Controlling Dust Bunnies

- Dust particles contaminated with bacteria & fungi can be dispersed during construction/renovation activities
- Puts patients/residents at risk
 - Compromised immune systems - transplants
 - Co-morbidities – dialysis, diabetes, cancer, COPD, cardiac
 - Age
 - Post-operative
 - Steroid therapy (particularly for Legionella)
- Also concerns for staff and visitors

Human Waste Management

- Winner for most frequently asked question....
- Best practice guidance (SBAR)
 - Support of automated waste disposal systems
 - Don't dispose in sinks, shared toilets
 - Macerators, flusher/disinfectors systems
 - Cleaning & disinfection of equipment

Human Factors

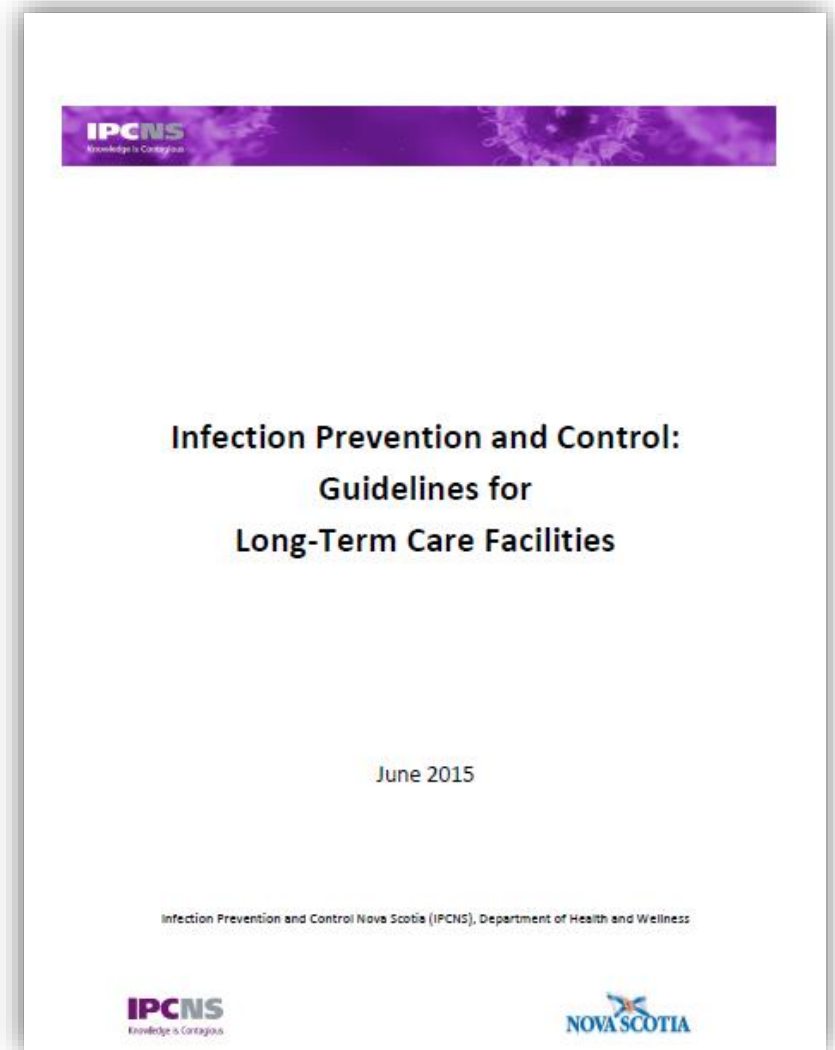
- Human factors examines the relationship between human beings and the systems with which they interact by focusing on improving efficiency, creativity, productivity and job satisfaction, with the goal of minimizing errors.
- Study of the interrelationship between humans, the tools and equipment they use in the workplace and the environment where they use it.

Human Factors Engineering

- Humans are not machines; making the right thing to do more visible & reduce errors
- Standardizing processes
- Checklists and pictures
 - e.g. Pictorial reminder to staff and patients/residents about cleaning their hands; housekeeping checklist; all clean utility rooms labelled and supplies organized in the same manner

FINALLY!

- Released June 2015
- The information should be integrated with existing IP&C programs and policies in each facility and used as part of a comprehensive effort to implement accepted standards and best practices for infection prevention and control



IP&C in Long-Term Care Facilities

- The DHW guidelines are not regulatory
 - Recommend they be used to standardize infection prevention and control practices
- A consistent approach will reduce confusion and promote a better understanding by all
- Be prepared for questions as document is implemented.....

Also Hot off the Press...

- “Patient-Focused Primary Healthcare Design Guide for Infrastructure Supporting Collaborative Healthcare Teams”
- This has been approved and is successfully being used!

The Challenge

- Limited everything!

TIME

MONEY!

KNOWLEDGE &
CAPACITY

STAFF & HUMAN
RESOURCES

The Opportunities

- Collaboration!
- Cost savings/avoidance
- Patient/resident safety and satisfaction with care
- Mutual understanding of IP&C best practices

Next time someone says “let’s see what IP&C thinks?”



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NOVA SCOTIA

Thank you!

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