

The Science Behind *Just Clean Your Hands*

Education on Health Care Associated Infections and Hand Hygiene

Version 1.0

Acknowledgement

- The Ministry of Health and Long-Term Care would like to thank:
 - the WHO World Alliance for Patient Safety for sharing its *Clean Care is Safer Care* materials. This presentation includes slides adapted from annex 16 of *Clean Care is Safer Care*, the WHO multimodal hand hygiene improvement strategy developed by the World Alliance for Patient Safety.



- the UK National Patient Safety Agency for sharing its multimodal hand hygiene improvement materials from the *cleanyourhands* campaign.



Instructions for trainers

- This presentation should be used:
 - as a resource to provide rationale behind the *Just Clean Your Hands* program
 - to educate trainers on the key messages to support health care provider and observer training. Health care providers include all who work with patients or in the patient care area.
 - as an additional education resource
- Trainers are encouraged to add/adapt some slides with local figures and to make sure that the main messages of this presentation are transmitted to health care providers.
- During the session, the discussion and health care provider participation should be stimulated as much as possible in order to achieve an optimal understanding of the key messages.
- The presentation can be either given in a single session of approximately one hour or split up into shorter sessions according to its different parts.

Overview

1. Impact and burden of health care associated infections
2. Role health care providers' hands play in spreading infection
3. Strategies to prevent health care associated infections with a primary focus on hand hygiene
4. Highlights of findings from the *Just Clean Your Hands* pilot program
5. How to use the *Just Clean Your Hands* program to address barriers to hand hygiene compliance

Impact and Burden of Health Care Associated Infections (HAI)



The World Alliance for Patient Safety

- Hand hygiene is one of the five key initiatives set out by the World Alliance for Patient Safety's Global Patient Safety Challenge.
 - The first strategy is to improve hand hygiene practices
- The goal of *Clean Care is Safer Care* is to reduce both the spread of infection and multi-resistant organisms as well as numbers of patients acquiring a preventable health care associated infection (HAI). The mandate is to reduce the adverse health and social consequences of unsafe health care.

What is a health care associated infection? (HAI)



HAI is:

“An infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among health care providers of the facility”

Ducel G et al. Prevention of hospital-acquired infections. A practical guide. WHO 2002



The impact of health care associated infections

- Health care associated infection remains a patient safety issue and represents a significant adverse outcome of the health care system (Baker et al, 2004; Stone et al, 2004)
- Estimates of the global burden of health care associated infection are hampered by limited availability of reliable data



Estimated rates of health care associated infection (HAI) - global

- At any time, **over 1.4 million people worldwide** are suffering from infections acquired in hospital
- In modern hospitals *in the developed world*: **5-10 per cent** of patients acquire one or more infections
- In intensive care units, HAI affects about **30 per cent** of patients and the attributable mortality may reach **44 per cent**
- *In developing countries* the risk of health care associated infection is **2 to 20 times higher** than in developed countries and the proportion of patients affected by HAI can exceed **25 per cent**

Impacts negatively

- In Canada, it has been estimated that 220,000 incidents of HAI occur each year, resulting in more than 8,000 deaths.
(Zoutman et al 2003)
- The fear of acquiring a health care associated infection may impact the patient and community's confidence in the delivery of health care
- It is estimated that antibiotic resistant organisms (AROs) increase the annual direct and indirect costs to patients by an additional \$40 to \$52 million in Canada (Birnbaum, 2007)

Impacts negatively (continued)

Patients with one or more HAIs during in-patient stay remain in hospital and incur costs on average three times greater than uninfected patients. (Plowman et al, 2001)

HAI can impact costs of providing care

- In Canada in acute care, the cost for precautions and management of patients colonized and/or infected with MRSA:
 - the median cost associated with MRSA can be more than twice the cost of methicillin *S. aureus* in acute care facilities
 - colonization with MRSA cost in Canadian dollars: \$8,841 per patient
 - infection with MRSA cost in Canadian dollars: \$25,661.32

(Lim, 2006)



Health care associated infection: scale and costs worldwide

Country	No. of cases/year	No. of deaths/year	Costs/year
UK	100,000	5,000	UK£ 1 billion
USA	2 million	90,000	US\$ 4.5 billion
MEXICO	450,000	32/100,000 inhabitants	US\$ 1.5 billion
CANADA	220,000	8,000/year	Data not available

Most frequent sites of infection and their risk factors





The impact of health care associated infection (HAI)

HAI can cause:

- more serious illness
- prolonged hospital stay
- increased wait times
- long-term disability
- increased mortality rates
- increased cost of providing health care
- high personal costs for patients and their families

Role Health Care Providers' Hands Play in Spreading Infections

Direct and Indirect Contact: A primary method of transmission of health care associated organisms



Adapted from

Mode of transmission	Reservoir/source	Transmission dynamics	Examples of organisms
Direct Contact	Patients, Health care provider	Direct physical contact between the source and the patient (person-to-person contact); e.g., transmission by shaking hands, giving the patient a bath, abdominal palpation	<i>Staphylococcus aureus</i> , Gram-negative rods, Respiratory viruses, HAV
Indirect Contact	Medical devices, equipment, endoscopes	Transmission of the infectious agent from the source to the patient occurs passively via an intermediate object (usually inanimate); e.g., transmission by not changing gloves between patients, sharing stethoscope	<i>Salmonella</i> spp, <i>Pseudomonas</i> spp, <i>Acinetobacter</i> spp, <i>S. maltophilia</i>

Hand transmission



- Hands are the most common vehicle to transmit health care associated organisms
- Transmission of health care associated organisms from one patient to another via health care provider hands requires five sequential steps





Hand transmission: Step 1

(*The Lancet Infectious Diseases* 2006)

Organisms present on patient skin and environment surfaces_

- Organisms (*S. aureus*, *P. mirabilis*, *Klebsiella* spp and *Acinetobacter* spp.) present on intact areas of some patients' skin: 100-1 million colony forming units (CFU)/cm²
- Nearly 1 million skin squames containing viable organisms are shed daily from normal skin
- Patient environment (bed linen, furniture, objects) becomes contaminated (especially by staphylococci and enterococci) by patient organisms



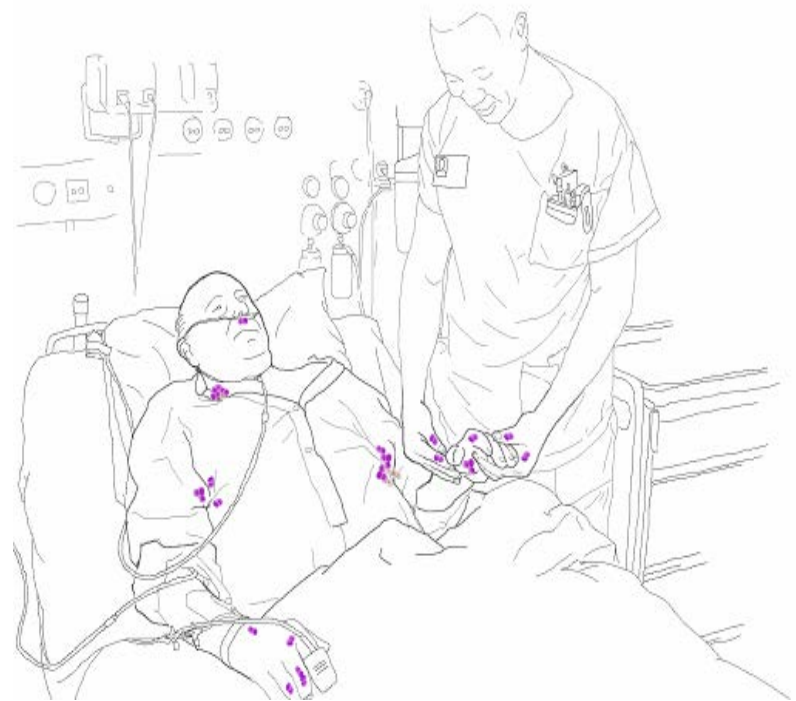


Hand transmission: Step 2

(*The Lancet Infectious Diseases 2006*)

Organisms transfer on health care providers' hands – examples:

- Nurses could contaminate their hands with 100-1,000 CFU of *Klebsiella* spp. during "clean" activities (lifting patients, taking the patient's pulse, blood pressure, or oral temperature)
- 15 per cent of nurses working in an isolation unit carried a median of 10,000 CFU of *S. aureus* on their hands
- In a general hospital, 29 per cent nurses carried *S. aureus* on their hands (median count, 3,800 CFU) and 17-30 per cent carried Gram- negative bacilli (median counts: 3,400-38,000 CFU)



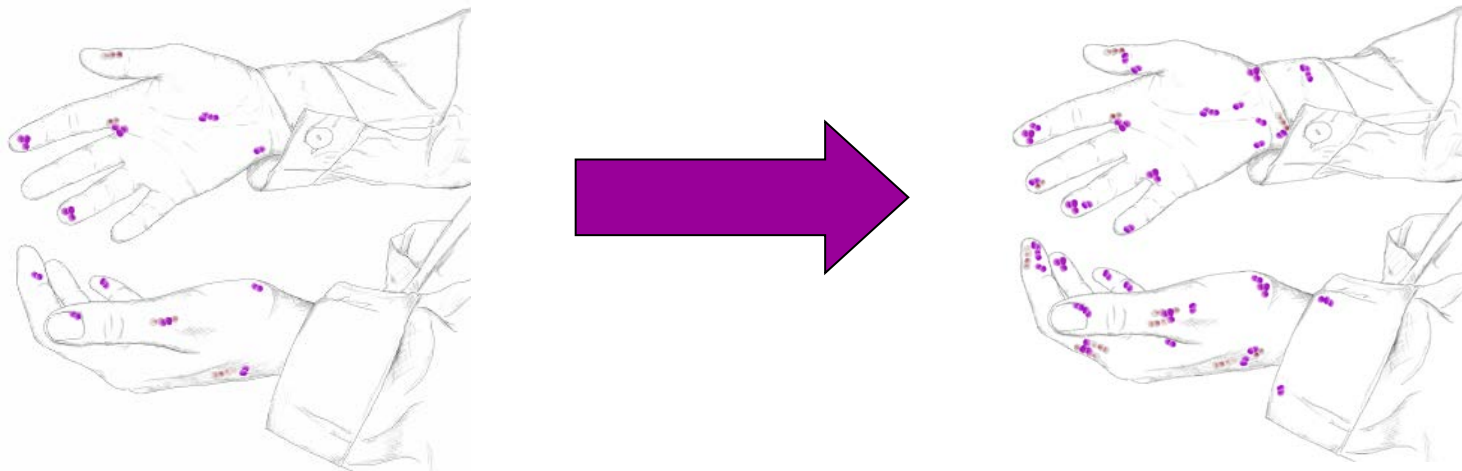


Hand transmission: Step 3

(The Lancet Infectious Diseases 2006)

Organisms survival on hands

- Following contact with patients and/or contaminated environment, organisms can survive on hands for differing lengths of time (2-60 minutes)
- In the absence of hand hygiene, the longer the duration of care, the higher the degree of hand contamination



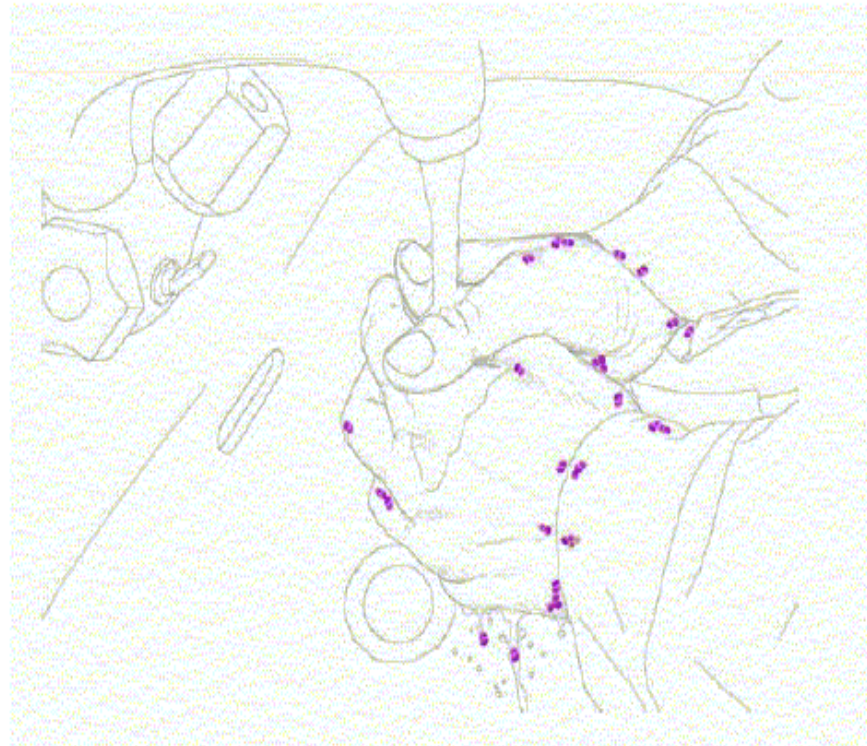
Hand transmission: Step 4

(The Lancet Infectious Diseases 2006)



Defective hand cleansing results in hands remaining contaminated

- Insufficient amount of product, and/or insufficient technique and duration of hand hygiene action lead to poor hand cleaning
- Transient organisms may still be recovered on hands following handwashing with soap and water, whereas handrubbing with an alcohol-based hand rub has been proven significantly more effective



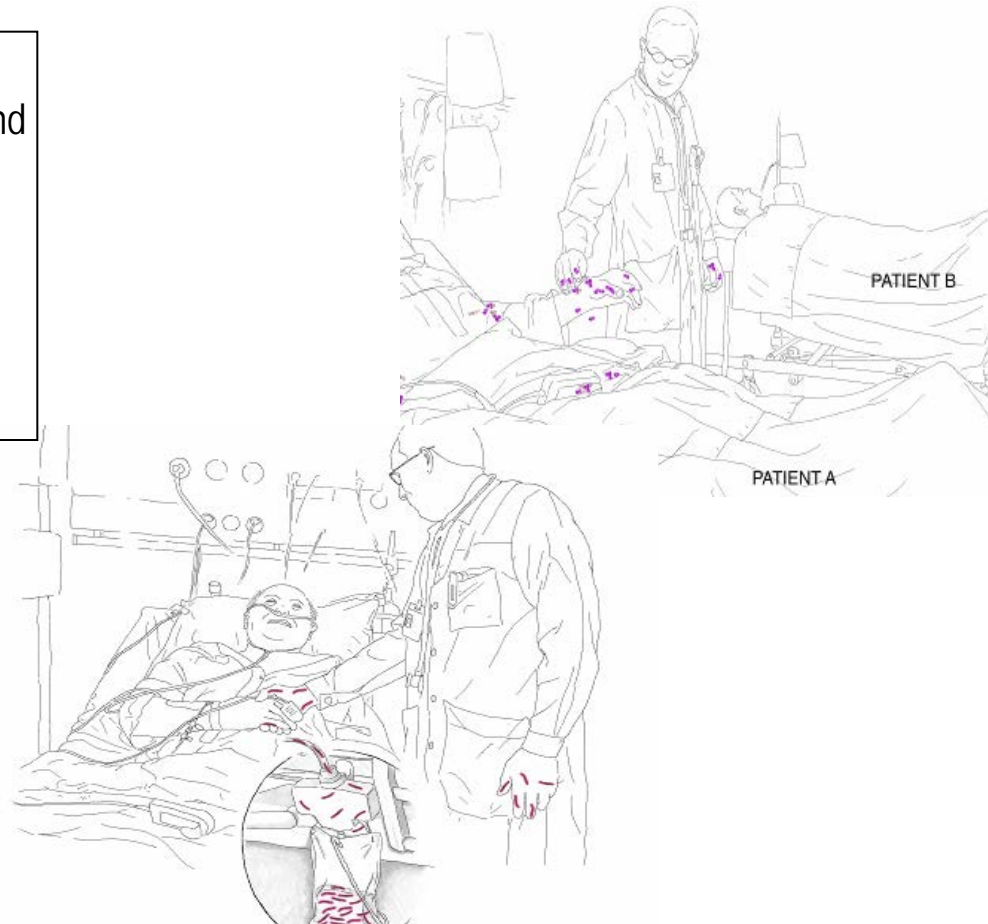
Hand transmission: Step 5

(The Lancet Infectious Diseases 2006)



Contaminated hands cross-transmit organisms

- In many outbreaks, organism transmission between patients and from the environment (both the health care setting and patient environment) to patients through health care providers' hands has been demonstrated



Techniques for performing hand hygiene

To clean hands properly:

- rub all parts of the hands with an alcohol-based hand rub or soap and running water
- pay special attention to fingertips, between fingers, backs of hands and base of the thumbs

- Keep nails short and clean
- Remove rings and bracelets
- Do not wear artificial nails
- Remove chipped nail polish
- Make sure that sleeves are rolled up and do not get wet

- Clean hands for at least 15 seconds
- Dry hands thoroughly
- Apply lotion to hands frequently

Hand care is important

- Intact skin is the first line of defence against organisms.
- Organisms can enter skin that is cracked or broken.
- Frequent hand hygiene can dry hands.

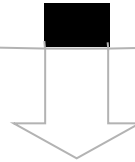
To reduce skin dryness and irritation:

- use warm running water instead of hot water when washing hands
- rinse thoroughly and pat hands dry with a paper towel instead of rubbing them
- Frequently use the lotion that is provided by the facility.
- protect hands 24/7 from chemicals and extreme conditions at home and work (e.g., wear gloves in cold weather, when cleaning, gardening, etc.)

If hands are cracked and irritated, contact the person responsible for Occupational Health at the hospital for an assessment and recommendations.

Certain factors decrease hand hygiene effectiveness

To ensure that hand hygiene is effective the following should NOT be present:



- Skin with cracks, cuts or dermatitis
- Nails:
 - longer than 3-4 mm (1/4 inch)
 - polish not in good condition
 - artificial nails or nail enhancements
- Hand and arm jewellery

Long nails and jewellery interfere with effective hand hygiene

NAILS



- Long nails are:
 - difficult to clean
 - can pierce gloves
 - harbour more microorganisms than short nails
- Artificial nails and nail enhancements have been implicated in the transfer of microorganisms

JEWELLERY



- Rings increase the number of microorganisms present on hands and increase the risk of tears in gloves
- Eczema often starts under a ring as irritants may be trapped under ring causing irritation.
- Arm jewellery interferes with the action of hand hygiene

Nails and infections

Artificial nails, enhancements, long nails linked to NICU outbreak and surgical site infections

NICU Outbreak of *P. aeruginosa* 2000

- 46 (10 per cent) neonates affected; 35 per cent died
- Cared for by nurses with same strain – one with long natural nails and one with artificial nails

NICU Outbreak of *K. pneumonia* 2004

- 19 (45 per cent) neonates affected
- Cared for by nurse with artificial nails with same strain

Health care providers who bite their nails significantly are more likely to have fecal carriage of resistant Enterococci

Molenaar *ICHE* 2000; Gupta *ICHE* 2004; Passaro *JID* 175:992-5; Parry *CID* 2001; *NEJM* 323:1814, 1990



Reproduced with permission from Dr. V. Roth, The Ottawa Hospital



Strategies to Prevent Health Care Associated Infections with a Primary Focus on Hand Hygiene

Prevention of health care associated infection (HAI)



- Validated and standardized prevention strategies are available to reduce HAI
- Most solutions are simple and not resource-demanding and can be implemented in developed, as well as in transitional and developing countries

Benefits of hand hygiene in health care

Studies show that improved hand hygiene:

- Decreases health care associated infections by 20-40 per cent
- Hospital costs in a 1,600 bed hospital decrease by \$8 million/year

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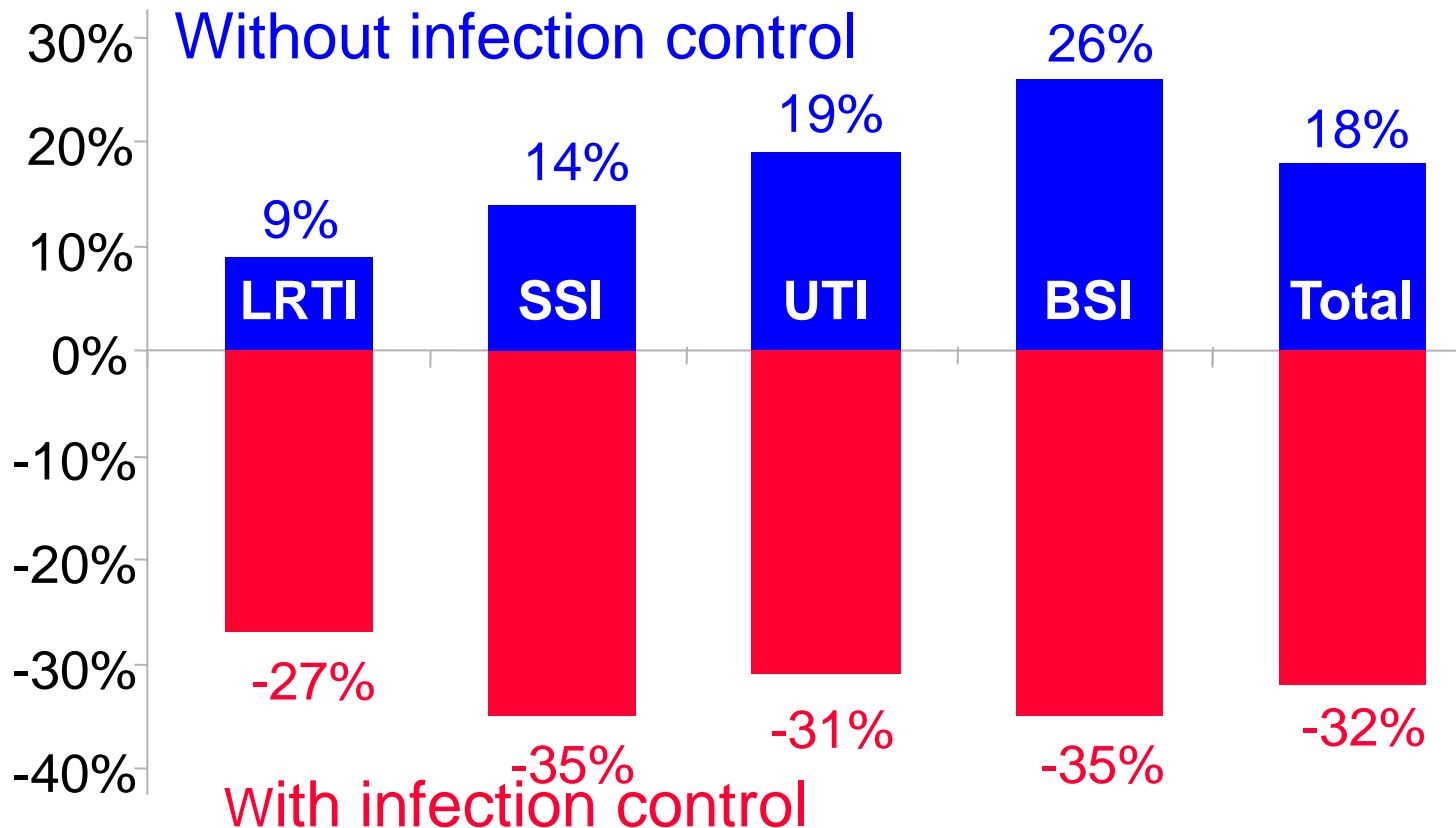


SENIC STUDY

Study on the Efficacy of Nosocomial Infection Control: >30% of HAI are preventable (*Haley RW et al. Am J Epidemiol 1985*)



Relative change in NI in a 5 year period (1970-1975)





Strategies for infection prevention and control

General measures

- Surveillance
- Routine practices
- Transmission-based precautions

Prudent antibiotic control

Specific measures

Specifically targeted against:

- Surgical site infections
- Respiratory infections
- Bloodstream infections
- Urinary tract infections



Prevention of HAIs

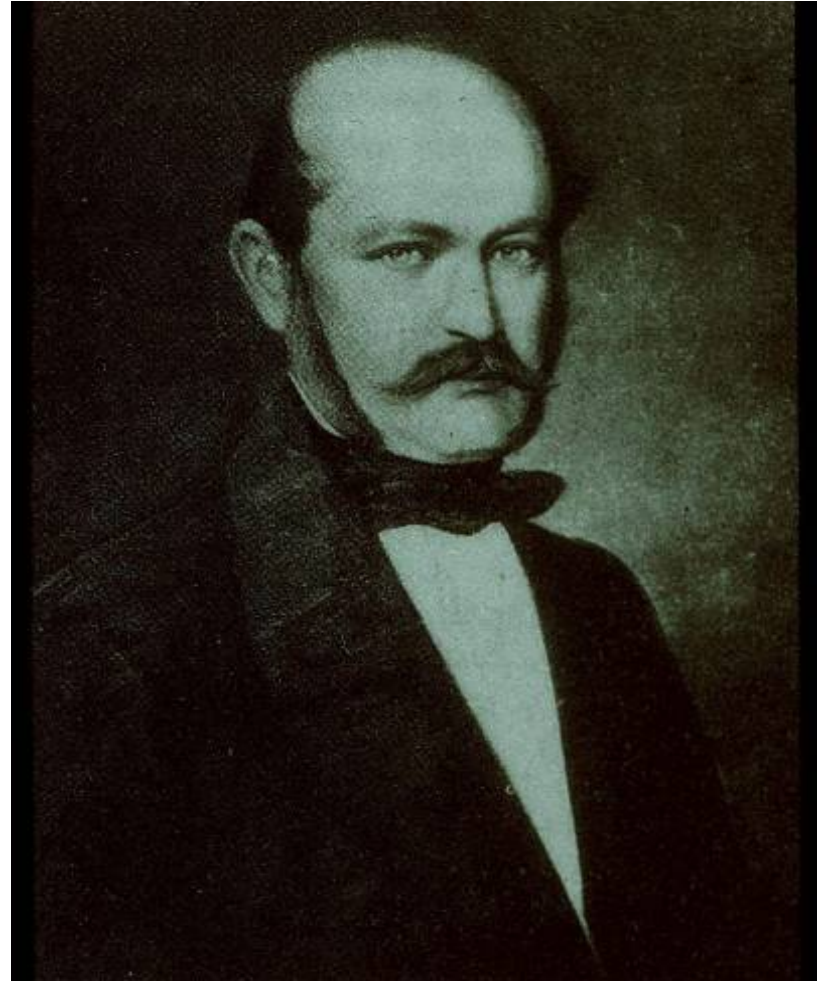
Hand hygiene is the single most effective measure to reduce health care associated infections

Ignaz Philipp Semmelweis: the pioneer of hand hygiene



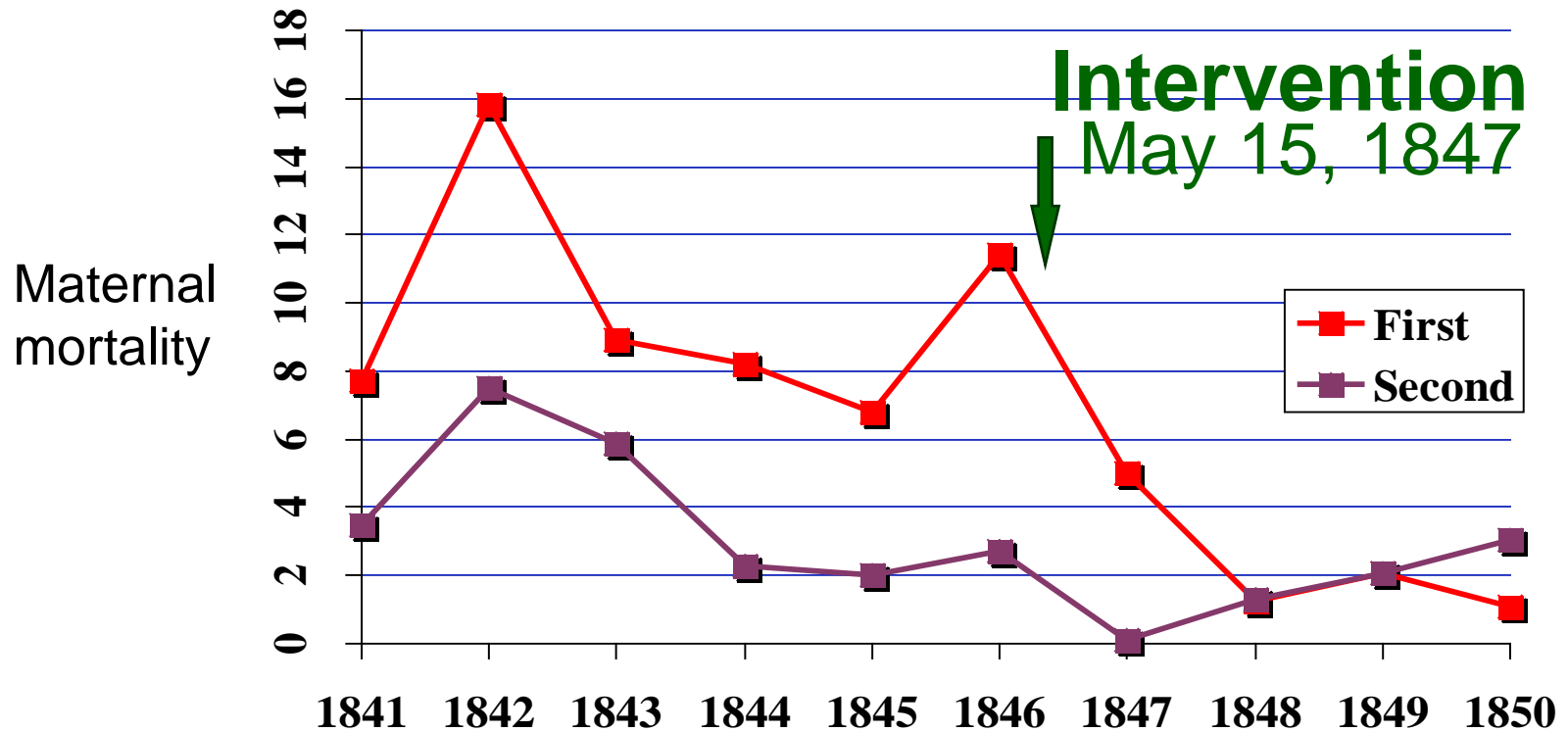
Vienna, Austria
General Hospital,
1841-1850

Fighting puerperal
fever





Maternal mortality rates, first and second obstetrics clinics, General Hospital of Vienna



Semmelweis IP, 1861

Inspired by the Semmelweis example, from 1975 to 2005, 17 studies demonstrated the effectiveness of hand hygiene promotion to reduce health care associated infections. A few are listed in the table below.



Year	Authors	Hospital setting	Significant results	Duration of follow-up
2000	Pittet et al.	Hospital-wide	Significant ($p=0.04$ and $p<0.001$) reduction in the annual overall prevalence of healthcare associated infections (41.5%) and MRSA cross-transmission rates (87%)	5 years
2004	Won et al	NICU	Significant ($p=0.003$) reduction in health care associated infection rates (from 15.1/1000 patient-days to 10.7/1000 patient-days), in particular of respiratory infections	2 years
2005	Rosenthal et al	Adult ICUs	Significant ($p<0.0001$) reduction in health care associated infection rates (from 47.5/1000 patient-days to 27.9/1000 patient-days)	21 months
2005	Johnson et al	Hospital-wide	Significant ($p=0.01$) reduction (57 per cent) in MRSA bacteremia	36 months

Adapted from Pittet D et al, *The Lancet Infectious Diseases* 2006

Highlights of Findings from the Ontario *Just Clean Your Hands* Pilot Program

Hand hygiene compliance in Ontario

- *Just Clean Your Hands* pilot, 2007

The MOHLTC collaborated with 10 acute care facilities to test hand interventions to improve hand hygiene compliance.

- A multifaceted program was introduced after the baseline data collection.

Program components included:

- A communications toolkit
- Demonstrated senior management and administration support
- Environmental modifications
- Point of care alcohol-based hand rub (ABHR); moisturizers
- Champions and role models
- Education of health care workers
- Observation and feedback

Hand hygiene compliance in Ontario (continued)

Just Clean Your Hands pilot

Baseline general compliance rate was under 40 per cent

- Note: Compliance rates must be broken down into each indication and the type of health care provider in order to provide reliable comparative data.

The *Just Clean Your Hands* baseline rate is similar to a study done by Tong et al from McMaster University, Hamilton. This study reported the average compliance rate was 32 per cent

Just Clean Your Hands pilot involved:

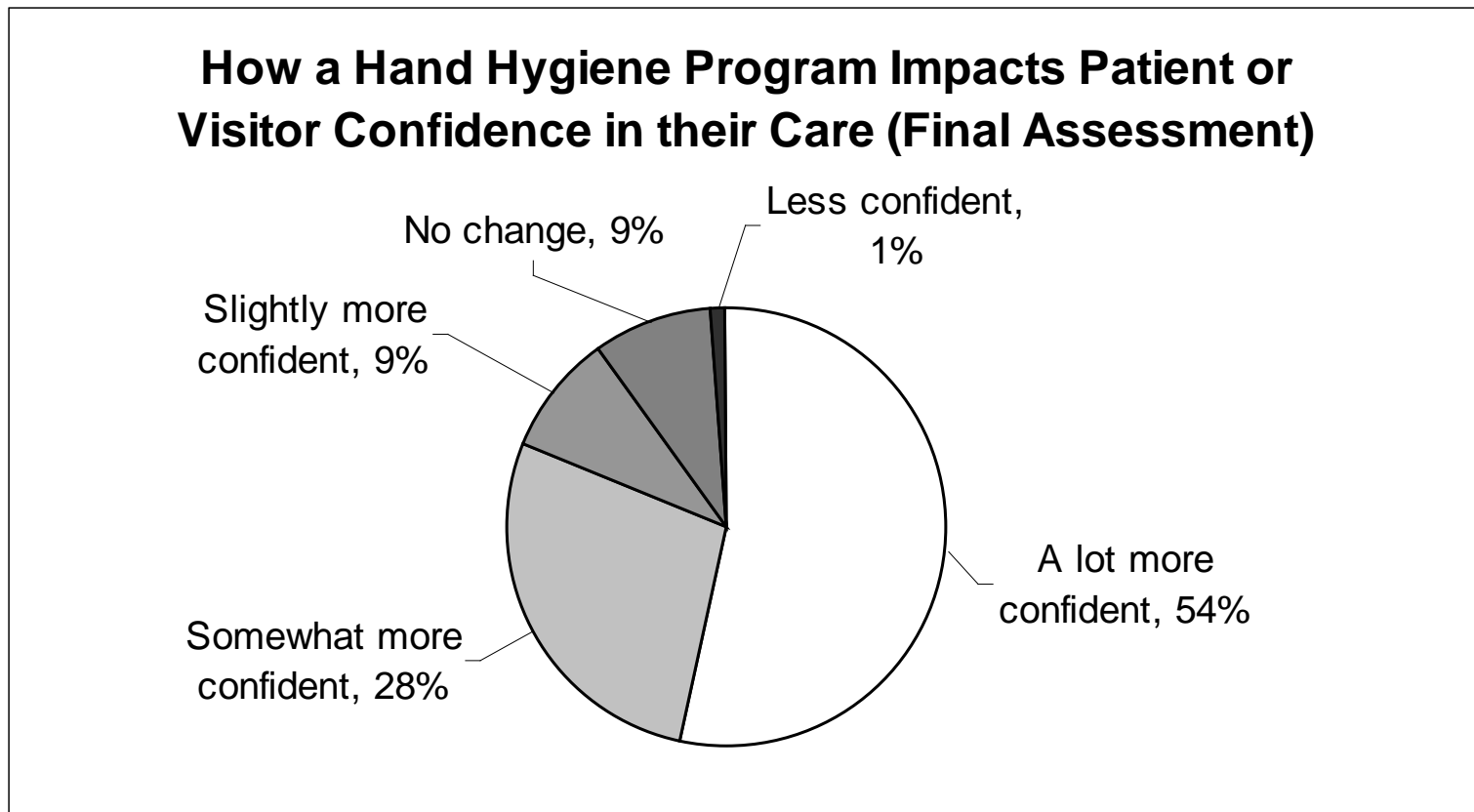
- Hand Hygiene Observational Audit
 - 4,240 HCPs observed in 11,351 opportunities across all three periods
- Health care provider focus groups
 - 27 groups baseline, 20 groups interim
- Health care provider survey
 - 2,260 respondents, ~53 per cent response rate across all three periods
- Patient survey
 - 5,594 respondents, ~57 per cent response rate across all three periods
 - 66 per cent of the surveys were from one site, but the results were similar across sites for most items.

Why don't health care providers "just do it"?

- Many health care providers do not have a clear understanding of the essential times to clean their hands in health care settings.
- Providers' perceive that they are already practicing good hand hygiene.
- Physical barriers such as lack of access to alcohol-based hand rub at point of care.
- Hand hygiene products that are unpleasant to use or hard on their hands and the lack of a hand care program to promote health intact hands.

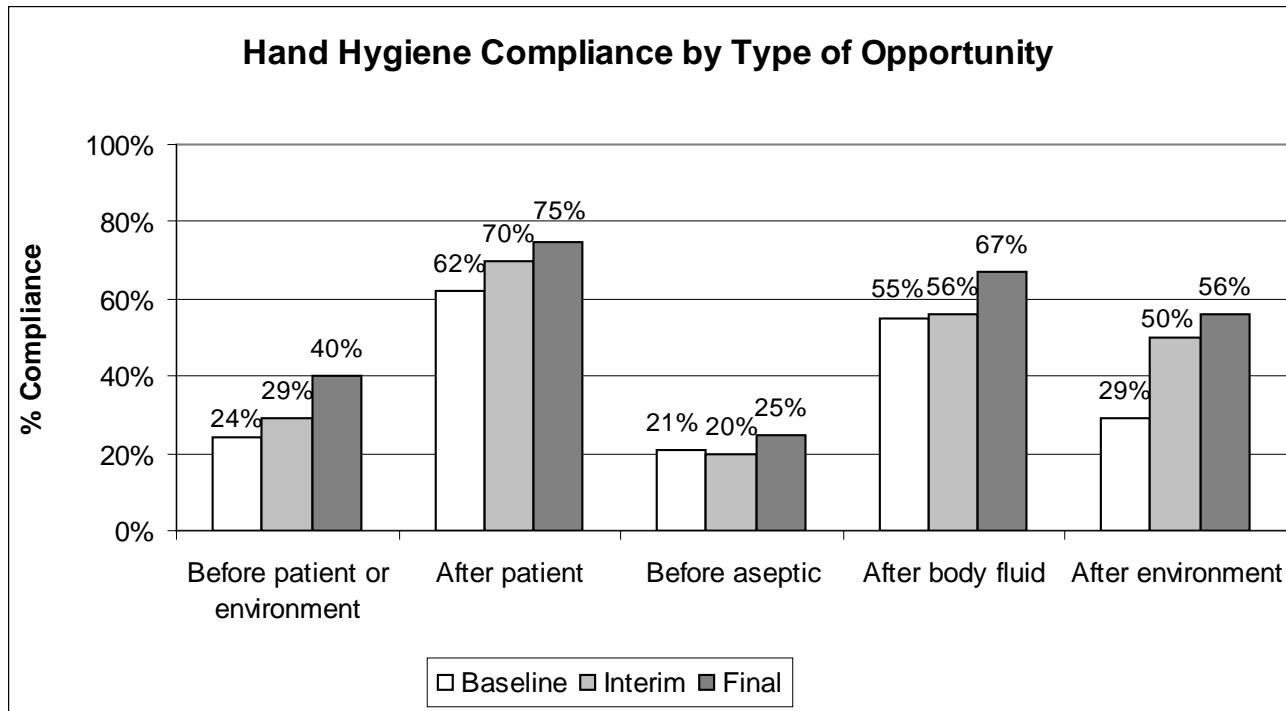
Patient Confidence Improves:

91% of patients indicated they feel more confident about the health care system knowing there is a hand hygiene program in place (*Patient Survey data*)



Just Clean Your Hands Pilot, 2007

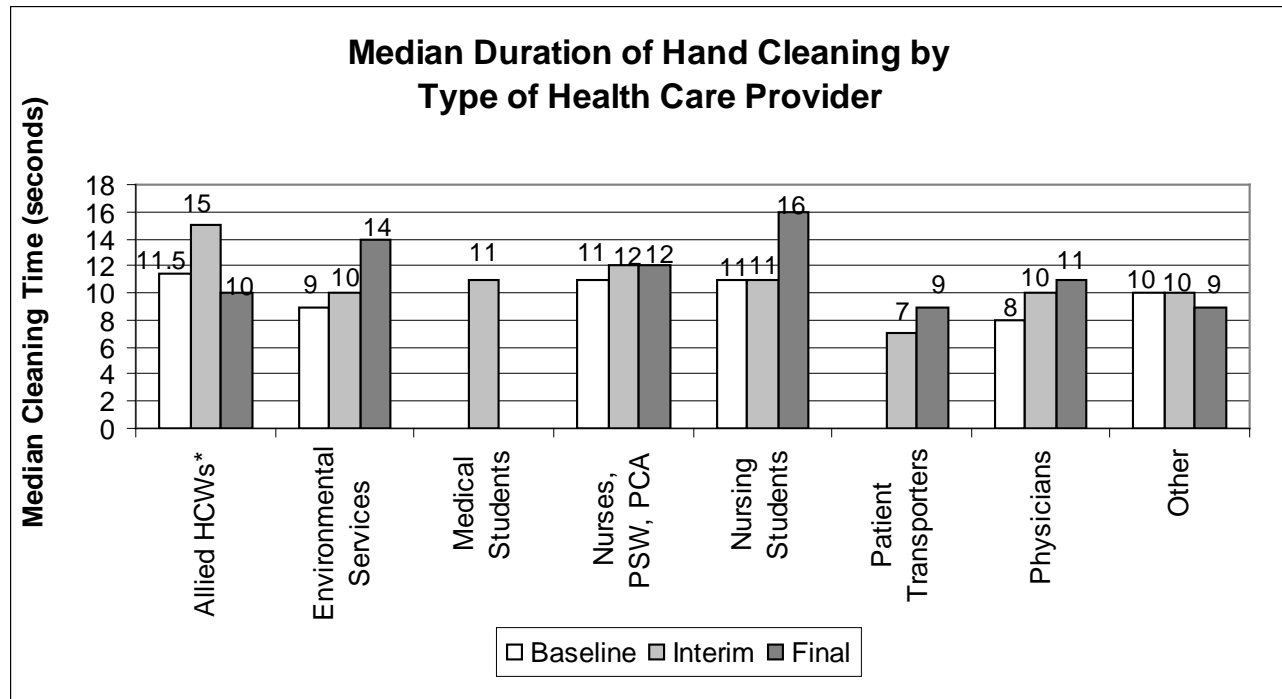
Hand Hygiene Compliance by Type of Opportunity (Obs. Audit)



*Allied HCPs include continuing care/social workers, IV team, physiotherapists, dieticians, respiratory therapists.

Note: There were few observations for environmental services, medical students, nursing students, patient transporters, and other HCPs, so the findings for these groups may not be reliable. Some data have been suppressed due to small numbers.

Duration of hand cleaning by type of health care provider



*Allied HCPs include continuing care/social workers, IV team, physiotherapists, dieticians, respiratory therapists
Note: There were few observations for environmental services, medical students, nursing students, patient transporters, and other HCPs, so the findings for these groups may not be reliable. Some data have been suppressed due to small numbers.

Hand hygiene compliance by type of HCP

(Observational Audit)

HCP Category	Final N	Final Compliance	Change from Baseline
Allied HCPs*	195	41%	-1%
Environmental Services	152	29%	+22%
Medical Students	20	15%	-8%
Nurses, PSWs, PCAs	3,205	60%	+16%
Nursing Students	23	48%	+6%
Patient Transporters	50	22%	+14%
Physicians	339	28%	+10%
Others	28	29%	+8%

*Allied HCPs include continuing care/social workers, IV team, physiotherapists, dietitians, respiratory therapists

Note: The compliance rate for each type of HCP may be affected by the mix of opportunities observed, since different types of opportunities have different compliance rates.

Note: There were few observations of medical students, nursing students, and other HCPs, so the findings for these groups may not be reliable.

Overview of key findings

- HCPs and patients think HCPs clean their hands when they should
- Compliance rates vary from 25 per cent (before aseptic procedures) to 75 per cent (after patient contact)
- Median cleaning time = 12 seconds (Note: 15 seconds is the recommended minimum)
- Compliance has improved steadily since baseline when the *Just Clean Your Hands* program was introduced
- Relatively little change in cleaning time, bracelets, nails, or rings

Overview of key findings

- **Hand Hygiene in Different Opportunities**
 - HCPs clean hands most often after patient contact, after body fluid exposure and after patient environment
 - HCPs clean hands least often before aseptic procedure and before patient contact
 - HCPs' compliance is less when wearing gloves than when not
 - There has been steady improvement since baseline for all opportunities

Overview of key findings

- Hand Hygiene differs by type of HCP
 - The greatest increase in compliance has occurred with environmental services workers, patient transporters, and physicians
- Health care providers need education on when to clean hands and how to protect skin integrity

Using the *Just Clean Your Hands* Program to Address Barriers to Hand Hygiene

Addressing barriers

Time constraint and access to products:

- *Access to ABHR at point of care*

Skin integrity:

- *Hand care program*

Lack of knowledge of when and how to clean hands:

- *Your 4 Moments for Hand Hygiene*

Reminders needed:

- *Role models, prompts/posters*

Time constraint = major obstacle for hand hygiene



Adapted from



Adequate handwashing with water and soap requires:
15 sec lather with procedure taking at least 1 minute

Median cleaning time by HCPs in Just Clean Your Hands pilot: = 12 secs

Use of alcohol-based hand rub (ABHR) addresses many of the barriers to improving hand hygiene compliance

- Two methods of cleaning hands:
 - Alcohol-based hand rub (ABHR) is the preferred method (gold standard) in all clinical situations when hands are not visibly soiled
 - Handwashing with soap and running water is used only when hands are visibly dirty or following visible exposure to body fluids

Point of care defined

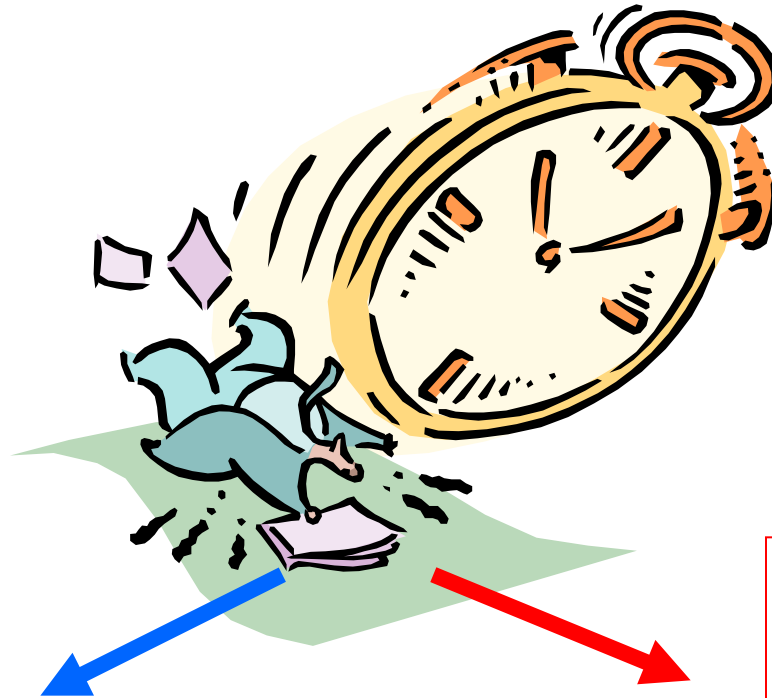


- **Point of care** - refers to the place where three elements occur together:
 - the patient
 - the health care provider
 - care involving contact is taking place
- The concept refers to a hand hygiene product (e.g., alcohol-based hand rub) which is easily accessible to health care providers by being as close as possible, e.g., within arm's reach (as resources permit) to where patient contact is taking place. Point of care products should be capable of being used at the required moment, without leaving the patient environment. This enables health care provider to quickly and easily fulfill the *4 Moments for Hand Hygiene*.
- Point of care can be achieved in a variety of methods. (e.g., ABHR attached to the bed, wall, equipment, carried by the HCP)

Handrubbing with alcohol-based solutions to overcome the time constraint obstacle



Adapted from

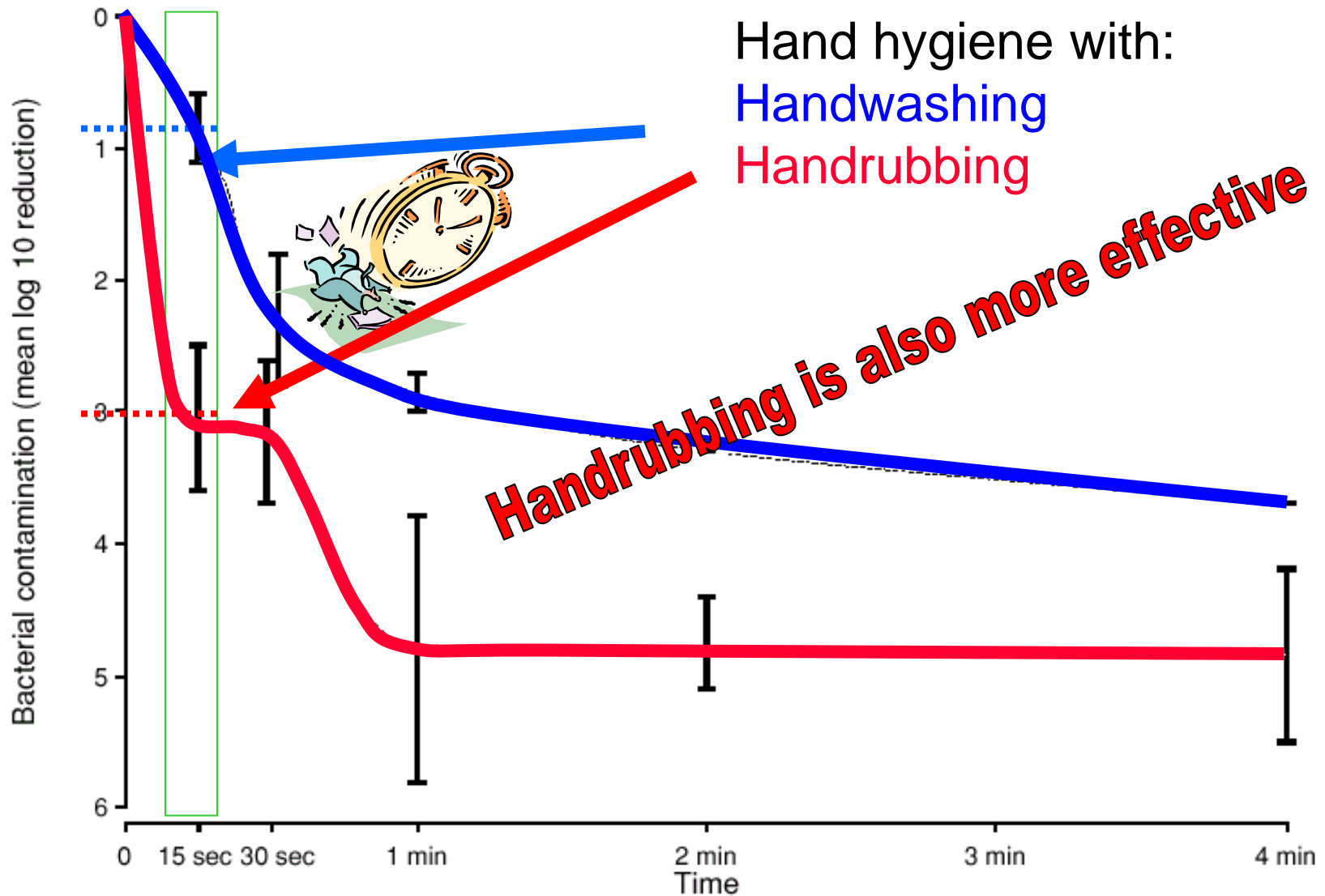


Handwashing
*Lather 15 seconds
up to 1.5 min for
entire procedure*

*Alcohol-based
Handrubbing*

15 sec

Application time of hand hygiene (handwashing and handrubbing) and reduction of bacterial contamination



Taking care of health care provider hands



How to handrub

Handrub for 15 seconds

- 1 Apply 1 to 2 pumps of product to palms of dry hands.
- 2 Rub hands together, palm to palm.
- 3 Rub in between and around fingers.
- 4 Rub back of each hand with palm of other hand.

Handrub for 15 seconds

- 5 Rub fingertips of each hand in opposite palm.
- 6 Rub each thumb clasped in opposite hand.
- 7 Rub hands until product is dry. Do not use paper towels.
- 8 Once dry, your hands are safe.

JUST CLEAN YOUR HANDS



How to handwash

Lather hands for 15 seconds

- 1 Wet hands with warm water.
- 2 Apply soap.
- 3 Lather soap and rub hands palm to palm.
- 4 Rub in between and around fingers.

Lather hands for 15 seconds

- 5 Rub back of each hand with palm of other hand.
- 6 Rub fingertips of each hand in opposite palm.
- 7 Rub each thumb clasped in opposite hand.
- 8 Rinse thoroughly under running water.

- 9 Pat hands dry with paper towel.
- 10 Turn off water using paper towel.
- 11 Your hands are now safe.

JUST CLEAN YOUR HANDS



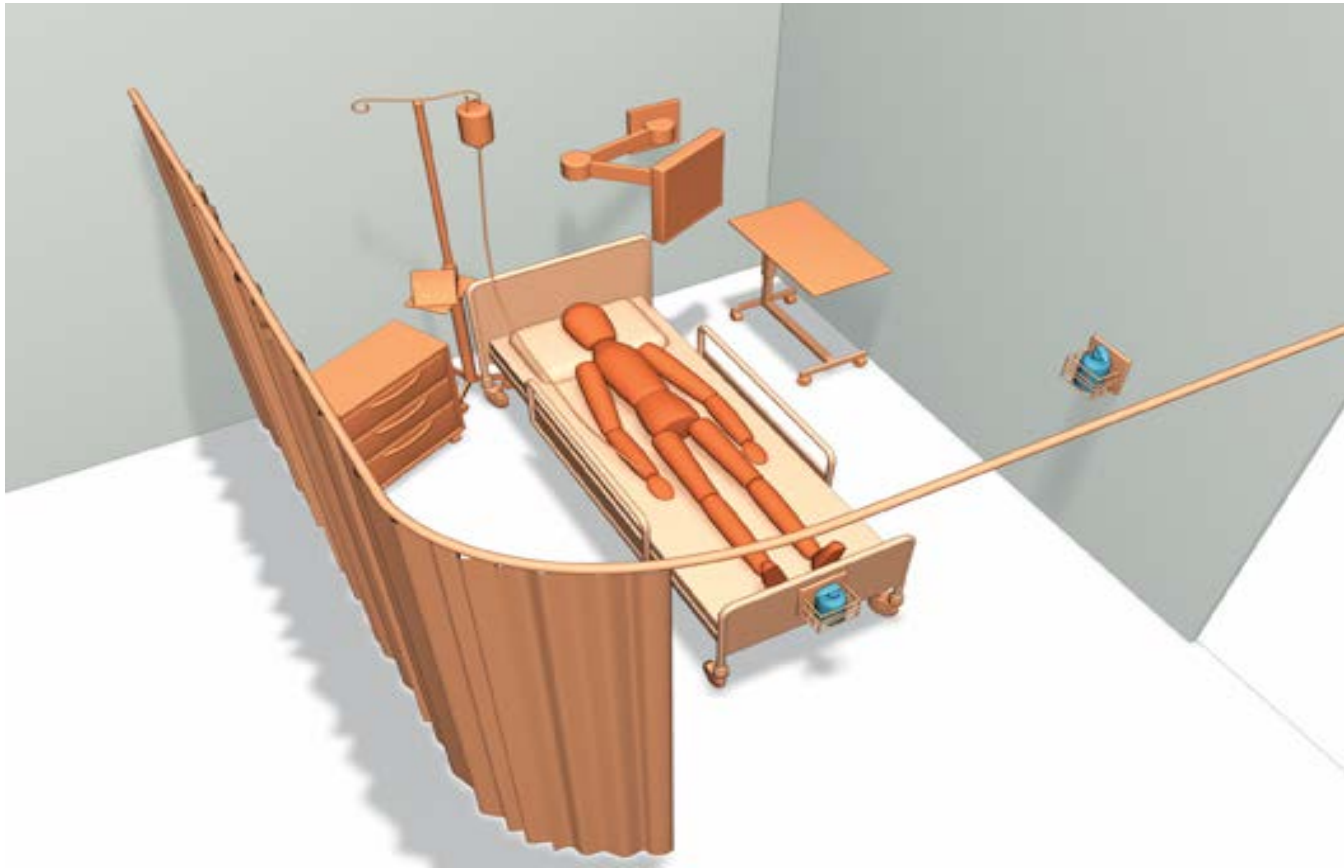
Why is hand hygiene compliance low?



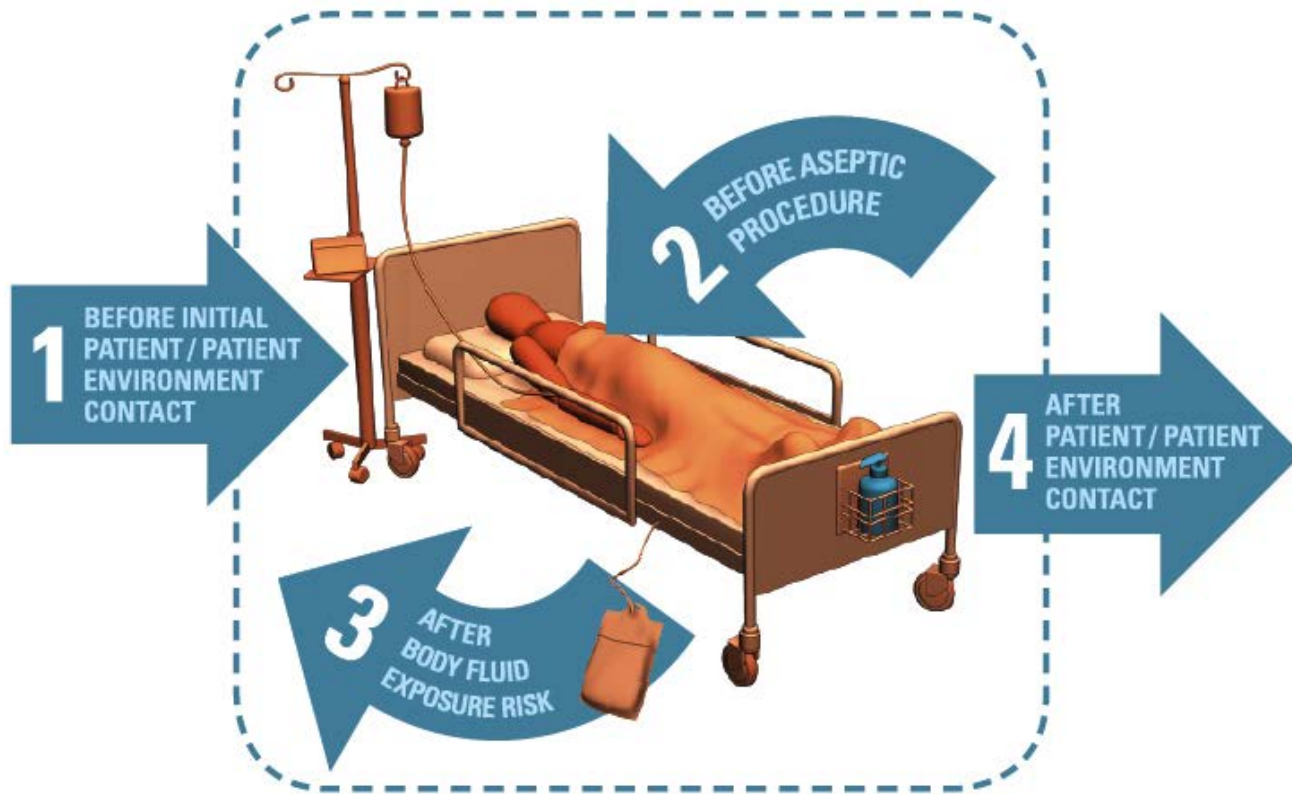
Behavioural studies indicate there are two types of hand hygiene practice:

1. The health care provider's internalized need of when hand hygiene is necessary (inherent hand hygiene practice):
 - health care providers generally clean hands when their hands are visibly soiled, sticky or gritty, or for personal hygiene purposes (e.g. after using the toilet). Usually these indications require handwashing with soap and water.
2. Other hand hygiene indications (non-inherent hand hygiene practice are not triggered by an intrinsic need to cleanse the hands).
 - Examples of non-inherent practice include touching a client, taking a pulse or blood pressure, or touching the environment. This type of hand hygiene is frequently missed in health care settings.

Definition of Patient's Environment



When and how to clean hands



Role models and reminders



JUST CLEAN YOUR HANDS

How to handrub

Rub hands for 15 seconds



1 Apply 1 to 2 pumps of product to palm of dry hands.



2 Rub hands together, palm to palm.



3 Rub in between and around fingers.



4 Rub back of each hand with palm of other hand.

Rub hands for 15 seconds



5 Rub fingertips of each hand in opposite palm.



6 Rub each thumb clasped in opposite hand.



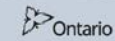
7 Rub hands until product is dry. Do not use paper towels.



8 Once dry, your hands are safe.



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