



Best Practices for Hand Hygiene in All Health Care Settings, 4th edition

April 2014

Public Health Ontario

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NOTES

This document is intended to provide best practices only. Health care settings are encouraged to work towards these best practices in an effort to improve quality of care.

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Best Practices for Hand Hygiene in All Health Care Settings, 4th Edition

This document is current to January 2014. New material in this revision is highlighted in **mauve** in the text (or **grey** for black-and-white printers).

Summary of Major Revisions:

<u>Page</u>	<u>Revision</u>
3	New glossary item: Natural Health Product (NHP)
10	Hand hygiene as a mandatory patient safety indicator
17	Additional elements of a hand hygiene program
20-21	Expanded explanation of the 4 Moments for hand hygiene
22	Application of 4 moments in Ambulatory Care, Home Care and NICUs
25	Information regarding new types of nail polish, nail enhancements and wearing of watches
28	Clarification of ABHR dispenser types and location
30	New recommendation regarding surgical hand rub
32	Clarification of technique for surgical hand antisepsis
34-35	New information regarding placement of hand washing sinks to comply with CSA standards
36	Clarification for use of paper towels and hot-air dryers
37	Information regarding individual-use ABHR
37	New information regarding placement of ABHR dispensers
38	Revised recommendations to comply with CSA standards
40	New information regarding patient education in hand hygiene
40-41	New information regarding hand hygiene monitoring
41-42	New information regarding hand hygiene feedback
62	New appendix detailing search strategy for this revision

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Assumptions for Best Practices in Infection

Prevention and Control

The best practices in this document are based on the assumption that health care settings in Ontario already have basic infection prevention and control (IPAC) systems and programs in place.¹ Health care settings that do not have infection control professionals (ICPs) should work with organizations that have IPAC expertise, such as academic health science centres, regional infection control networks (RICN), public health units that have professional staff certified in IPAC and local IPAC associations (e.g., Infection Prevention and Control Canada chapters), to develop evidence-based programs.

In addition to the above general assumption about basic IPAC, these best practices are based on the following additional assumptions and principles:

1. Adequate resources are devoted to IPAC in all health care settings. See PIDAC's Best Practices for Infection Prevention and Control Programs in Ontario,¹ available at: http://www.publichealthontario.ca/en/eRepository/BP_IPAC_Ontario_HCSettings_2012.pdf.
2. Best practices to prevent and control the spread of infectious diseases are routinely implemented in all health care settings, in accordance with:
 - a) PIDAC's *Routine Practices and Additional Precautions in All Health Care Settings*,² available at: http://www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf
 - b) PIDAC's Annex A: *Screening, Testing and Surveillance for Antibiotic-Resistant Organisms (AROs)*,³ available at: http://www.publichealthontario.ca/en/eRepository/PIDAC-IPC_Annex_A_Screening_Testing_Surveillance_AROs_2013.pdf.
 - c) PIDAC's Annex B: *Best Practices for Prevention of Acute Respiratory Infection in All Health Care Settings*,⁴ available at: http://www.publichealthontario.ca/en/eRepository/PIDAC-IPC_Annex_B_Prevention_Transmission_ARI_2013.pdf.
 - d) PIDAC's Annex C: *Testing, Surveillance and Management of Clostridium difficile in All Health Care Settings*,⁵ available at: http://www.publichealthontario.ca/en/eRepository/PIDAC-IPC_Annex_C_Testing_SurveillanceManage_C_difficile_2013.pdf.
3. Programs are in place in all health care settings that ensure effective disinfection and sterilization of used medical equipment according to *Best Practices for Cleaning, Disinfection and Sterilization in All Health Care Settings*,⁶ available from the PHO website at: http://www.publichealthontario.ca/en/eRepository/PIDAC_Cleaning_Disinfection_and_Sterilization_2013.pdf.
4. Adequate resources are devoted to Environmental Services/Housekeeping in all health care settings that include written procedures for cleaning and disinfection of client/patient/resident rooms and equipment; education of new cleaning staff and continuing education of all cleaning staff; and ongoing review of procedures. See PIDAC's *Best Practices for Environmental Cleaning in All Health Care Settings*,⁷ available at: http://www.publichealthontario.ca/en/eRepository/Best_Practices_Environmental_Cleaning_2012.pdf.
5. Regular education (including orientation and continuing education) and support is provided in all health care settings to help staff consistently implement appropriate IPAC practices. Effective education programs emphasize:
 - the risks associated with infectious diseases, including acute respiratory illness and gastroenteritis

- hand hygiene, including the use of alcohol-based hand rubs and hand washing
- principles and components of Routine Practices as well as additional transmission-based precautions (Additional Precautions)
- assessment of the risk of infection transmission and the appropriate use of personal protective equipment (PPE), including safe application, removal and disposal
- appropriate cleaning and/or disinfection of health care equipment, supplies and surfaces or items in the health care environment
- individual staff responsibility for keeping clients/patients/residents, themselves and co-workers safe
- collaboration between professionals involved in occupational health and IPAC.

NOTE: Education programs should be flexible enough to meet the diverse needs of the range of health care providers and other staff who work in the health care setting. The local public health unit and regional infection control networks may be a resource and can provide assistance in developing and providing education programs for community settings.

6. Collaboration between professionals involved in Occupational Health and Safety (OHS) and IPAC is promoted in all health care settings to implement and maintain appropriate IPAC standards that protect workers.
7. There are effective working relationships between the health care setting and local Public Health. Clear lines of communication are maintained and Public Health is contacted for information and advice as required and the obligations (under the *Health Protection and Promotion Act*, R.S.O. 1990, c.H.7)⁸ to report reportable and communicable diseases is fulfilled. Public Health provides regular aggregate reports of outbreaks of reportable infectious diseases in facilities and/or in the community to all health care settings.
8. Access to ongoing IPAC advice and guidance to support staff and resolve differences are available to the health care setting.
9. There are established procedures for receiving and responding appropriately to all international, national, regional and local health advisories in all health care settings. Health advisories are communicated promptly to all affected staff and regular updates are provided. Current advisories are available from local public health units, the Ministry of Health and Long-Term Care (MOHLTC), Health Canada and Public Health Agency of Canada (PHAC) websites and local RICN.
10. Where applicable, there is a process for evaluating personal protective equipment (PPE) in the health care setting, to ensure it meets quality standards.
11. There is regular assessment of the effectiveness of the infection prevention and control program and its impact on practices in the health care setting. The information is used to further refine the program.¹

Occupational Health and Safety requirements shall be met:

1. Health care facilities are required to comply with applicable provisions of the *Occupational Health and Safety Act* (OHSA), R.S.O. 1990, c.0.1 and its Regulations.⁹ Employers, supervisors and workers have rights, duties and obligations under the OHSA. Specific requirements under the OHSA and its regulations are available at:
 - a) Occupational Health and Safety Act: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o01_e.htm
 - b) Ontario Regulation 67/93 Health care and Residential Facilities: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_930067_e.htm.

2. The Occupational Health and Safety Act places duties on many different categories of individuals associated with workplaces, such as employers, constructors, supervisors, owners, suppliers, licensees, officers of a corporation and workers. A guide to the requirements of the Occupational Health and Safety Act may be found at: <http://www.labour.gov.on.ca/english/hs/pubs/ohsa/index.php>.
3. The OHSA section 25(2)(h), the '*general duty clause*', requires an employer to take every precaution reasonable in the circumstances for the protection of a worker.
4. Specific requirements for certain health care and residential facilities may be found in the Regulation for Health Care and Residential Facilities, available at: http://www.e-laws.gov.on.ca/html/reg/english/elaws_regs_930067_e.htm. Under that regulation there are a number of requirements, including:
 - a) Requirements for an employer to establish written measures and procedures for the health and safety of workers, in consultation with the joint health and safety committee or health and safety representative, if any. Such measures and procedures may include, but are not limited to, the following:
 - safe work practices
 - safe working conditions
 - proper hygiene practices and the use of hygiene facilities
 - the control of infections
 - immunization and inoculation against infectious diseases.
 - b) The requirement that at least once a year the measures and procedures for the health and safety of workers shall be reviewed and revised in the light of current knowledge and practice.
 - c) A requirement that the employer, in consultation with the joint health and safety committee or health and safety representative, if any, shall develop, establish and provide training and educational programs in health and safety measures and procedures for workers that are relevant to the workers' work.
 - d) A worker who is required by his or her employer or by the *Regulation for Health Care and Residential Facilities* to wear or use any protective clothing, equipment or device shall be instructed and trained in its care, use and limitations before wearing or using it for the first time and at regular intervals thereafter and the worker shall participate in such instruction and training.
 - e) The employer is reminded of the need to be able to demonstrate training, and is therefore encouraged to document the workers trained, the dates training was conducted, and the information and materials covered during training.
5. Under the *Occupational Health and Safety Act*, a worker must work in compliance with the Act and its regulations, and use or wear any equipment, protective devices or clothing required by the employer.
6. The Needle Safety Regulation (O.Reg 474/07)¹⁰ has requirements related to the use of hollow-bore needles that are safety-engineered needles. The regulation is available at: http://www.e-laws.gov.on.ca/html/reg/english/elaws_regs_070474_e.htm.

Additional information is available at the Ministry of Labour Health and Community Care Page: <http://www.labour.gov.on.ca/english/hs/topics/healthcare.php>.

Abbreviations

ABHR	Alcohol-Based Hand Rub
ARO	Antibiotic-Resistant Organism
CCC	Complex Continuing Care
HAI	Health Care-Associated Infection
ICU	Intensive Care Unit
LTC	Long-Term Care
MICU	Medical Intensive Care Unit
MRSA	Methicillin-Resistant <i>Staphylococcus aureus</i>
NICU	Neonatal Intensive Care Unit
NPN	Natural Product Number
OHS	Occupational Health and Safety
PHAC	Public Health Agency of Canada
PHO	Public Health Ontario
PIDAC	Provincial Infectious Diseases Advisory Committee
PPE	Personal Protective Equipment
RICN	Regional Infection Control Networks
VRE	Vancomycin-Resistant Enterococci

Glossary of Terms

Alcohol-Based Hand Rub (ABHR): A liquid, gel or foam formulation of alcohol (e.g., ethanol, isopropanol) which is used to reduce the number of microorganisms on hands in clinical situations when the hands are not visibly soiled. ABHRs contain emollients to reduce skin irritation and are less time-consuming to use than washing with soap and water.

Antibiotic-Resistant Organism (ARO): A microorganism that has developed resistance to the action of several antimicrobial agents and that is of special clinical or epidemiological significance.

Antimicrobial Soap/Antiseptic Soap: Soap (detergent) that contains an antimicrobial agent (e.g., chlorhexidine, hexachlorophene, iodine compounds, triclosan, chloroxylenol/PCMX) to reduce the numbers of microorganisms on the skin. Low concentrations of these chemical agents are often used as a preservative in liquid soap, but are not effective as an antimicrobial agent (see also *Plain Soap*, below).

Champions: Health care providers who publicly share their commitment to improving hand hygiene practice in the health care setting.

Client/Patient/Resident: Any person receiving care within a health care setting.

Complex Continuing Care (CCC): Continuing, medically complex and specialized services provided to both young and old, sometimes over extended periods of time. Such care also includes support to families who have palliative or respite care needs.

Contamination: The presence of an infectious agent on hands or on a surface, such as clothing, gowns, gloves, bedding, toys, surgical instruments, client/patient/resident care equipment, dressings or other inanimate objects.

Continuum of Care: Across all health care sectors, including settings where emergency (including pre-hospital) care is provided, hospitals, complex continuing care, rehabilitation hospitals, long-term care homes, outpatient clinics, community health centres and clinics, physician offices, dental offices, independent health facilities, out-of-hospital premises, offices of other health professionals, public health and home health care.

Direct Care: Provision of hands-on care (e.g., bathing, washing, turning client/patient/resident, changing clothes, continence care, dressing changes, care of open wounds/lesions, toileting).

Environment of the Client/Patient/Resident: The immediate space around a client/patient/resident that may be touched by the client/patient/resident and may also be touched by the health care provider when providing care. In a single room, the client/patient/resident environment is the room. In a multi-bed room, the client/patient/resident environment is the area inside the individual's curtain. In an ambulatory setting, the client/patient/resident environment is the area that may come into contact with the client/patient/resident within their cubicle. In a nursery/neonatal setting, the patient environment includes the inside of the bassinet or incubator, as well as the equipment outside the bassinet or incubator used for that infant (e.g., ventilator, monitor). Refer to [Appendix F, 'Environment of the Client/Patient/Resident'](#), for a graphical depiction of the environment around a client/patient/resident. See also, *Health Care Environment*.

Hand Care: Actions and products that reduce the risk of skin irritation.

Hand Care Program: A hand care program for staff is a key component of hand hygiene that includes hand care assessment, staff education, Occupational Health assessment if skin integrity is an issue, provision of hand moisturizing products and provision of alcohol-based hand rub that contains an emollient.

Hand Hygiene: A general term referring to any action of hand cleaning. Hand hygiene relates to the removal of visible soil and removal or killing of transient microorganisms from the hands. Hand hygiene may be accomplished using an alcohol-based hand rub or soap and running water. Hand hygiene includes surgical hand antisepsis.

Hand Hygiene Indication^{11, 12}: The reason why hand hygiene is necessary at a given moment.

Hand Hygiene Moment^{11, 12}: The point(s) in an activity at which hand hygiene is performed. There may be several hand hygiene moments in a single care sequence or activity. For more information refer to [Appendix E, 'Your 4 Moments for Hand Hygiene'](#).

Hand Hygiene Opportunity^{11, 12}: Terminology used when performing an audit of hand hygiene. A hand hygiene opportunity is an observed indication for hand hygiene. Each opportunity must correspond to an action. Several indications for hand hygiene may come together to create an opportunity.

Hand Washing: The physical removal of microorganisms from the hands using soap (plain or antimicrobial) and running water.

Health Care-Associated Infection (HAI): A term relating to an infection that is acquired during the delivery of health care (also known as *nosocomial infection*).

Health Care Environment: People and items which make up the care environment (e.g. objects, medical equipment, staff, clients/patients/residents) of a hospital, clinic or ambulatory setting, outside the immediate environment of the client/patient/resident. See also, *Environment of the Client/Patient/Resident*.

Health Care Facility: A set of physical infrastructure elements supporting the delivery of health-related services. A health care facility does not include a client/patient/resident's home or physician/dentist/other health offices where health care may be provided.

Health Care Provider: Any person delivering care to a client/patient/resident. This includes, but is not limited to, the following: emergency service workers, physicians, dentists, nurses, midwives, respiratory therapists and other health professionals, personal support workers, clinical instructors, students and home health care workers. In some non-acute settings, volunteers might provide care and would be included as a health care provider. See also *Staff*.

Health Care Setting: Any location where health care is provided, including settings where emergency care is provided, hospitals, complex continuing care, rehabilitation hospitals, long-term care homes, mental health facilities, outpatient clinics, community health centres and clinics, physician offices, dental offices, independent health facilities, out-of-hospital premises, offices of other health professionals, public health clinics and home health care.

Infection: The entry and multiplication of an infectious agent in the tissues of the host. Asymptomatic or sub-clinical infection is an infectious process running a course similar to that of clinical disease but below the threshold of clinical symptoms. Symptomatic or clinical infection is one resulting in clinical signs and symptoms (disease).

Infection Prevention and Control (IPAC): Evidence-based practices and procedures that, when applied consistently in health care settings, can prevent or reduce the risk of transmission of microorganisms to health care providers, other clients/patients/residents and visitors and the development of health care-associated infections in clients/patients/residents from their own microorganisms.

Infectious Agent: A microorganism, i.e., a bacterium, fungus, parasite, virus or prion, which is capable of invading body tissues and multiplying.

Joint Health and Safety Committee: An advisory group of worker and management representatives. The workplace partnership to improve health and safety depends on the joint committee. It meets regularly to discuss health and safety concerns, review progress and make recommendations.

Long-Term Care (LTC): A broad range of personal care, support and health services provided to people who have limitations that prevent them from full participation in the activities of daily living. The people who use long-term care services are usually the elderly, people with disabilities and people who have a chronic or prolonged illness.

Moistened Towelette: Single-use, disposable material that is pre-moistened, usually with a skin antiseptic (e.g., alcohol), that is used to physically remove visible soil from hands in situations where running water is not available (e.g., pre-hospital care).

Moment: See *Hand Hygiene Moment*.

Natural Health Product (NHP): An NHP is a term used by Health Canada to refer to a group of health products that include alcohol-based hand rubs. NHPs are regulated according to the Natural Health Products Regulations which came into effect on January 1, 2004. More information is available at: <http://www.hc-sc.gc.ca/dhp-mps/prodnatur/nhp-new-nouvelle-psn-eng.php>.

Occupational Health and Safety (OHS): Preventive and therapeutic health services in the workplace provided by trained occupational health professionals, e.g., nurses, hygienists, physicians.

Opportunity: See *Hand Hygiene Opportunity*.

Personal Protective Equipment (PPE): Clothing or equipment worn for protection against hazards.

Plain Soap: Detergents that do not contain antimicrobial agents or that contain very low concentrations of antimicrobial agents that are present only as preservatives.

Point-of-Care¹²: The place where three elements occur together: the client/patient/resident, the health care provider and care or treatment involving client/patient/resident contact. The concept is used to locate hand hygiene products which are easily accessible to staff by being as close as possible, i.e., within arm's reach, to where client/patient/resident contact is taking place. Point-of-care products should be accessible to the health care provider without the provider leaving the zone of care, so they can be used at the required moment.

Pre-Hospital Care: Acute emergency client/patient/resident assessment and care delivered in an uncontrolled environment by designated practitioners, performing delegated medical acts at the entry to the health care continuum.

Provincial Infectious Diseases Advisory Committee (PIDAC): A multidisciplinary scientific advisory body of Public Health Ontario that provides evidence-based advice regarding multiple aspects of infectious disease identification, prevention and control. More information is available at: <http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC.aspx>.

Public Health Agency of Canada (PHAC): A national agency that promotes improvement in the health status of Canadians through public health action and the development of national guidelines. The PHAC website is located at: <http://www.phac-aspc.gc.ca>.

Public Health Ontario (PHO): Public Health Ontario is the operating name for the Ontario Agency for Health Protection and Promotion (OAHPP). The PHO website is located at: <http://www.publichealthontario.ca/en/Pages/default.aspx>.

Regional Infection Control Networks (RICN): The RICN of Ontario coordinate and integrate resources related to the prevention, surveillance and control of infectious diseases across all health care sectors and for all health care providers, promoting a common approach to infection prevention and control and utilization of best-practices within the region. There are 14 regional networks in Ontario. More information is available at: http://www.publichealthontario.ca/en/About/Departments/Pages/Regional_Infection_Control_Networks.aspx#.UpY3HNJOzcw.

Reservoir: An animate or inanimate source where microorganisms can survive and multiply (e.g., water, food, people).

Resident Bacteria: Bacteria found in deep layers or crevices of skin which are resistant to removal with hand hygiene agents. These bacteria do not generally cause health care-associated infection and can be beneficial to the good health of the skin.

Routine Practices: The system of infection prevention and control practices to be used with all clients/patients/residents during all care to prevent and control transmission of microorganisms in all health care settings. For a full description of Routine Practices, refer to PIDAC's *Routine Practices and Additional Precautions for all Health Care Settings*², available at: http://www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf.

Staff: Anyone conducting activities in settings where health care is provided, including but not limited to, health care providers. See also, *Health Care Providers*.

Surgical Hand Antisepsis¹²: The preparation of hands for surgery, using either antimicrobial soap and water or an alcohol-based hand rub, preferably with sustained antimicrobial activity.

Surgical Hand Rub¹²: Surgical hand preparation with an alcohol-based hand rub that has sustained antimicrobial activity.

Surgical Hand Scrub¹²: Surgical hand preparation with antimicrobial soap that has sustained antimicrobial activity, and water.

Transient Bacteria: Bacteria that colonize the upper layers of the skin and are acquired during direct contact with clients/patients/residents, health care providers, contaminated equipment or the environment. Transient bacteria may be removed or killed by hand hygiene agents.

User-Friendly Product: Product used for hand hygiene that meets the recommendations in this document and that users have found supports healthy hand care.

Visibly Soiled Hands: Hands on which dirt or body fluids can be seen.

Waterless Antiseptic Agent: Does not require the use of exogenous water (e.g., alcohol-based hand rub)

Preamble

ABOUT THIS DOCUMENT

This document deals with the performance of hand hygiene in health care settings across the continuum of care (see below) including, but not limited to, pre-hospital care, acute care, complex continuing care, rehabilitation facilities, long-term care, chronic care, home health care and ambulatory care, including physician offices, community health centres and clinics, independent health facilities (IHF) and out-of-hospital premises (OHP).

This document provides infection prevention and control practices for:

- knowing why and when to perform hand hygiene
- understanding barriers and enablers that might influence hand hygiene
- choosing hand hygiene agents
- applying the correct hand hygiene techniques.

- **FOR RECOMMENDATIONS IN THIS DOCUMENT:**
- **SHALL** indicates mandatory requirements based on legislated requirements or national standards (e.g., Canadian Standards Association – CSA).
- **MUST** indicates best practice, i.e., the minimum standard based on current recommendations in the medical literature.
- **SHOULD** indicates a recommendation or that which is advised but not mandatory.
- **MAY** indicates an advisory or optional statement.

EVIDENCE FOR RECOMMENDATIONS

The best practices in this document reflect the best evidence and expert opinion available at the time of writing. As new information becomes available, this document will be reviewed and updated.

Refer to [Appendix A](#), ‘*Ranking System for Recommendations*’, for grading system used for recommendations.

HOW AND WHEN TO USE THIS DOCUMENT

The best practices for hand hygiene set out in this document must be practiced in all settings where care is provided, across the continuum of health care. This includes settings where emergency (including pre-hospital) care is provided, hospitals, complex continuing care facilities, rehabilitation facilities, long-term care homes, outpatient clinics, community health centres and clinics, physician offices, dental offices, IHFs and OHPs, offices of other health professionals, public health clinics and home health care.

This document should be used in conjunction with *Just Clean Your Hands*, Ontario’s evidence-based hand hygiene program,¹¹ available at:

<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

I. Introduction

TERMS USED IN THIS DOCUMENT (see glossary for details and examples):

Health Care Provider: Any person delivering care to a client/patient/resident.

Staff: Anyone conducting activities within a health care setting (includes health care providers).

Health Care Setting: Any location where health care is provided, including settings where emergency care is provided, hospitals, complex continuing care, rehabilitation hospitals, long-term care homes, mental health facilities, outpatient clinics, community health centres and clinics, physician offices, dental offices, IHFs and OHPs, offices of other health professionals and home health care.

1. BACKGROUND

Hand hygiene is an effective strategy to prevent health care-associated infections (HAI) and limit the transmission of microorganisms, including antibiotic-resistant organisms (ARO). It is a required practice for all health care providers, is recommended in all national and international infection control guidelines and is a basic expectation of patients and their families.¹²⁻¹⁴

Hand hygiene is one of the five key initiatives set out by the World Alliance for Patient Safety's Global Patient Safety Challenge. The World Health Organization (WHO) states: *"The goal of Clean Care is Safer Care is to ensure that infection control is acknowledged universally as a solid and essential basis towards patient safety and supports the reduction of health care-associated infections and their consequences"*.¹⁵

- For more information about *Clean Care is Safer Care*, visit: <http://www.who.int/gpsc/en/>.

The hands of health care providers are the most common vehicle for the transmission of microorganisms from client/patient/resident to client/patient/resident, from client/patient/resident to equipment and the environment, and from equipment and the environment to the client/patient/resident. During the delivery of health care, the health care provider's hands continuously touch surfaces and substances including inanimate objects, client/patient/resident's intact or non-intact skin, mucous membranes, food, waste, body fluids and the health care provider's own body. The total number of hand exposures in a health care facility might reach as many as several tens of thousands per day. With each hand-to-surface exposure a bidirectional exchange of microorganisms between hands and the touched object occurs and the transient hand-carried flora is thus continuously changing. In this way, microorganisms can spread throughout a health care environment within a few hours.¹²

Because health care providers move from client/patient/resident-to-client/patient/resident carrying out a number of tasks and procedures, there are many more indications for hand hygiene during the delivery of health care than there are in the activities of daily living outside of the health care setting.

In Ontario, staff hand hygiene rates have been reportable annually as a mandatory patient safety indicator since 2009.

- For more information about Health Quality Ontario and public reporting, visit: <http://www.hqontario.ca/public-reporting>.

2. EVIDENCE FOR HAND HYGIENE

Health care-associated infections (HAIs) occur worldwide and affect both developed and developing countries. At any time, over 1.4 million people worldwide suffer from infections acquired in hospital. It is estimated that in developed countries, five to ten per cent of patients admitted to acute care hospitals acquire an infection. In high risk settings, such as intensive care units, more than one-third of patients can be affected.¹² In long-term care, both endemic and epidemic infections are common occurrences.^{12, 15, 16}

“Adherence to hand hygiene recommendations is the single most important practice for preventing the transmission of microorganisms in health care and directly contributes to patient safety.” [Public Health Agency of Canada]

HAIs remain a client/patient/resident safety issue and represents a significant adverse outcome of the health care system.¹⁷⁻¹⁹ Patients with one or more HAIs during in-patient stay remain in hospital and incur costs on average three times greater than uninfected patients.²⁰

Hand hygiene is the responsibility of all individuals involved in health care.

Hand hygiene is the most important and effective infection prevention and control measure to prevent the spread of microorganisms causing HAIs.¹³ Despite this, compliance with hand hygiene protocols by health care providers continues to be challenging.²¹⁻²³ It has been shown that a facility-wide, multifaceted hand hygiene program, which includes administrative leadership, support and incentives, can be effective in reducing the incidence of HAIs²³⁻²⁵ (Tables 1 and 2).

Table 1: Studies showing association between improved adherence with hand hygiene practice and decrease in antibiotic-resistant organisms (AROs) and *C. difficile*

Year	Authors	Hospital Setting	Significant Results	Duration of follow-up	Reference No.
2000	Larson et al.	MICU/NICU	Significant relative reduction of VRE rate in the intervention hospital	8 months	26
2000	Pittet et al.	Hospital-wide	Significant reduction in the annual overall prevalence of HAIs and MRSA rates. Active surveillance cultures and contact precautions were implemented during the same time period.	8 years	23

Year	Authors	Hospital Setting	Significant Results	Duration of follow-up	Reference No.
2002	Gopal et al.	Hospital-wide	Hospital-acquired MRSA decreased from 50% to 39%. Cases of <i>Clostridium difficile</i> -associated diarrhea decreased by 17.4% following a multifaceted hand hygiene campaign.	1 year	27
2004	MacDonald et al.	Hospital-wide	Significant reduction in hospital-acquired MRSA cases following introduction of hand hygiene observation of health care workers with feedback of results.	1 year	28
2005	Johnson et al.	Hospital-wide	Significant reduction in MRSA bacteraemia following implementation of a multifaceted hand hygiene program.	3 years	29
2007	Mahamat et al.	Hospital-wide	Two hospital time series analysis demonstrated that introduction of ABHR was associated with a reduction in MRSA.	7 years	30
2008	Grayson et al.	Hospital-wide	Significant reduction in MRSA bacteraemia following implementation of a multifaceted hand hygiene program.	2 years	31
2009	Kaier et al.	Hospital-wide	A single hospital time series analysis showing that increased use of ABHR was associated with a reduction in health care-associated MRSA infection but not <i>C.difficile</i> .	4 years	32
2009	Kaier et al.	Hospital-wide	A single hospital time series analysis showing that increased ABHR use reduced incidence of health care-associated ESBL.	34 months	33
2010	Sakamoto et al.	NICU	An NICU time series analysis that demonstrated that increased use of ABHR led to a reduction in MRSA incidence.	6 years	34

Year	Authors	Hospital Setting	Significant Results	Duration of follow-up	Reference No.
2012	Stone et al.	Hospitals - national	Demonstrated a reduction in MRSA bacteraemia and <i>C. difficile</i> infection following implementation of a multifaceted national hand hygiene campaign.	4 years	35
2012	Lee et al.	Hospital-wide	Time series at single hospital demonstrated that increased ABHR use was associated with a reduction in hospital-acquired MRSA and HAI	6 years	36

Abbreviations:

ESBL = extended-spectrum beta-lactamase

SSI = surgical site infection

MRSA = methicillin-resistant *Staphylococcus aureus*

VRE = vancomycin-resistant enterococci

ICU = intensive care unit

MICU = medical ICU

NICU = neonatal ICU

HAI = health care-associated infection

Notes:

Parts of this table were adapted from the World Health Organization: *WHO Guidelines on Hand Hygiene in Health Care, May 2009* [Table 1.22.1]¹²

Table 2: Studies showing association between improved adherence with hand hygiene practice and decrease in rates of health care-associated infection (HAI)

Year	Authors	Hospital Setting	Significant Results	Duration of follow-up	Reference No.
1977	Casewell & Phillips	Adult ICU	Significant reduction in HAI caused by <i>Klebsiella spp.</i> linked to improved hand hygiene.	2 years	37
1989	Conly et al.	Adult ICU	Significant reduction in HAI rates during periods of improved hand hygiene adherence.	6 years	38
1992	Doebbeling et al.	Adult ICU	Significant difference in HAI rates with better hand hygiene compliance.	8 months	39
2003	Hilburn et al.	Orthopaedic Surgical Unit	Decrease in urinary tract infection rates when ABHR introduced.	10 months	24
2004	Swoboda et al.	Adult intermediate care unit	Improvement in HAI rates associated with improved hand hygiene compliance.	2.5 months	40
2004	Won et al.	NICU	Improved hand washing compliance associated with significant reduction in HAI rates in the NICU.	2 years	41

Year	Authors	Hospital Setting	Significant Results	Duration of follow-up	Reference No.
2005	Rosenthal et al.	Adult ICU	Reduction in HAI rates following implementation of a hand hygiene program that included focused education and performance feedback.	21 months	42
2005	Zerr et al.	Hospital-wide	Significant reduction in hospital-acquired rotavirus infections associated with institution of a hand hygiene program that included monitoring and observation.	4 years	43
2007	Pessoa-Silva et al.	NICU	Reduction in HAI rates, particularly in very low birth weight neonates, associated with promotion of hand hygiene.	27 months	44
2009	Herud et al.	Hospital-wide	Demonstrated an inverse association between use of hand hygiene products and rates of infection.	8 years	45
2010	Marra et al.	Step-down units	Improvements in hand hygiene were associated with an overall decrease in the incidence of HAIs.	9 months	46
2011	Chen et al.	Hospital-wide	There was an 8.9% decrease in HAIs following implementation of a hand hygiene program.	4 years	47
2012	Kirkland et al.	Hospital-wide	Single hospital time series showing reduction in <i>C.difficile</i> , infections due to <i>S.aureus</i> , and all cause bloodstream infection with sequential introduction of elements of a multimodal hand hygiene campaign and increased hand hygiene compliance.	4 years	48
2013	Talbot et al.	Tertiary care academic medical centre	Hand hygiene adherence rates were inversely correlated with rates of device-associated infections.	3 years	49
2013	Al-Tawfiq et al.	Community hospital	A multifaceted hand hygiene program resulted in significant reduction in HAIs.	5 years	50

Abbreviations:

ESBL = extended-spectrum beta-lactamase

SSI = surgical site infection

MRSA = methicillin-resistant *Staphylococcus aureus*

VRE = vancomycin-resistant enterococci

ICU = intensive care unit

MICU = medical ICU

NICU = neonatal ICU

HAI = health care-associated infection

Notes:

Parts of this table were adapted from the World Health Organization: *WHO Guidelines on Hand Hygiene in Health Care, May 2009* [Table 1.22.1]¹²

A multifaceted, multidisciplinary hand hygiene program must be implemented in all health care settings.

A multifaceted, multidisciplinary hand hygiene program (e.g., hand hygiene bundle) that incorporates the following elements must be implemented in all health care settings^{12, 23, 51, 52}:

- assessment of staff readiness and cultural influences in order to effectively implement a hand hygiene program
- a written policy and procedure regarding hand hygiene
- easy access to hand hygiene agents at point-of-care
- 70 to 90% alcohol-based hand rub (ABHR) is preferred and must be provided in the health care setting; for more information about alcohol concentration, see Section II.6.A, ‘*Alcohol-based Hand Rub*’
- education that includes indications for hand hygiene, hand hygiene techniques, indications for hand hygiene agents and hand care
- education in the appropriate selection, limitations and use of gloves (e.g., gloves not a substitute for hand hygiene)
- access to free-standing hand washing sinks dedicated to hand hygiene and used for no other purpose
- a hand care program
- client/patient/resident engagement
- a program to monitor, evaluate and improve hand hygiene compliance, with feedback to individual employees, managers, chiefs of service and the Medical Advisory Committee/Professional Advisory Committee.

“91% of patients feel more confident about the health care system knowing there is a hand hygiene program in place.”

“Just Clean Your Hands”, Ontario’s Evidence-Based Hand Hygiene Program

The implementation of a multifaceted, multidisciplinary hand hygiene program, which includes education, motivation and system changes, has been shown to be successful and cost-effective,^{26, 53} resulting in sustained improvement in compliance with hand hygiene among health care providers as well as significant reductions in HAI rates^{23, 26} with associated reduction of client/patient/resident morbidity and mortality from HAIs.^{29, 39, 54-56}

3. WHAT IS HAND HYGIENE?

Hand hygiene is a general term referring to any action of hand cleaning.¹² Hand hygiene relates to the removal of visible soil and removal or killing of transient microorganisms from the hands while maintaining the good skin integrity resulting from a hand care program. Hand hygiene includes surgical hand antisepsis.

All humans carry microorganisms on their skin. These have been divided into two groups – transient and resident bacteria. *Transient* (or contaminating) *bacteria* colonize the upper layers of the skin and are acquired during direct contact with clients/patients/residents, health care providers, contaminated equipment or the environment. Transient bacteria may also be easily passed on to others or to objects in the environment and are a frequent cause of HAIs. *Resident bacteria* are found in deeper layers of skin and are more resistant to removal. These bacteria do not generally cause HAIs and can be beneficial to the good health of the skin.

Effective hand hygiene kills or removes transient bacteria on the skin and maintains good hand health. There are two methods of killing/removing microorganisms on hands:

1. **Hand sanitizing with a 70 to 90% alcohol-based hand rub (ABHR) is the preferred method (when hands are not visibly soiled)** for cleaning hands (for more information about alcohol concentration, see Section II.6.A, '*Alcohol-based Hand Rub*'). Using easily-accessible ABHR in health care settings takes less time than traditional hand washing⁵⁷ and has been shown to be more effective than washing with soap (even using an antimicrobial soap) and water when hands are not visibly soiled.^{13, 14, 23, 57-60}
2. **Hand washing with soap and running water must be performed when hands are visibly soiled.**¹²⁻¹⁴ The effectiveness of alcohol is inhibited by the presence of organic material. The mechanical action of washing, rinsing and drying is the most important contributor to the removal of transient bacteria that might be present.

If hands are visibly soiled and running water is not available, use a moistened towelette to remove the visible soil, followed by ABHR.

ALCOHOL-BASED HAND RUB vs. SOAP AND WATER

Alcohol-based hand rub (ABHR):

- preferred when hands are not visibly soiled
- should contain 70 – 90% alcohol
- takes less time than hand washing
- more effective than hand washing with soap and water when hands are not visibly soiled
- mechanical rubbing action is important to kill transient bacteria
- less drying to hands than soap and water

Hand washing with soap and running water:

- preferred when hands are visibly soiled because alcohol is inhibited by organic matter
- mechanical action of washing, rinsing and drying removes most transient bacteria

II. Best Practices

1. THE HAND HYGIENE PROGRAM

There have been many approaches to improving hand hygiene compliance in health care settings, but the introduction of a multifaceted, multidisciplinary strategy is the most effective.⁵³ See Figure 1 for the components of a multifaceted hand hygiene program. Key elements include¹⁵:

- strong commitment by all stakeholders including frontline staff, managers and health care leaders, to add hand hygiene as an essential component of client/patient/resident and staff safety¹⁴
- staff education and awareness programs
- environmental changes and system supports, including adoption of ABHR as the gold standard
- monitoring and use of performance indicators with feedback
- client/patient/resident engagement and empowerment
- promotion of hand hygiene by champions and role models.

It is imperative that the enablers and barriers to an effective hand hygiene program are assessed and addressed in order to support the health care provider and promote compliance. These include the selection of user-friendly hand hygiene products, providing ABHR at point-of-care and implementing an effective hand care program.

For an example of some of the components and tools of a multifaceted hand hygiene program, Refer to Appendix D, 'Just Clean Your Hands, Ontario's Evidence-based Hand Hygiene Program',¹¹ available at: <http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

An integral part of an effective hand hygiene program is the promotion of hand hygiene by champions and role models^{12, 26} within the health care setting. By being role models for best practices, these champions will take personal responsibility and hold others accountable as part of a facility's internal responsibility system.

A multidisciplinary group within the health care setting may facilitate adherence to best practices and provide leadership and decision-making.¹⁴ Members of this committee should be actively engaged in the process and should include, but are not limited to:

- senior management representative
- middle management representative(s)
- physician representative(s)
- infection prevention and control representative(s)
- occupational health representative(s)
- environmental services/housekeeping representative
- plant services/maintenance representative
- hand hygiene program champions
- product purchasing representative
- public relations/communications representative

An effective hand hygiene program is based on using the right product in the right place at the right time by health care providers who have received education in appropriate hand hygiene indications and techniques, combined with a good hand care program.

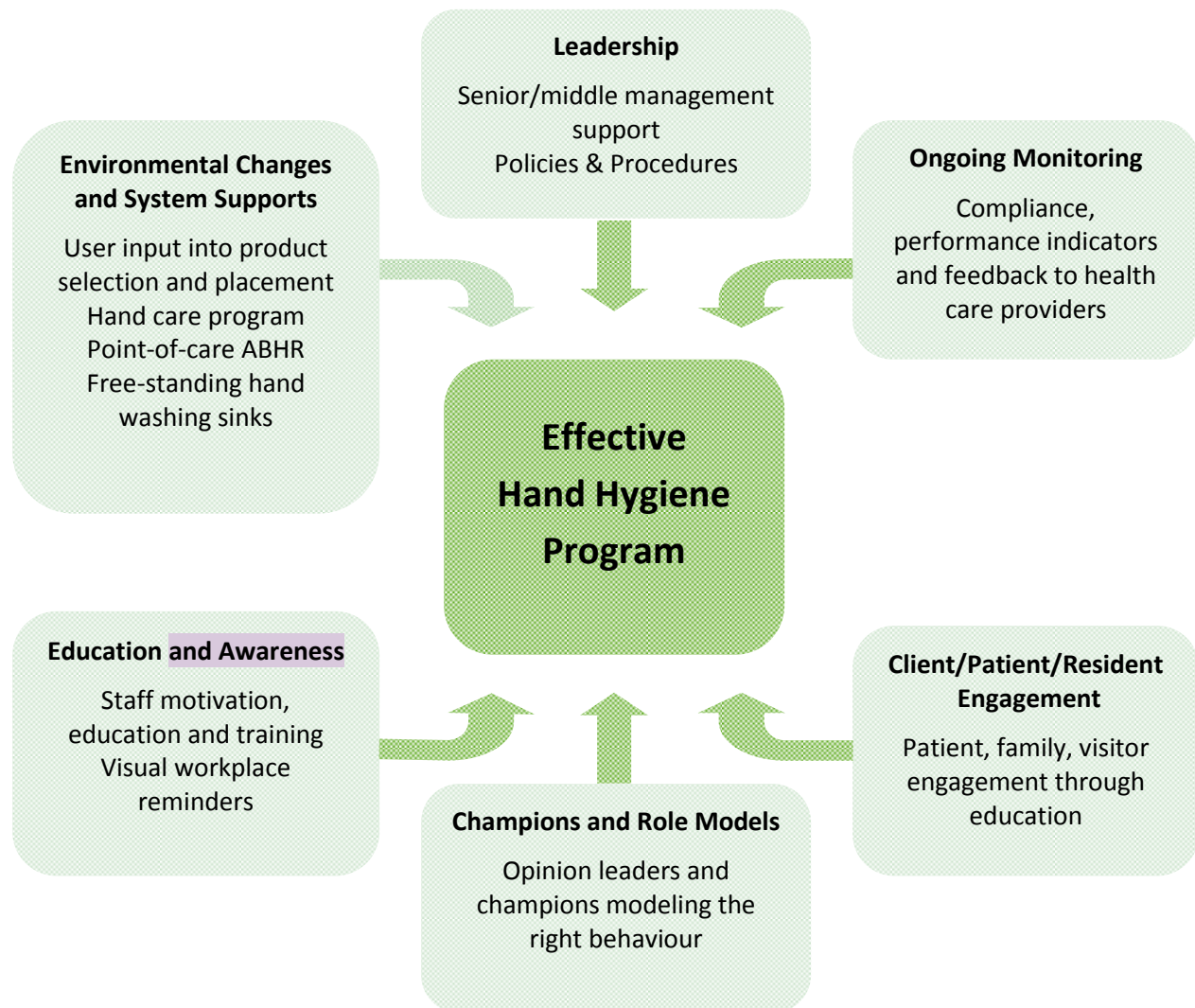


Figure 1: Components of a Multifaceted Hand Hygiene Program

Recommendations

1. ***A multidisciplinary, multifaceted hand hygiene program must be developed and implemented in all health care settings, [BI] including hand hygiene agents that are available at point-of-care in all health care settings. [AI] In health care facilities the hand hygiene program must also include:***
 - a) ***senior and middle management support and commitment to make hand hygiene an organizational priority***
 - b) ***environmental changes and system supports, including alcohol-based hand rub at the point-of-care and a hand care program***
 - c) ***education for health care providers about when and how to clean their hands***
 - d) ***ongoing monitoring and observation of hand hygiene practices, with feedback to health care providers***
 - e) ***client/patient/resident engagement***
 - f) ***opinion leaders and champions modelling the right behaviour.***

2. HAND HYGIENE POLICIES AND PROCEDURES

For each health care setting, a written hand hygiene policy and procedure must be developed that includes the following:

- indications for hand hygiene
- how to perform hand hygiene
- selection of products used for hand hygiene
- appropriate placement of hand hygiene products
- management of product dispensing containers
- hand care program
- use of ABHR as the preferred method of hand hygiene
- issues pertaining to nail enhancements and jewellery
- hand hygiene compliance and feedback.

For more information visit the *Just Clean Your Hands* website:

<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

Recommendations

2. ***Each health care setting must have written hand hygiene policies and procedures. [BIII]***

3. INDICATIONS AND MOMENTS FOR HAND HYGIENE DURING HEALTH CARE ACTIVITIES

Just Clean Your Hands, Ontario's evidence-based hand hygiene program

Some items in this section are excerpted from the *Just Clean Your Hands* program for hospitals and long-term care homes. These items and related Appendices are provided for information only, to assist in understanding how the recommendations in this best practice document are being implemented by Public Health Ontario.

Just Clean Your Hands program documents are available via the website at:

<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>

A hand hygiene indication points to the reason hand hygiene is necessary at a given moment as a health care provider moves from client/patient/resident to client/patient/resident while providing care and working in the care environment. This movement while carrying out tasks and procedures provides many opportunities for the transmission of organisms on hands.¹¹ There may be several hand hygiene indications in a single care sequence or activity.

Examples of hand hygiene indications are:

- before initial contact with a client/patient/resident¹²⁻¹⁴ or items in their environment¹²; this should be done on entry to the room or bed space, even if the client/patient/resident has not been touched
- before putting on gloves when performing an invasive/aseptic procedure¹²⁻¹⁴
- before preparing, handling or serving food or medications to a client/patient/resident¹²⁻¹⁴ (see also, *long-term care homes, below*)
- after care involving contact with blood, body fluids, secretions and excretions of a client/patient/resident, even if gloves are worn
- immediately after removing gloves and before moving to another activity¹²⁻¹⁴; when moving from a contaminated body site to a clean body site during health care¹²⁻¹⁴
- after contact with a client/patient/resident^{12, 14} or items in their immediate surroundings^{12, 14} on leaving room, even if the client/patient/resident has not been touched
- whenever in doubt.¹³

The essential indications for hand hygiene can be simplified into **four moments** for training purposes.¹¹ This makes it easier to understand the moments where the risk of transmission of microorganisms via the hands is highest, to memorize them, and to assimilate them into the dynamics of health care activities.

The 4 Moments for Hand Hygiene in All Health Care Settings:

1. **BEFORE initial patient/patient environment contact**
2. **BEFORE aseptic procedure**
3. **AFTER body fluid exposure risk**
4. **AFTER patient/patient environment contact**

The 4 Moments for Hand Hygiene are¹¹:

- **BEFORE initial patient*/patient environment contact:** Clean your hands when entering the room or cubicle and before touching the patient or any object or furniture in the patient's environment. This protects the patient and his/her environment from microorganisms carried on your hands from the hospital care environment (e.g., nursing station), other patients/environments, or from yourself. Examples include shaking hands, stroking an arm, helping a patient to move around or get washed, giving a massage, taking pulse/blood pressure, abdominal palpation, before adjusting an intravenous rate.
- **BEFORE aseptic procedures:** Clean your hands immediately before performing any aseptic procedure and before putting on gloves. This protects the patient against microorganisms, including his/her own organisms, from entering his/her body. Examples include providing oral/dental care, giving eye drops, aspirating secretions, changing wound dressings, giving injections, inserting catheters, opening a vascular access system or a draining system, preparing medications or dressing sets.
- **AFTER body fluid exposure risk:** Clean your hands immediately after an exposure risk to body fluids and after glove removal. This protects yourself and the environment from harmful patient microorganisms. Examples include providing oral/dental care, giving eye drops, aspirating secretions, skin lesion care, changing wound dressings, drawing and manipulating any fluid sample, opening a draining system, inserting and removing endotracheal tube, clearing up urine/faeces/ vomit, handling waste (bandages, napkins, incontinence pads), cleaning contaminated and visibly soiled material or areas (bathroom, medical instruments).
- **AFTER patient/patient environment contact:** Clean your hands on leaving the room/cubicle after touching the patient or any object or furniture in the patient's environment. This protects yourself, the next patient and the wider health care environment from harmful patient microorganisms. Examples include shaking hands, stroking an arm, helping a patient to move around or get washed, taking pulse/blood pressure, abdominal palpation, changing bed linen, perfusion speed adjustment, touching monitors, holding a bed rail, clearing the bedside table.

* **NOTE:** The term "patient" in this section refers to clients, patients or residents.

- For more information about hand hygiene moments refer to Appendix E, 'Your 4 Moments for Hand Hygiene', also available at:
<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.¹¹

A process review of the health care setting that takes into account facility layout and staff workflow can be beneficial to implementing the 4 Moments.⁶¹ In each health care setting, an assessment should also be done to determine what is considered to be the 'client/patient/resident environment'.

A. APPLICATION OF 4 MOMENTS IN LONG-TERM CARE HOMES

The *Just Clean Your Hands* program has been adapted for long-term care homes. Many of the activities in long-term care homes are shared activities and the approach to hand hygiene incorporates these shared activities:

- In the resident's room (entire room in a single room) or bed space (inside the privacy curtain in a multi-bed room), staff, volunteers and family members are to clean hands according to the 4 Moments for Hand Hygiene.

- In common areas where residents gather, to reduce the spread of organisms, residents, staff, volunteers and family members are to clean hands before beginning and after ending the activity. Some residents might need help cleaning their hands before they begin and after they end an activity.
 - If staff, volunteers or family members provide any direct care (see *glossary*) in areas where shared or group activities occur, the *4 Moments for Hand Hygiene* are to be followed.
 - Hands of residents, staff, volunteers or family members are to be cleaned before assisting with meals or snacks.
 - If, during assisting with meals or snacks of one or more residents, there is exposure of the hands to saliva or mucous membranes, hands should be cleaned before continuing.
- The *Just Clean Your Hands* program for long-term care homes is available at: <http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

B. APPLICATION OF 4 MOMENTS IN AMBULATORY CARE

The basic principles of infection prevention and control and hand hygiene are the same in all health care settings.⁶² However, ambulatory care presents some specific challenges related to the application of the *4 Moments for Hand Hygiene*. While *point-of-care* carries the same meaning in ambulatory care as it does in acute and long-term care (i.e., the place where three elements come together: the client/patient, the health care provider, and care or treatment involving contact with the client/patient⁶²), the client/patient's *environment* (the immediate space around a client/patient that may be touched by the client/patient and may also be touched by the health care provider when providing care) is not static and moves beyond the walls of a single room or cubicle.

To help identify when hand hygiene is needed, health care providers must differentiate between the health care environment and the client/patient care environment and apply the *4 Moments for Hand Hygiene* in the client/patient care environment at the point-of-care.⁶²

C. APPLICATION OF 4 MOMENTS IN HOME HEALTH CARE

In home health care, the entire home is the client/patient's environment. Hand hygiene is needed on entry to, and exit from, the home as well as according to the *4 Moments*.

D. APPLICATION OF 4 MOMENTS IN NEONATAL INTENSIVE CARE UNITS (NICU)

For the purposes of hand hygiene, there are three distinctive environments in the NICU⁶³:

1. **Neonate Environment:** the environment inside an isolette/ warmer that includes the neonate
2. **Immediate Care Environment:** the environment immediately outside the isolette/ warmer that includes equipment used in the care of the neonate (e.g., monitors, ventilators, supplies)
3. **NICU Environment:** the remainder of the NICU (e.g., nursing station, hallways, lounges, storage rooms, preparation rooms, utility rooms).

For the purposes of the *4 Moments for Hand Hygiene*, the Immediate Care Environment and the Neonate Environment may be considered to be distinct, presenting **an additional opportunity** for hand hygiene. Hand hygiene in the NICU would then be performed. One way of accomplishing this is:

- 1.A BEFORE contact with the Immediate Care Environment
- 1.B BEFORE contact with the neonate or the Neonate Environment
2. BEFORE performing an aseptic procedure
3. AFTER care involving body fluid exposure risk
4. AFTER contact with the Immediate Care Environment

➤ For more information on the application of the *4 Moments for Hand Hygiene* in neonatal care, see PIDAC's *Best Practices for Infection Prevention and Control in Perinatology*, available at: http://www.publichealthontario.ca/en/eRepository/IPC%20in%20Perinatology_ENGLISH_Final_2012-05-25%5B1%5D.pdf.

E. HAND HYGIENE FOR THE CLIENT/PATIENT/RESIDENT

Personal hand hygiene for clients/patients/residents is also important and is often overlooked. In office and clinic settings⁶⁴ and emergency waiting rooms, ABHR should be provided for clients/patients/residents and visitors to reduce the risks of environmental contamination with respiratory viruses,⁴ gastrointestinal viruses and antibiotic-resistant organisms (AROs). Clients/patients/residents should be encouraged or assisted to perform hand hygiene after toileting, before leaving their room and prior to eating.¹³

Recommendations

3. *The four moments for hand hygiene in health care are:*
 - a) *before initial contact with each client/patient/resident or items in their environment [BI]*
 - b) *before performing an invasive/aseptic procedure [BI]*
 - c) *after care involving risk of exposure to, or contact with, body fluids [AI]*
 - d) *after contact with a client/patient/resident or their environment.*
4. *Provide hand hygiene facilities for clients/patients/residents and visitors in all health care settings. Encourage and assist clients/patients/residents to perform hand hygiene upon arrival, before eating and before leaving their room or clinic area. [BIII]*

4. HAND CARE PROGRAMS

A hand care program for staff should be a key component of improving effective and safe hand hygiene practices to protect staff and clients/patients/residents from infections.⁶⁵ Hand eczema in health care providers can lead to decreased work productivity, increased sick leave and increases in health care costs.^{66, 67}

An effective hand care program includes the following:

- Provide staff with appropriate hand moisturizing skin care products (and encourage regular, frequent use) to minimize the occurrence of irritant contact dermatitis associated with hand

hygiene.^{14, 68, 69} Optimally, the best hand cream is one where the hand cream's fat content is approximately 70%.

- Perform a hand care assessment of new staff and staff who have developed skin problems related to the use of hand hygiene products and gloves.
- Refer to [Appendix D](#), *'Just Clean Your Hands – Ontario's Evidence-Based Hand Hygiene Program'*, for links to sample tools.
- Educate staff on the benefits of using ABHR over washing with soap and water^{70, 71} as well as appropriate hand hygiene techniques to minimize damage to hands.⁷²
- Refer individuals to Occupational Health for assessment if skin integrity is an issue.
- Provide an ABHR product that contains an emollient, which can significantly decrease irritant contact dermatitis under frequent-use conditions.⁷³

Staff should be provided with appropriate hand moisturizing skin care products and be encouraged to use these frequently.

A. CONDITION OF THE HANDS

The condition of the hands can influence the effectiveness of hand hygiene. Intact skin is the body's first line of defence against bacteria, therefore careful attention to hand care is an essential part of the hand hygiene program. The presence of dermatitis, cracks, cuts or abrasions can trap bacteria and compromise hand hygiene. Dermatitis also increases shedding of skin squames and, therefore, shedding of bacteria. A common barrier to compliance with hand hygiene is the adverse effects of products on the skin.

It is estimated that approximately 30% of health care providers report symptoms or signs of dermatitis involving their hands,⁷⁴ and as many as 85% give a history of having skin problems.^{14, 75} Hence, promoting skin integrity through providing good hand hygiene products and teaching the correct techniques for hand hygiene is vital for the safety of both the health care provider and clients/patients/residents. Occupational hand dermatitis is mainly caused by hand washing and work where skin is occluded by wearing gloves.⁶⁸ ABHR has been shown to be less irritating to skin than soap and water,^{57, 60, 76, 77} despite perceptions to the contrary, and may significantly decrease dermatitis due to emollients in the product.⁷³ If an individual feels a burning sensation following the application of ABHR, it is generally due to pre-irritated skin.⁶⁸

Allergic contact dermatitis and cutaneous adverse reactions associated with ABHRs is uncommon.^{77, 78} Staff education relating to the benefits of ABHR will help to alleviate anxiety and promote their use.¹⁴

ABHRs have been shown to be less irritating to skin than soap and water, despite perceptions to the contrary.

B. BARRIER CREAMS

Unlike hand lotions, which penetrate the skin via pores, barrier creams are adsorbed to the skin and are designed to form a protective layer that is not removed by standard hand washing.¹⁴ In certain occupational settings, barrier creams may actually be harmful as they trap agents beneath them, ultimately increasing risk for either irritant or allergic contact dermatitis.¹² Furthermore, inappropriate barrier cream application may exacerbate irritation rather than provide benefit.⁷⁹

In a study by Berndt et al,⁸⁰ there were no differences in skin condition between an agent applied for skin care (lotion) and an agent applied for skin protection (barrier cream). Both worked equally well to improve skin when applied correctly, regularly and frequently. In a double-blind, randomized controlled study, McCormick et al⁸¹ yielded a higher percentage of improvement in skin condition in a group that used a lotion compared to a group that used a barrier cream. It is apparent that more study is required to determine whether barrier creams are effective in preventing irritant contact dermatitis among health care providers.⁸²

Recommendations

5. ***Health care providers should strive to maintain hand skin integrity to enable effective hand hygiene. [BI]***
6. ***In all health care settings, implement a hand care program that includes hand assessment, staff education and staff input into product selection. [BI]***
7. ***Provide staff with hand moisturizing skin-care products (and encourage regular frequent use) to minimize the occurrence of irritant contact dermatitis associated with hand hygiene. [AI]***
8. ***Refer individuals to Occupational Health if skin integrity is an issue. [BIII]***

5. IMPEDIMENTS TO EFFECTIVE HAND HYGIENE

A. Nails

Long nails are difficult to clean, can pierce gloves⁸³ and harbour more microorganisms than short nails.⁸⁴ Keep natural nails clean and short.¹⁴ The nail should not show past the end of the finger.⁸⁵

B. NAIL POLISH

Studies have shown that chipped nail polish or nail polish worn longer than 4 days can harbour microorganisms that are not removed by hand washing, even with surgical hand scrubs.^{86, 87} Fingernail polish, if worn, must be fresh and in good condition. Freshly applied nail polish does not result in increased numbers of bacteria around the nails.^{86, 88}

Gel polish has been shown to damage nails, resulting in nail weakness, brittleness and thinning,⁸⁹ putting nails at increased risk for breaking. Nail art (adding decorative paint effects to nails) has been shown to be associated with outbreaks of infection.⁹⁰

C. ARTIFICIAL NAILS OR NAIL ENHANCEMENTS

Acrylic nails harbour more microorganisms and are more difficult to clean than natural nails.⁹¹ Artificial nails and nail enhancements, such as gel nails and nail wraps (adhesive decorative plastic or vinyl attached to nails), have been implicated in the transfer of microorganisms such as *Pseudomonas* species,^{84, 92} *Klebsiella pneumoniae*⁹³ and yeast⁹⁴; and in outbreaks, particularly in neonatal nurseries^{84, 92, 93} and other critical care areas.^{84, 91-98} Surgical site infections^{94, 95} and hemodialysis-related bacteraemias^{15, 99} have been linked to artificial nails.

Artificial nails and nail enhancements are also associated with poor hand hygiene practices and result in more tears to gloves.⁹⁸

For these reasons, artificial nails and nail enhancements are not to be worn by those having direct contact with a client/patient/resident.¹⁰⁰

D. HAND AND ARM ADORNMENTS

The presence of hand and/or arm adornments can influence the effectiveness of hand hygiene.

It is recommended that rings and bracelets not be worn by those with direct contact with a client/patient/resident. If the health care setting policy allows health care providers to wear hand and/or arm jewellery, it must be limited to a single smooth wedding band without projections or mounted stones.^{101, 102} A watch, if worn, should not be manipulated or touched.¹⁰³

Impediments to effective hand hygiene include:

- Jewellery that is very hard to clean hides bacteria and viruses from the action of the hand hygiene agent.^{102, 104-108}
- Rings increase the number of microorganisms present on hands,^{88, 102, 104, 107, 109-112} although this has not been linked to increases in infections.^{113, 114} Rings may increase the risk of tears in gloves.¹¹⁵
- Eczema often starts under a ring and may be trapped under the ring, causing irritation.¹¹⁶

There is no evidence that hand contamination is reduced with a 'bare below the elbows' policy.^{103, 117} However, long sleeves or jewellery should not interfere with, or become wet when performing, hand hygiene. If watches and other wrist jewellery are present, remove or push up above the wrist before performing hand hygiene.

Recommendations

9. To enable effective hand hygiene:

- **Nails must be kept clean and short. [BII]**
- **Nail polish, if worn, must be fresh and free of cracks or chips. [BII]**
- **Artificial nails or nail enhancements must not be worn. [AI]**
- **It is preferred that rings not be worn. [BII]**
- **Hand and arm jewellery, including watches, must be removed or pushed up above the wrist by staff caring for clients/patients/residents before performing hand hygiene. [BIII]**

6. HAND HYGIENE PRODUCTS

Careful selection of products that influence hand hygiene practice (e.g., ABHR, soaps, lotions, paper towels) will have a positive impact on hand hygiene compliance. The following should be taken into consideration:

- The primary factor influencing hand hygiene product selection should be efficacy of the product.
- Choose hand hygiene products that are "user-friendly," with staff input into the product choice regarding feel, fragrance and skin tolerance.^{13, 14, 82}
- Provide staff with hand hygiene products that have low irritancy potential, particularly when these products are used multiple times per shift.¹⁴
- Select an ABHR that contains emollients.^{73, 118}
- Solicit information from manufacturers regarding any effects that hand lotions, creams or ABHR may have on the persistent effects of antimicrobial soaps being used in the health care setting.¹⁴
- Solicit information from manufacturers regarding interactions between hand hygiene products or hand care products and gloves used in the health care setting.¹⁴
- Ensure manufacturer product information is available to staff.
- Evaluate the dispenser system of product manufacturers to ensure that dispensers function adequately and deliver an appropriate volume of product.¹⁴
- Select paper towels that are non-irritating and dispensers where the paper towel can be accessed without touching the dispenser with the hands.^{119, 120}

Staff must be provided with hand hygiene products that are effective and non-irritating to the skin. Staff input into product selection will enhance acceptance and use of the hand hygiene agent.¹⁴

A. ALCOHOL-BASED HAND RUB (ABHR)

ABHR is the first choice for hand hygiene when hands are not visibly soiled.^{13, 14} ABHR is less time-consuming to use than washing with soap and water and is the most time-effective protocol for routine client/patient/resident care.¹²¹

ABHR is the preferred method for decontaminating hands, when hands are not visibly soiled.

Using ABHR is more effective than washing hands (even with an antibacterial soap) when hands are not visibly soiled.

For maximum compliance and use, health care providers should perform hand hygiene at the appropriate moment of care.¹⁵ ABHR should be located at point-of-care,^{12, 14, 23, 122} i.e., the place where three elements occur together: the client/patient/resident, the health care provider and care or treatment involving client/patient/resident contact. Point-of-care products should be accessible without leaving the client/patient/resident.

For maximum compliance, ABHR must be available at point-of-care, i.e., the place where three elements occur together: the client/patient/resident, the health care provider and care or treatment involving client/patient/resident contact.

Efficacy of ABHR

In a recent randomized controlled trial, ABHR was shown to be as efficacious as chlorhexidine hand washing.¹²¹ The efficacy of the ABHR depends on the consistency of the product (e.g., gel, foam, liquid), the concentration of the product (i.e., percentage of alcohol), the volume of product used, the time spent rubbing and the hand surface rubbed.¹⁵ ABHR should not be used with water, as water will dilute the alcohol and reduce its effectiveness.¹³ ABHR should not be used immediately after hand washing with soap and water as it will result in more irritation of the hands.^{12, 14}

Alcohols provide for a rapid kill of most transient microorganisms due to their ability to denature proteins.⁵⁷⁻⁵⁹ The most common types of alcohols used for hand hygiene include ethanol, isopropanol or combinations of these. The antimicrobial action of ethanol and isopropanol are similar, however ethanol has greater activity against viruses than isopropanol.¹⁴ Ethanol is the primary agent used in North America; isopropanol is the primary agent used in Europe.

ABHRs available for health care settings range in concentration from 60 to 90% alcohol. Concentrations higher than 90% are less effective because proteins are not denatured easily in the absence of water. Norovirus and other non-enveloped viruses (e.g., rotavirus, enterovirus) are a frequent cause of gastroenteritis outbreaks in health care facilities. Studies¹²³ suggest that norovirus is inactivated by alcohol concentrations ranging from 70% to 90%. Since norovirus is a concern in all health care settings, this should be taken into consideration when choosing an ABHR product. A minimum concentration of 70% alcohol should be chosen.

ABHR Formulations and Product Selection

ABHR products being considered for purchase must have a Natural Product Number (NPN) from Health Canada. The active concentration of alcohol in products may be checked by searching on the NPN number in the Health Canada Drugs and Health Products Database, located at: <http://www.hc-sc.gc.ca/dhp-mps/prodnatur/nhp-new-nouvelle-psn-eng.php>.

ABHR is available as rinses, gels and foams. The choice of product will depend on a number of factors (e.g., efficacy, safety, environmental concerns). Before selecting a product¹¹:

- Form a point-of-care assessment team that includes representation from the hand hygiene implementation committee, front-line health care providers and content experts.
- Choose a product with proven efficacy according to the published literature.
- Choose a product dispenser that dispenses an appropriate amount of ABHR to ensure at least 15 seconds of rubbing is required for drying.
- Verify local fire regulations regarding choice of ABHR (see Section II. 6.B). Pressurized foam products are not permitted in health care facilities.
- Conduct a local risk assessment related to placement and choice of ABHR dispensers, taking into consideration the client/patient/resident population, protrusion of dispensers in an unsafe manner, and product leakage on surfaces (e.g., carpeting) that could cause falls or other injuries (see Section II.9.C).

- Identify locations that will provide the best access to ABHR at point-of-care as well as workflow patterns (see Section II.9.C) on a unit-by-unit basis and as best suits the type of patient/resident population or unique requirements of the unit. This might also influence choice of product dispenser.
- Where possible, standardization of dispenser location across units should be taken into consideration.

Sustained antimicrobial activity is not required or recommended for point-of-care products. The addition of other chemical agents to ABHR formulations for non-surgical use is not necessary and may cause more hand irritation than the use of ABHR alone. See Section II.6.D for more information regarding surgical hand preparation.

B. RISK OF FIRE RELATED TO THE USE OF ABHR

The risk of fire related to the use of ABHR is very small.^{22, 124} Hands must be fully dry before touching the client/patient/resident or their environment/equipment for the ABHR to be effective and to eliminate the extremely rare risk of flammability in the presence of an oxygen-enriched environment¹²⁵ or static electricity from carpeting.¹²⁶

Placement and storage of ABHR must be in compliance with fire prevention guidelines¹²⁷:

- In corridors, not more than one dispenser (maximum 1.2 L) of ABHR gel or liquid shall be located at each entry into a room.
- Client/patient/resident rooms may have up to 1.2 L of ABHR gel or liquid installed at each point-of-care.
- Special settings with an open concept patient care area (e.g., ICU, NICU) may have ABHR at each bedside.
- ABHR that is attached to the wall must not be installed within 150 mm. (six inches) of a source of ignition (i.e., electrical outlet, light switch). In addition, the wall space between the dispenser and the floor must remain clear and unobstructed.
- ABHR that is placed on the bed itself should be secured in an approved holder made for this purpose; the product should be placed so that the spout faces outward from the bed to reduce the risk of excess alcohol dripping on the bed linen.
- ABHR must not be installed near radiant heaters that can raise the temperature of the contents.
- ABHR shall not be installed directly over carpeted surfaces unless measures are taken to control excess accumulation of product in the carpet.
- ABHR stock shall be located in a storage room protected with a 1-hour fire separation or in a fire safety cabinet.

Where optimal placement or storage of ABHR for hand hygiene adherence appears to conflict with local fire safety regulations or guidelines, the fire Marshall and the infection prevention and control team must be consulted to resolve the issue.

C. HAND WASHING SOAPS

The physical actions of scrubbing with soap and water and rinsing are important for effective removal of material from the hands. It has been shown that at least 15 seconds of lathering with soap is required to remove transient flora.

Efficacy of Soaps

Plain soaps act on hands by emulsifying dirt and organic substances (e.g., blood, mucous), which are then flushed away with rinsing. Antimicrobial agents in plain soaps are only present as a preservative.

Antimicrobial soaps have residual antimicrobial activity and are not affected by the presence of organic material. Studies have shown that antimicrobial soap is more effective than plain soap and water¹²⁸⁻¹³² in critical care settings such as intensive care units and burn units.

Since the advent of ABHR, comparisons between ABHR and antimicrobial soap have confirmed the superiority of ABHR.¹³³ The best evidence suggests that antimicrobial soap is equivalent to ABHR in terms of microorganism reduction but is harsher on the hands and more time-consuming to use.¹³⁴

- Where ABHR is available at the point-of-care, antimicrobial soap is not required, including critical care areas.¹⁴
- Disadvantages of antimicrobial soap include:
 - Antimicrobial soaps are harsher on hands than plain soaps and frequent use may result in skin breakdown.
 - Frequent use of antimicrobial soap may lead to resistance.
- Antimicrobial soap is not required in clinical laboratories.¹³⁵

Soap Formulations and Product Selection

Liquid and foam soaps may become contaminated. Liquid products **shall** be dispensed in disposable pump dispensers that are discarded when empty.¹³⁶ They should never be “topped-up” or refilled.¹⁴

Bar soaps for hand hygiene must not be used in health care facilities except for the personal use of a single patient/resident. In this case, the soap should be supplied in small pieces that are single-patient/resident use, and the bar must be stored in a soap rack to allow drainage and drying. It should be discarded on patient/resident discharge.¹⁴

D. SURGICAL HAND PREPARATION

A surgical hand preparation must eliminate the transient flora and reduce the resident flora of the hands. It should also inhibit growth of bacteria under the gloved hand. The spectrum of antimicrobial activity for a surgical hand preparation should be as broad as possible, so that it is active against bacteria and fungi.¹²

The antimicrobial activity of ABHRs is superior to that of all other currently available methods of preoperative surgical hand preparation.

Due to the rapid multiplication of bacteria under surgical gloves and the high percentage of glove punctures found after surgery, a hand hygiene product with a prolonged antiseptic effect on the skin is desirable.^{12, 14} In an operative setting, an ABHR (surgical hand rub) or an antimicrobial soap (surgical hand scrub) with persistent antimicrobial activity should be used.

Alcohols are effective for preoperative cleaning of the hands of surgical staff.^{14, 137, 138} The antimicrobial activity of ABHRs is superior to that of all other currently available methods of preoperative surgical hand

preparation^{12, 138} and is preferred. Several ABHRs have been licensed for use as a surgical hand rub¹³⁹ and many formulations also contain long-acting compounds such as chlorhexidine gluconate (CHG).

E. TOWELETTES/WIPES

When visible soil is present and running water is not immediately available (e.g., prehospital care, home care), use moistened towelettes to remove the visible soil, followed by ABHR.

There is no evidence to suggest that the use of towelettes containing alcohol may be used as a substitute for ABHR for hand antisepsis in health care settings.¹³

F. NON-ALCOHOL-BASED WATERLESS ANTISEPTIC AGENTS

There is no evidence for the efficacy of non-alcoholic, waterless antiseptic agents in the health care environment.¹⁴ Non-alcoholic products have a quaternary ammonium compound (QAC) as the active ingredient, which has not been shown to be as effective against most microorganisms as ABHR or soap and water.¹⁴ QACs are prone to contamination by Gram-negative organisms.^{12, 13} QACs are also associated with an increase in skin irritancy.^{140, 141}

Non-alcohol-based waterless antiseptic agents are not recommended for hand hygiene in health care settings and should not be used.

Recommendations

- 10. Use 70 to 90% alcohol-based hand rub for hand hygiene in all health care settings. [BI]**
- 11. Wash hands with soap and water if there is visible soiling with dirt, blood, body fluids or other body substances. [AI] If hands are visibly soiled and running water is not available, use moistened towelettes to remove the visible soil, followed by alcohol-based hand rub.**
- 12. In all health care settings, provide hand hygiene products at point-of-care for use by staff and clients/patients/residents. [BI]**
- 13. Dispense all hand hygiene and hand care products from a disposable dispenser that delivers an appropriate volume of the product. [All]**
- 14. Use single-use product dispensers that are discarded when empty. Do not “top-up” or refill containers. Clearly define responsibility for maintaining product dispensers. [AI]**
- 15. Do not use bar soap for hand hygiene in any health care setting except for individual patient/resident use. [DII]**
- 16. Do not use alcohol-free, waterless antiseptic agents as hand hygiene agents in any health care setting. [DII]**
- 17. Consider user acceptability as a factor in hand hygiene product selection. [BI]**
- 18. Choose hand hygiene and hand care products with low irritant potential. [BI]**
- 19. Hand hygiene products must not interfere with glove integrity or with the action of other hand hygiene or hand care products. [All]**

20. *Evaluate the dispenser system of product manufacturers to ensure that dispensers function adequately and deliver an appropriate volume of product. [AI]*
21. *In an operative setting, ABHR (surgical hand rub) with persistent antimicrobial activity is preferred for surgical hand preparation. [AI]*

7. TECHNIQUES FOR PERFORMING HAND HYGIENE

To ensure effective hand hygiene, remove hand and arm jewellery. If a watch is worn, it must be worn above the wrist and fit snugly. Clothing or other items that impede frequent and effective hand hygiene should be removed. A simple and practical solution allowing effective hand hygiene is for health care providers to wear their rings around their neck on a chain as a pendant.¹²

A. TECHNIQUE FOR USING ABHR

The following procedure should be used for cleaning hands with ABHR (refer to [Appendix B](#), ‘Techniques for Performing Hand Hygiene’ for more information):

- Ensure hands are visibly clean (if soiled, follow hand washing steps) and dry.¹³
- Apply one to two full pumps of product onto one palm; the volume should be such that 15 seconds of rubbing is required for drying.
- Spread product over all surfaces of hands,¹⁴ concentrating on finger tips, between fingers, back of hands, and base of thumbs; these are the most commonly missed areas.
- Continue rubbing hands until product is dry.^{14, 68} This will take a minimum of 15 seconds if sufficient product is used.

Hands must be fully dry before touching the client/patient/resident or the care environment/equipment for the ABHR to be effective and to eliminate the extremely rare risk of flammability in the presence of an oxygen-enriched environment.²²

B. TECHNIQUE FOR HAND WASHING

The following procedure should be used for hand washing (refer to [Appendix B](#), ‘Techniques for Performing Hand Hygiene’, for more information):

- Wet hands with warm (not hot or cold) water; hot or cold water is hard on the hands, and will lead to dryness.
- Apply liquid or foam soap.
- Vigorously lather all surfaces of hands for a minimum of 15 seconds.¹⁴ Removal of transient or acquired bacteria requires a minimum of 15 seconds of mechanical action. Pay particular attention to finger tips, between fingers, backs of hands and base of the thumbs; these are the most commonly missed areas.
- Using a rubbing motion, thoroughly rinse soap from hands; residual soap can lead to dryness and cracking of skin.
- Dry hands thoroughly by blotting hands gently with a paper towel; rubbing vigorously with paper towels can damage the skin.
- Turn off taps with paper towel, to avoid recontamination of the hands.^{12, 13}

- DO NOT use ABHR immediately after washing hands, as skin irritation will be increased.¹²

If hand air dryers are used in non-clinical areas, hands-free taps are required to avoid re-contaminating the hands when turning off the taps.

C. TECHNIQUE FOR SURGICAL HAND ANTISEPSIS IN OPERATIVE SETTINGS

The following considerations must be incorporated into procedures used for surgical hand antisepsis (refer to [Appendix B](#), ‘*Techniques for Performing Hand Hygiene*’ for more information):

- Surgical hand antisepsis using either an ABHR with persistent activity (“*surgical hand rub*”) or an antimicrobial soap (“*surgical hand scrub*”) is recommended before donning sterile gloves when performing surgical procedures.^{12, 14}
- When performing a surgical hand-rub, follow the product manufacturer’s instructions. Apply the product to dry hands and forearms only.
- When performing a surgical hand scrub, scrub hands and forearms for the length of time recommended by the manufacturer, usually two to five minutes. Long scrub times are not needed (e.g., 10 minutes).^{12, 14} Pay special attention to nails, subungual areas, between fingers and between thumb and index finger.¹⁴² the direction of the scrubbing procedure is from the hands to the elbows, without returning to the cleaned hands.¹⁴² Brushes should not be used for hand scrubs.^{12, 143, 144}
- After performing a surgical hand rub, allow hands and forearms to dry thoroughly before donning sterile gloves.^{14, 68, 142}
- After performing a surgical hand scrub, dry hands and arms with a sterile towel, ensuring that hands and arms are completely dry.¹⁴²
- Do not sequentially combine a surgical hand scrub with a surgical hand rub.⁶⁸

Recommendations

22. ***When using an alcohol-based hand rub, apply sufficient product such that it will remain in contact with the hands for a minimum of 15 seconds before the product becomes dry (usually one to two pumps). [BI]***
23. ***When using soap and water, lather hands for a minimum of 15 seconds before rinsing. [BI]***
24. ***Dry hands using a method that does not re-contaminate the hands. [BI]***
25. ***Dry hands completely before putting on gloves. [BI]***
26. ***Do not use alcohol-based hand rub immediately after washing hands with soap and water. [AII]***
27. ***When performing surgical hand antisepsis using an antimicrobial soap, scrub hands and forearms for the length of time recommended by the manufacturer, usually two to five minutes. Long scrub times (e.g., 10 minutes) are not required. [BI]***

8. CONSIDERATIONS WITH GLOVES

Several studies provide evidence that wearing gloves can help reduce transmission of pathogens in health care settings.^{145, 146} However, gloves do not provide complete protection against hand contamination.^{147, 148}

The use of gloves does not replace the need for hand hygiene.

The barrier integrity of gloves varies on the basis of type and quality of glove material, intensity of use, length of time used, manufacturer, whether gloves were tested before or after use and method used to detect glove leaks. It is preferable to provide more than one type of glove to health care providers, because it allows the individual to select the type that best suits their care activities.^{12, 14}

Because gloves are not completely free of leaks, and tears/punctures can occur, hands must be cleaned before donning gloves for an aseptic/clean procedure and after glove removal. Gloves must be removed immediately and discarded after the activity for which they were used and before exiting the environment of a client/patient/resident. Gloves must not be washed or re-used. Gloves must never be re-worn between clients/patients/residents. Gloves may be adversely affected by petroleum-based hand lotions or creams.¹²

To reduce hand irritation related to gloves:

- Wear gloves for as short a time as possible.⁶⁸
- Hands must be clean and dry before donning gloves.⁶⁸
- Gloves must be intact and clean and dry inside.
- For more information about standards for gloves, visit the Canadian General Standards Board Certification and Qualification Programs web page at: <http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/programme-program/certification/index-eng.html>.
- Detailed information about the indications and appropriate use of gloves are included in PIDAC's *Routine Practices and Additional Precautions in All Health Care Settings*,² available at: http://www.publichealthontario.ca/en/eRepository/RPAP_All_HealthCare_Settings_Eng2012.pdf.

Recommendations

28. *The use of gloves does not replace the need for hand hygiene. [BI]*
29. *Wear gloves when it is anticipated that the hands will be in contact with mucous membranes, non-intact skin or body fluids. [CI]*
30. *Do not use the same pair of gloves for the care of more than one client/patient/resident. [BI]*
31. *Remove gloves immediately and discard after the activity for which they were used, then perform hand hygiene. [All]*
32. *Change or remove gloves if moving from a contaminated body site to a clean body site within the same client/patient/resident. [All]*
33. *Change or remove gloves after touching a contaminated environmental surface and before touching a client/patient/resident or a clean environmental surface. [All]*
34. *Do not wash or re-use gloves. [BI]*

9. HAND HYGIENE CONSIDERATIONS IN FACILITY DESIGN

Hand hygiene facilities must be readily available in all clinical areas.¹³ Hand washing facilities which are not immediately accessible are one of the main reasons that health care providers do not comply with hand hygiene protocols.¹⁴⁹ Studies offer convincing and important evidence that providing a conveniently located hand hygiene sink in each client/patient/resident room reduces HAIs rates.¹⁵⁰ See Table 3 for a summary of hand washing sink indications and placement criteria, for consideration in renovations or new construction.

A. HAND WASHING SINKS

There must be sufficient sinks to encourage and assist staff to readily conform to hand hygiene protocols.¹⁴⁹ Nearby surfaces should be nonporous to resist fungal growth¹⁵¹ and must be protected from splashes with impermeable back/side splashguards. Hand washing sinks must be cleaned on a regular basis. Hand washing sinks should be regularly inspected to ensure they are maintained in good condition.

Hand washing sinks must be dedicated to this purpose and not be used for any other purpose.

Improper sink placement and design can add to the environmental reservoir of contaminants and can lead to outbreaks, particularly with gram-negative bacilli (e.g., *Pseudomonas* spp.).¹⁵² When installing new sinks and in new builds, CSA requirements regarding sink placement and design shall be met.¹³⁶

- For more information regarding sinks and facility design, refer to the Canadian Standards Association's CSA Z8000-11 *Canadian Health Care Facilities*,¹³⁶ available at: <http://shop.csa.ca/en/canada/landing-pages/z8000-canadian-health-care-facilities/page/z8000>.

Sinks need to be convenient and accessible and, where possible, follow established criteria regarding placement and design.¹³⁶

Placement Criteria

- Hand washing sinks must not be used for both hand washing and other purposes¹³⁶ (e.g. cleaning of equipment, emptying intravenous and other solutions), as this will significantly increase the risk of subsequent hand contamination.
- Sinks should be located in such a way and at sufficient distance that they do not contaminate clients/patients/residents, clean supplies or adjacent counters through splashing.¹⁵¹
- Foot pedal-operated waste bins, with a waste bag, should be provided by each hand washing sink.^{149, 153}
- To avoid recontamination of the hands, there should be single-use towels available to turn off faucets.¹³
- Paper towel waste container should be located near the exit door for disposal of the paper towel used on the door hardware.¹⁵⁴

See Table 3 for indications for, and placement of, hand washing sinks in health care facilities.

Design Criteria



Figure 2: ACCEPTABLE

Free-standing hand-free sink

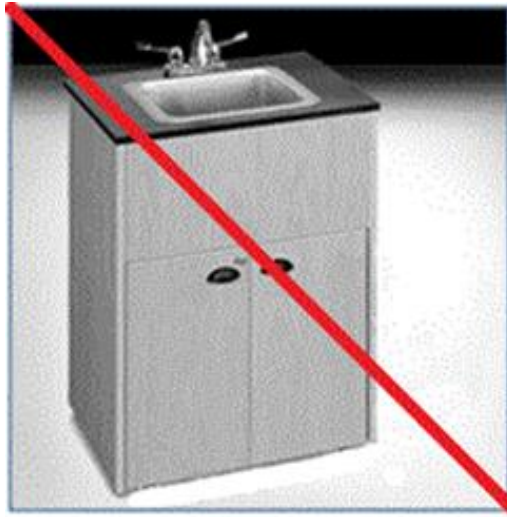


Figure 3: NOT ACCEPTABLE

Sink built into cabinet with counter

- Hand washing sinks shall be made of non-porous material.¹³⁶
 - Hand washing sinks must be free-standing¹⁴⁹ and shall be wall-mounted and at least one metre away from any fixed work surface or separated by a splash barrier (see Figure 2). There shall be no storage underneath¹³⁶ (due to proximity to sanitary sewer connections and risk of leaks or water damage).¹⁵¹ Sinks shall not be inserted into, or immediately adjacent to, a counter (see Figure 3).¹³⁶
 - The design of hand washing sinks (e.g., depth, position of drain) shall prevent splash back that may contaminate hands or faucets.¹³⁶
 - Backsplashes shall extend a minimum 60 cm/24 inches above sink level and a minimum of 25 cm./10 inches below sink level.^{136, 149}
 - Backsplashes shall be seam-free. All edges shall be sealed with a waterproof barrier. Backsplashes shall include the area under the paper towel dispenser and soap dispenser.^{136, 149, 151, 153, 155}
 - Controls (faucets) shall be hands-free.¹³⁶ Electric eye operation or foot, elbow or knee operated handles/blades are acceptable.
 - Faucets shall not swivel^{136, 154, 156} and shall not be fitted with aerators^{136, 157-159} or similar devices.
 - Water temperature must be able to be adjusted. Electric eye technology should have a means for manual adjustment of water temperature. Automatic temperature control or ultrasonic controls shall not be used.¹³⁶
 - If electric eye-triggered devices are used, there shall be a contingency plan to deal with power failure¹³⁶ (e.g., tie in to emergency power system).
- For more information regarding sinks and facility design, refer to the Canadian Standards Association's CSA Z8000-11 *Canadian Health Care Facilities*,¹³⁶ available at:
<http://shop.csa.ca/en/canada/landing-pages/z8000-canadian-health-care-facilities/page/z8000>

Table 3: Indications for, and placement of, hand washing sinks in health care facilities

Indication and Sink Placement	Reference No.
Inside each client/patient/resident room, adjacent to the entrance, and in addition to sink in client/patient/resident washroom.	136, 149, 151, 160
If three or more clients/patients/residents share a room, then at least one sink is required for every three clients/patients/residents, with a sink being no more than 6 metres/20 feet from each individual bed space.	136, 149, 151, 160
Inside any room where treatment is provided or procedures or physical examinations are performed.	136, 160
Inside any room with a toilet.	136, 160
Inside or within 6 metres/20 feet of each nursing station.	136
Inside each soiled utility/soiled holding room (in addition to sinks or hoppers that are used for contaminated material).	136, 160
Inside each area where unbagged, soiled linen is handled.	136, 160
Inside or within 6 metres/20 feet of each staff lounge.	136
Within 6 metres/20 feet of each laboratory workstation and within each work room.	136
Inside each room in which medication is prepared (including in pharmacies)	136, 160
Inside any room in which food (e.g., infant formula, breast milk, nourishment) or client/patient/resident care items (e.g., tray) are prepared .This includes, but is not limited to, clean utility rooms used for equipment preparation, nourishment centres and rooms where infant formula is prepared.	136, 160
Inside each clinical laboratory and morgue.	160, 161
In areas where hands are likely to be contaminated, such as in goods receiving areas, chemical storage and waste storage and disposal areas.	155
For airborne precautions rooms there should be one hand washing sink in the ante-room, one in the room itself, and one in the patient/resident bathroom.	136, 149

B. HAND DRYING (PAPER TOWEL, AIR DRYERS)

Effective hand drying is important for maintaining hand health.¹⁴⁹ Considerations include:

- Disposable paper hand-towels provide the lowest risk of cross-contamination and shall be used for drying hands in clinical practice areas.^{136, 149, 153}
- Cloth drying towels shall not be used.^{14, 136}
- Towel dispensers shall be mounted such that access to them is unobstructed and splashing or dripping onto adjacent wall and floor surfaces is minimized.^{136, 149, 153}
- Towel dispenser design shall be such that only the towel is touched during removal of towel for use.¹³⁶
- To avoid recontamination of the hands, paper towels should be available to use on the exit door hardware and a waste container for used towels should be located near the exit door.¹³⁶
- Hot-air dryers must not be used in clinical areas^{13, 149} and shall not be used with hand hygiene sinks.¹³⁶
- If hot-air dryers are used in non-clinical (public) areas:
 - hands-free taps are required
 - there must be a contingency for power interruptions.

C. PLACEMENT OF ABHR DISPENSERS

Installing alcohol-based hand rub dispensers at the point-of-care improves adherence to hand hygiene.^{23, 122, 150} Point-of-care is the place where three elements occur together: the client/patient/resident, the health care provider and care or treatment involving client/patient/resident contact. Hand hygiene products available at point-of-care are easily accessible to staff by being as close as possible, i.e., within arm's reach, to where client/patient/resident contact is taking place.¹⁵

There should be an assessment of workflow pattern when making the decision about where to place products. A point-of-care risk assessment will also help to guide placement of ABHR for clients/patients/residents who do not have the mental capacity to realize the negative effects of ingestion or misuse of any kind, such as paediatrics, units with cognitively-impaired clients/patients/residents and mental health units. In some areas, staff may need to carry ABHR for their own use when it cannot be installed (e.g., forensic units) or when point-of-care hand hygiene is more easily accessible (e.g., prehospital care).¹² When individual ABHR is used, it should fit against the body^{14, 23} (e.g., on a waistband or retractable cord¹⁶²) or be carried in a pocket.^{14, 23} Individual-use ABHR should be of sufficient volume to last through a shift (e.g., 60 mL),¹² must be disposable and not be topped-up.

Consideration should also be given to dispensers protruding in a way that could cause injuries and product leaking on surfaces that could cause falls or other injuries. For a sample assessment tool visit the *Just Clean Your Hands* website:

<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

The multidisciplinary team and end users should be involved in this decision on a unit-by-unit basis so that products are placed in the pattern of the workflow and are convenient to use. Requirements of the Ontario Fire Marshall's Office¹⁶³ with respect to placement of ABHR must be followed (see Section II.6.B).

General considerations for placement of ABHR:

- ABHR dispensers should be placed at point-of-care in all areas where client/patient/resident care is provided, except where patient safety could be put at risk (e.g., mental health unit).¹³⁶
- ABHRs should not be placed at, or adjacent to, hand washing sinks.
- ABHR dispensers should be mounted on the external wall immediately adjacent to the entrance to each patient/resident bedroom,^{136, 149} unless contraindicated by the risk assessment. This facilitates situations in which health care is given in hallways and allows visitors and others who are not providing health care to easily access ABHR.
- ABHR dispensers should be available immediately adjacent to the entrance to every client/patient /resident care area (e.g., outpatient clinic room, emergency department),¹³⁶ unless contraindicated by guidelines from the Ontario Fire Marshall's Office.¹⁶³
- ABHR dispensers should be mounted at a height that is ergonomically appropriate to facilitate access by a health care provider of average height, taking into consideration whether the dispenser dispenses from the top or the bottom.
- Dispensers should be placed so that they minimize splashing or dripping onto adjacent wall and floor surfaces.¹³⁶
- ABHR dispensers should not be installed over or directly adjacent to an ignition source such as an electrical outlet or switch, or over carpeted areas.¹⁶⁴
- In health care area, the responsibility for replacing dispensers of ABHR (who and when) should be clearly delineated.
- ABHR should be dispensed in a non-refillable bottle.
- Placement of ABHR should facilitate hand hygiene when putting on and taking off personal protective equipment (PPE).

D. PLACEMENT OF SOAP AND LOTION DISPENSERS

Soap and lotion dispensers shall be mounted to permit unobstructed access and minimize splashing or dripping onto adjacent wall and floor surfaces.^{136, 149, 153} Liquid products shall be placed to prevent splash-up contamination.^{136, 149, 153} Dispensers must be clearly labelled and easily distinguishable from each other.

Recommendations

35. *Before installing hand washing sinks and dispensers, prepare a workflow pattern and risk assessment to facilitate the decision about where to place sinks and products. [BIII]*
36. *Hand washing sinks shall be hands-free, free-standing and used only for hand washing.*
37. *There should be sufficient hand washing sinks such that staff do not need to walk more than six metres/20 feet to reach the sink. [BIII]*
38. *Disposable paper towels shall be used for drying hands in clinical areas.*
39. *Towel dispenser design shall be such that only the towel is touched during removal of towel for use.*
40. *Where hot-air dryers are used in non-clinical areas, hands-free taps are required. [BIII]*
41. *There shall be a contingency plan to deal with power interruptions and temperature regulation when hot-air dryers or sink controls based on electric-eye technology are used.*
42. *Locate alcohol-based hand rub dispensers at point-of-care and at the entrance to other locations where activities occur, unless contraindicated by the risk assessment or guidelines from the Ontario Fire Marshall's Office. [BIII]*

10. HAND HYGIENE MOTIVATION AND BEHAVIOUR

Patterns of hand hygiene behaviour are developed and established in early life.¹⁶⁵ As most health care providers do not begin their careers until their early twenties, improving compliance means modifying a behaviour pattern that has already been practiced for decades and continues to be reinforced in community situations.¹² These patterns of hand washing are carried into the health care setting. Sustained alteration to this ritualized behaviour is difficult to achieve.^{165, 166}

Behavioural studies have shown that there are two types of hand hygiene practice^{12, 165}:

- The health care provider's internalized need about when hand hygiene is necessary (*inherent* hand hygiene practice):
 - Cleaning hands when one's hands are visibly soiled, sticky or gritty; before eating; or for personal hygiene purposes (e.g., after using the toilet).
 - Usually these indications require hand washing with soap and water.
- Other hand hygiene indications (*non-inherent* hand hygiene practice) not triggered by an intrinsic need to cleanse the hands:
 - Examples of non-inherent practice include touching a client/patient/resident, taking a pulse or blood pressure, or touching the client/patient/resident care environment.
 - This type of hand hygiene is frequently omitted in health care settings.

An understanding of these concepts should assist in driving hand hygiene education programs. Behavioural beliefs may be strongly in favour of hand hygiene, but adherence is driven by peer pressure and the perception of high self-efficacy, rather than by reasoning about the impact of hand hygiene on client/patient/resident safety.¹⁶⁶ While health care providers must be schooled in how, when and why to clean hands, emphasis on the derivation of their community and occupational hand hygiene behaviour patterns may assist in altering attitudes.¹²

Leadership, role-modeling and an organization-wide commitment are essential to improving hand hygiene compliance rates. Staff compliance is significantly influenced by the behaviour of other health care providers.¹⁶⁷ Having hand hygiene champions and role models will have a positive impact on the motivation of staff.^{14, 26} Champions are health care providers who publicly share their commitment to improving hand hygiene practice in the health care setting.

It has been clearly demonstrated that sustainable success at improving hand hygiene adherence is achieved through a multifaceted, multidisciplinary program when several critical factors are in place. These include^{12, 15}:

- demonstrable organizational commitment to improvement
- multidisciplinary leadership
- hand hygiene role models and champions
- presence of drivers for improvement
- program adaptability
- involvement of front-line staff
- local ownership
- availability of finances
- links to health care regulations.

Recommendations

43. Focus promotional programs for health care providers on factors known to influence behaviour. [BI]

44. Incorporate peer role models and “champions” into the hand hygiene program. [BIII]

11. HAND HYGIENE EDUCATION

An important and integral part of an effective hand hygiene program is education of all staff about the importance of hand hygiene in a health care setting. General education should include:

- indications for hand hygiene (see Section II.3 and Appendix E)
- factors that adversely influence hand hygiene (see Section II.5)
- hand hygiene agents (see Section II.6)
- hand hygiene techniques (see Section II.7 and Appendix B)
- hand care to promote skin integrity (see Section II.4 and Appendix D).

It must be kept in mind that educational programs, although necessary, are not sufficient and other behaviour modifying strategies must be included in a multifaceted approach to achieve change.¹²

A. EDUCATION FOR HEALTH CARE PROVIDERS

It has been shown that valid information and knowledge on hand hygiene do influence good practices among health care providers.¹⁶⁸ A successful educational program must provide facts that are supported by evidence from the medical literature.¹²

All health care providers should receive basic training and periodic retraining to reinforce their practice. For health care providers, education must include the clinical indications/moments for hand hygiene during client/patient/resident care (see Section II.3, ‘*Indications and Moments for Hand Hygiene*’ and refer to [Appendix E](#), ‘*Your 4 Moments for Hand Hygiene*’).

- Basic training materials are available from Public Health Ontario.¹¹ Information about Ontario’s evidence-based hand hygiene program, *Just Clean Your Hands*, including tools and educational materials may be found at:
<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

B. EDUCATION FOR CLIENTS/PATIENTS/RESIDENTS AND VISITORS

Education aimed at clients/patients/residents and their families and visitors should be provided. Encouraging partnerships between clients/patients/residents, their families and health care providers to promote hand hygiene in health care has been shown to be successful.¹² Information fact sheets, brochures and posters may be used along with instructions regarding when and how to perform hand hygiene.

In 1999, McGuckin et al.¹⁶⁹ described the positive impact of the role of the patient in hand hygiene compliance programs. The inclusion of patient empowerment as one of the elements of a multifaceted hand hygiene program may be a useful component of the program.^{12, 170-173}

Recommendations

45. Educate health care providers about [AII]:

- *indications for hand hygiene*
- *factors that influence hand hygiene*
- *hand hygiene agents*
- *hand hygiene techniques*
- *hand care to promote skin integrity.*

46. Encourage partnerships between clients/patients/residents, their families and health care providers to promote hand hygiene in health care. [CIII]

12. HAND HYGIENE MONITORING AND FEEDBACK

A. MONITORING

Monitoring hand hygiene practices is essential in order to establish a baseline and to evaluate the impact of improvement interventions. Additionally, monitoring by itself is a useful intervention to improve hand hygiene through regular feedback of results and/or provision of immediate feedback to observed health care providers.¹²

Currently, direct observation by trained observers is considered the optimal means of monitoring hand hygiene as it is the only method that can measure all 4 moments of hand hygiene, allow an assessment of hand hygiene technique and duration, and allow immediate feedback to health care providers.¹²

Directly observed hand hygiene monitoring requires trained observers and a standardized approach in order to ensure consistent results over time and to allow, at least to some extent, comparison between facilities. Essential components include¹²:

- trained observers (using CD-ROM, practice scenarios)
- standardized observation tool with clear instructions
- quality control checks of data entry
- periodic inter-rater reliability testing.

Directly observed monitoring of hand hygiene has several disadvantages, however. It is labour-intensive, can only record a small fraction of the total hand hygiene opportunities in any setting, and may be subject to bias including selection bias, observer bias and observation bias (i.e., the Hawthorne Effect).^{12, 174}

While direct observation of compliance is essential, it may be useful to confirm the impact of hand hygiene improvement efforts by also tracking evidence of increased hand hygiene product usage (i.e., use of ABHR and soap). Tracking product usage is a less biased approach to hand hygiene monitoring, but cannot determine whether hand hygiene was performed at the correct moment, cannot assess technique, and cannot distinguish between hand hygiene performed by health care providers, visitors or clients/patients/residents.^{12, 174}

Recently, considerable interest in technological methods of hand hygiene monitoring has arisen.^{175, 176} A variety of electronic (automated) monitoring systems (EMS) or video monitoring systems (VMS) are now available. Each system varies in its approach and capabilities. Most systems either monitor dispensing frequency (i.e., number of times dispensers activated) or indirectly estimate compliance with Moment 1

and Moment 4, by monitoring staff entry and exit into a room, as well as whether a dispenser was activated within a set time. Some systems track individual staff while others only provide aggregate data. Some systems are capable of providing 'real time' feedback including voice prompts, or beeping/vibrating to indicate that the individual has not yet performed hand hygiene. Reminders are triggered by system defined prompts (e.g., no dispensing event detected within 10 seconds of room entry) but are not directly linked with contact with the client/patient/resident or his/her environment.

EMS and VMS systems allow continuous, 24/7 monitoring, collect large amounts of data, are not subject to the biases inherent in direct observation and may be less labour intensive once installed. However, there is very little published evidence that these systems can improve hand hygiene compliance in a sustainable manner. Furthermore, each system must be evaluated separately as they have their own strengths, weaknesses, and costs and each use different definitions of compliance. For some systems that track staff movements and individual level compliance, staff may have privacy issues and concerns about how the data will be used.

Thus, while many systems show promise, and will likely become a component of multi-modal improvement efforts at some facilities, there is not yet sufficient evidence to recommend any specific EMS/VMS at the present time.

B. FEEDBACK

Feedback must be bilateral, i.e., from both the observer and from staff. Staff should have input on the hand hygiene program, product selection and availability, and the education that is provided.

There are two levels of feedback from the monitoring process:

- Immediate feedback should be given to the person who has just been observed.
- Aggregate data should be shared with care units, managers, quality improvement committees and senior management.

All feedback should be given in a positive manner to facilitate education. Facilities where results of monitoring and feedback identify issues relating to compliance should provide ongoing educational and motivational activities to encourage long-lasting improvement in hand hygiene practices. A plan of action should be evident for persistent failure with compliance of hand hygiene. Non-compliance should not be tolerated, as this is a client/patient/resident safety and occupational health issue. Aggregate unit compliance results should be part of the performance appraisal of the unit manager.

- Details regarding Ontario's evidence-based hand hygiene program, *Just Clean Your Hands*, including tools and training materials for monitoring and providing feedback, may be found at: <http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

Recommendations

- 47. Routinely monitor hand hygiene compliance with the provision of timely feedback by using a reliable, validated observer audit tool and training process. [AII]**
- 48. Monitoring should assess compliance with each of the four moments to direct education and provide reliability. [BIII]**
- 49. Review results of hand hygiene compliance as part of the ongoing safety agenda of facility committees, such as Joint Health and Safety, Infection Prevention and Control, Medical Advisory Committee and Senior Management. [BIII]**

13. OTHER ISSUES RELATING TO HAND HYGIENE

A. HAND HYGIENE AND CLOSTRIDIUM DIFFICILE

Clostridium difficile is a spore-forming bacterium that causes serious diarrhea and intestinal illness in individuals following treatment with antibiotics. Clients/patients/residents known to have *C. difficile* infection are managed on Contact Precautions, i.e., gloves and gowns are used for care. Wearing gloves and subsequent removal on leaving the care environment has been shown to prevent transmission of *C. difficile*.¹⁷⁷ Observe meticulous hand hygiene after glove removal.

When *C. difficile* is diagnosed or suspected:

- Soap and water is theoretically more effective in removing spores than ABHR:
 - When a dedicated hand washing sink is immediately available, wash hands with soap and water.
 - When a dedicated hand washing sink is not immediately available, clean hands using ABHR.
 - Do not perform hand hygiene at a client/patient/resident's sink, as this may re-contaminate the health care provider's hands.
 - Provide education to the client/patient/resident regarding the need and procedure to be used for hand hygiene. Clients/patients/residents who are unable to perform hand hygiene independently should be assisted by the health care provider.
- For more information relating to *C. difficile* and hand hygiene, refer to PIDAC's *Annex C: Testing, Surveillance and Management of Clostridium difficile in All Health Care Settings*,⁵ available at: http://www.publichealthontario.ca/en/eRepository/PIDAC-IPC_Annex_C_Testing_SurveillanceManage_C_difficile_2013.pdf.

B. SYSTEMIC ALCOHOL ABSORPTION

The impact of religious faith and cultural specificities must be taken into consideration when implementing a strategy to promote hand hygiene.¹⁷⁸

Recent studies have shown that the frequent use of ABHRs does not raise serum blood alcohol levels in adults¹⁷⁹⁻¹⁸¹ or children.¹⁸²

The Muslim Scholar Board of the World Muslim League has declared: "*It is allowed to use medicines that contain alcohol in any percentage that may be necessary for manufacturing, if it cannot be substituted. Alcohol may be used as an external wound cleanser, to kill germs and in external creams and ointments*".¹²

III. Summary of Recommendations for Best Practices for Hand Hygiene in All Health Care Settings

This summary table is intended to assist with self-assessment internal to the health care setting for quality improvement purposes. See complete text for rationale.

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
1. The Hand Hygiene Program						
1.	<p><i>Develop and implement a multidisciplinary, multifaceted hand hygiene program in all health care settings, [BI] including hand hygiene agents that are available at point-of-care in all health care settings. [AI] In health care facilities the hand hygiene program must also include:</i></p> <ul style="list-style-type: none"> ■ <i>senior and middle management support and commitment to make hand hygiene an organizational priority</i> ■ <i>environmental changes and system supports, including alcohol-based hand rub at the point-of-care and a hand care program</i> ■ <i>education for health care providers about when and how to clean their hands</i> ■ <i>ongoing monitoring and observation of hand hygiene practices, with feedback to health care providers</i> ■ <i>client/patient/resident engagement</i> ■ <i>opinion leaders and champions modelling the right behaviour.</i> 					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
2. Hand Hygiene Policies and Procedures						
2.	<i>Each health care setting must have written hand hygiene policies and procedures. [BIII]</i>					
3. Indications and Moments for Hand Hygiene During Health Care Activities						
3.	<i>The four moments for hand hygiene in health care are: a) before initial contact with each client/patient/resident or items in their environment; [BI] b) before performing an invasive/aseptic procedure; [BI] c) after care involving risk of exposure to, or contact with, body fluids; [AI] and d) after contact with a client/patient/resident or their environment.</i>					
4.	<i>Provide hand hygiene facilities for clients/patients/residents and visitors in all health care settings. Encourage and assist clients/patients/residents to perform hand hygiene upon arrival, before eating and before leaving their room or clinic area. [BIII]</i>					
4. Hand Care and Hand Adornments						
5.	<i>Health care providers should strive to maintain hand skin integrity to enable effective hand hygiene. [BI]</i>					
6.	<i>In all health care settings, implement a hand care program that includes hand assessment, staff education and staff input into product selection. [BI]</i>					
7.	<i>Provide staff with hand moisturizing skin-care products (and encourage regular frequent use) to minimize the occurrence of irritant contact dermatitis associated with hand hygiene. [AI]</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
8.	<i>Refer individuals to Occupational Health if skin integrity is an issue. [BIII]</i>					
9.	<i>To enable effective hand hygiene:</i> <ul style="list-style-type: none"> ■ <i>Keep nails clean and short. [BII]</i> ■ <i>Nail polish, if worn, must be fresh and free of cracks or chips. [BII]</i> ■ <i>Do not wear artificial nails or nail enhancements.[AI]</i> ■ <i>It is preferred that rings not be worn. [BII]</i> ■ <i>Staff caring for clients/patients/residents must remove hand and arm jewellery, including watches, or push them up above the wrist before performing hand hygiene. [BIII]</i> 					
5. Hand Hygiene Products						
10.	<i>Use 70 to 90% alcohol-based hand rub for hand hygiene <u>in all health care settings</u>. [BI]</i>					
11.	<i>Wash hands with soap and water if there is visible soiling with dirt, blood, body fluids or other body substances. [AI] If hands are visibly soiled and running water is not available, use moistened towelettes to remove the visible soil, followed by alcohol-based hand rub.</i>					
12.	<i>In all health care settings, provide hand hygiene products at point-of-care for use by staff and clients/patients/residents. [BI]</i>					
13.	<i>Dispense all hand hygiene and hand care products from a disposable dispenser that delivers an appropriate volume of the product. [AII]</i>					
14.	<i>Use single-use product dispensers that are discarded when empty. Do not “top-up” or refill containers. Clearly define</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
	<i>responsibility for maintaining product dispensers. [AI]</i>					
15.	<i>Do not use bar soap for hand hygiene in any health care settings except for individual client/patient/resident use. [DII]</i>					
16.	<i>Do not use alcohol-free, waterless antiseptic agents as hand hygiene agents in any health care setting.[DII]</i>					
17.	<i>Consider user acceptability as a factor in hand hygiene product selection. [BI]</i>					
18.	<i>Choose hand hygiene and hand care products with low irritant potential. [BI]</i>					
19.	<i>Hand hygiene products must not interfere with glove integrity or with the action of other hand hygiene or hand care products. [AII]</i>					
20.	<i>Evaluate the dispenser system of product manufacturers to ensure that dispensers function adequately and deliver an appropriate volume of product. [AI]</i>					
6. Techniques for Performing Hand Hygiene						
21.	<i>In an operative setting, ABHR (surgical hand rub) with persistent antimicrobial activity is preferred for surgical hand preparation.[AI]</i>					
22.	<i>When using an alcohol-based hand rub, apply sufficient product such that it will remain in contact with the hands for a minimum of 15 seconds before the product becomes dry (usually one to two pumps). [BI]</i>					
23.	<i>When using soap and water, lather hands for a minimum of 15 seconds before rinsing. [BI]</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
24.	<i>Dry hands using a method that does not re-contaminate the hands. [BI]</i>					
25.	<i>Dry hands completely before putting on gloves. [BI]</i>					
26.	<i>Do not use alcohol-based hand rub immediately after washing hands with soap and water. [All]</i>					
27.	<i>When performing surgical hand antisepsis using an antimicrobial soap, scrub hands and forearms for the length of time recommended by the manufacturer, usually two to five minutes. <u>Long scrub times (e.g., 10 minutes) are not required.</u> [BI]</i>					
7. Considerations With Gloves						
28.	<i>The use of gloves does not replace the need for hand hygiene. [BI]</i>					
29.	<i>Wear gloves when it is anticipated that the hands will be in contact with mucous membranes, non-intact skin or body fluids. [CI]</i>					
30.	<i>Do not use the same pair of gloves for the care of more than one client/patient/resident. [BI]</i>					
31.	<i>Remove gloves immediately and discard after the activity for which they were used, then perform hand hygiene. [All]</i>					
32.	<i>Change or remove gloves if moving from a contaminated body site to a clean body site within the same client/patient/resident. [All]</i>					
33.	<i>Change or remove gloves after touching a contaminated environmental surface and before touching a client/patient/resident or a clean environmental surface. [All]</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
34.	<i>Do not wash or re-use gloves. [BI]</i>					
8. Hand Hygiene Considerations in Facility Design						
35.	<i>Before installing hand washing sinks and dispensers, prepare a workflow pattern and risk assessment to facilitate the decision about where to place sinks and products. [BIII]</i>					
36.	<i>Hand washing sinks shall be hands-free, free-standing and used only for hand washing. [AIII]</i>					
37.	<i>There should be sufficient hand washing sinks such that staff do not need to walk more than six metres/20 feet to reach the sink. [BIII]</i>					
38.	<i>Disposable paper towels shall be used for drying hands in clinical areas. [BIII]</i>					
39.	<i>Towel dispenser design shall be such that only the towel is touched during removal of towel for use. [BIII]</i>					
40.	<i>Where hot-air dryers are used in non-clinical areas, hands-free taps are required. [BIII]</i>					
41.	<i>There shall be a contingency plan to deal with power interruptions and temperature regulation when hot-air dryers or sink controls based on electric-eye technology are used. [BIII]</i>					
42.	<i>Locate alcohol-based hand rub dispensers at point-of-care and at the entrance to other locations where activities occur, unless contraindicated by the risk assessment or guidelines from the Ontario Fire Marshall's Office. [BIII]</i>					
9. Hand Hygiene Motivation and Behaviour						
43.	<i>Focus promotional programs for health care providers on</i>					

	Recommendation	Compliant	Partial Compliance	Non-compliant	Action Plan	Accountability
	<i>factors known to influence behaviour. [BI]</i>					
44.	<i>Incorporate peer role models and “champions” into the hand hygiene program. [BIII]</i>					
10. Hand Hygiene Education						
45.	<i>Educate health care providers about [All]: indications for hand hygiene factors that influence hand hygiene hand hygiene agents hand hygiene techniques hand care to promote skin integrity.</i>					
46.	<i>Encourage partnerships between clients/patients/residents, their families and health care providers to promote hand hygiene in health care. [CIII]</i>					
11. Hand Hygiene Monitoring and Feedback						
47.	<i>Routinely monitor hand hygiene compliance with the provision of timely feedback by using a reliable, validated observer audit tool and training process. [All]</i>					
48.	<i>Monitoring should assess compliance with each of the four moments to direct education and provide reliability. [BIII]</i>					
49.	<i>Review results of hand hygiene compliance as part of the ongoing safety agenda of facility committees, such as Joint Health and Safety, Infection Prevention and Control, Medical Advisory Committee and Senior Management. [BIII]</i>					

Appendices

APPENDIX A: RANKING SYSTEM FOR RECOMMENDATIONS

Categories for strength of each recommendation

CATEGORY	DEFINITION
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A	Good evidence to support a recommendation for use.
B	Moderate evidence to support a recommendation for use.
C	Insufficient evidence to support a recommendation for or against use
D	Moderate evidence to support a recommendation against use.
E	Good evidence to support a recommendation against use.

Categories for quality of evidence on which recommendations are made

GRADE	DEFINITION
-------	------------

I	Evidence from at least one properly randomized, controlled trial.
II	Evidence from at least one well-designed clinical trial without randomization, from cohort or case-controlled analytic studies, preferably from more than one centre, from multiple time series, or from dramatic results in uncontrolled experiments.
III	Evidence from opinions of respected authorities on the basis of clinical experience, descriptive studies, or reports of expert committees.

Note: When a recommendation is based on a regulation, no grading will apply.

APPENDIX B: TECHNIQUES FOR PERFORMING HAND HYGIENE

To clean hands properly, rub all parts of the hands and wrists with an alcohol-based hand rub or soap and water. Pay special attention to fingertips, between fingers, backs of hands and base of the thumbs.

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

Cleaning with alcohol-based hand rub

- **Clean hands for minimum 15 seconds**
- **Clean wrists and forearms if they are likely to have been contaminated**
- **Ensure hands are dry**
- **Apply lotion to hands frequently**

Hand washing with soap and water



Reproduced with permission from Just Clean Your Hands, Ontario's evidence-based hand hygiene program.¹¹ Available at: <http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.

Technique for Performing Surgical Hand Antisepsis

Practice	Rationale
Preparation for Scrubbing	
Finger nails shall be clean, short, natural and appear healthy. Natural nail tips should be less than 0.6 cm (1/4-inch) long.	The subungual region harbours the majority of microorganisms on the hand. Damaged nails, chipped or peeling polish may provide a harbour for microorganisms. Long nails, natural and/or artificial, can tear gloves.
Artificial nails, extenders or artificial enhancers shall not be worn.	Artificial nails and tips harbour higher numbers of organisms. Artificial nails are known to promote the growth of <i>Staphylococcus aureus</i> , gram-negative bacilli and yeast as moisture becomes trapped between the natural and artificial nail.
Each health care facility's infection control policy should dictate the use of nail polish.	Surgical conscience must be foremost in the minds of those individuals who choose to wear nail polish.
All jewellery should be removed.	Jewellery harbours microorganisms and could result in a glove tear. Several studies have demonstrated that skin underneath rings is more heavily colonized than skin on fingers without rings.
Protocol for Scrubbing	
Health care workers should practice general hand hygiene including: <ul style="list-style-type: none"> • hand hygiene immediately before and after patient contact; • after removing gloves; and • any time when there is the possibility of blood or other infectious material contact. 	Gloves do not provide complete protection against hand contamination.
Masks and protective eyewear shall be adjusted for proper fit prior to beginning a surgical hand scrub.	To be effective, a mask filters inhalations and exhalations. Therefore it is worn over both the nose and the mouth. To be effective, air must pass only through the filtering system; thus the mask needs to conform to facial contours to prevent leakage of expired air.
The skin of the hands and arms shall be free of open lesions and have no breaks in skin integrity.	Cuts, abrasions, burns and dermatitis are sources of infection and pose a risk to patients and personnel.
Members of the scrub team shall be free of respiratory infections.	Reduces the spread of possible infections to the patient and other members of the surgical team.
A surgical hand antiseptic/scrub agent approved by infection control shall be used.	A broad-spectrum surgical hand antiseptic/scrub agent should have the ability to kill organisms

Practice	Rationale
	immediately upon application, provide antimicrobial persistence to reduce re-growth of microorganisms and have a cumulative effect over time.
Each surgical hand antisepsis/scrub procedure (water or waterless) should follow a standardized protocol established and approved by the health care facility and the manufacturers' written instructions for use.	The manufacturer's written instructions should prevail because scrub procedures may differ.
Scrub personnel who have an identified allergy or sensitivity to antimicrobial agents should be directed by Occupational Health and Infection Control staff regarding appropriate hand scrub antiseptic agents.	
Special attention should be given to nails, subungual areas, between fingers and between thumb and index finger. Cleaning under each fingernail shall be done before performing the first scrub of the day. Nail cleaners shall be used to remove soil from nails.	The majority of flora on the hands is found under and around the fingernails.
When using water-facilitated scrub methods, hands shall be held above the elbows and away from surgical attire at all times during the surgical hand scrub and while drying the hands and arms with a sterile towel. The direction of the scrubbing procedure is from the hands to the elbows, without returning to the cleaned hands.	To allow the flow of water to run from clean to least clean. Applies the principle of "clean" to "dirty".
Open the scrub nurse's towel, gown and gloves on a separate sterile field, away from the back table and operative area.	Reduces the chance of contamination of the instrument table.
When using water-facilitated scrub methods, hands and arms shall be dried with a sterile towel prior to gowning. When using a waterless-facilitated scrub method, hands and arms shall be dry. Sterile glove liners, if used, are put on prior to gowning. Once donned, glove liners are not considered sterile.	Residual moisture increases the risk of strike-through, which contaminates the gown and surgical field.

Reproduced with permission from the Operating Room Nurses Association of Canada, 'Standards, Guidelines and Position Statements for Perioperative Registered Nursing Practice', 10th Edition; Revision 1- Dec 2011. Section 2, 'Infection Prevention and Control', Items 5.3.9 - 5.3.10 and Items 6.1.1 – 6.1.10.

APPENDIX C: PIDAC'S HAND HYGIENE FACT SHEET FOR HEALTH CARE SETTINGS

In health care settings, hand hygiene is the single most important way to prevent infections.

Hand hygiene is the responsibility of the organization and all individuals involved in health care. Hand hygiene is a core element of client/patient/resident safety for the prevention of infections and the spread of antimicrobial resistance. There are two methods of performing hand hygiene:

1. ALCOHOL-BASED HAND RUB (ABHR)

ABHR is the preferred method for decontaminating hands. ABHR is faster and more effective than washing hands (even with an antibacterial soap) when hands are not visibly soiled:

- ABHRs provide for a rapid kill of most transient microorganisms
- 70 to 90% is preferred for health care settings
- ABHRs are not to be used with water
- ABHRs contain emollients to reduce hand irritation
- ABHRs are less time-consuming than washing with soap and water
- If running water is not available, use moistened towelettes to remove the visible soil, followed by ABHR

2. HAND WASHING

Hand washing with soap and running water must be performed when hands are visibly soiled. Antimicrobial soap may be considered for use in critical care areas but is not required and not recommended in other care areas. Bar soaps are not acceptable in health care settings except for individual client/patient/resident personal use.

YOUR 4 MOMENTS FOR HAND HYGIENE

1. Before initial client/patient/resident or environment contact

When? Clean your hands when entering a room:

- before touching client/patient/resident
- before touching any object or furniture in the client/patient/resident's environment

Why? To protect the client/patient/resident and their environment from harmful germs carried on your hands.

2. Before aseptic procedure

When? Clean your hands immediately before any aseptic procedure.

Why? To protect the client/patient/resident from harmful germs, including his/her own germs, entering his or her body.

3. After body fluid exposure risk

When? Clean your hands immediately after an exposure risk to body fluids (and after glove removal).

Why? To protect yourself and the health care environment from harmful client/patient/resident germs.

4. After client/patient/resident or environment contact

When? Clean your hands on leaving:

- after touching client/patient/resident or
- after touching any object or furniture in the client/patient/resident's environment

Why? To protect yourself and the health care environment from harmful germs.

FACTORS THAT REDUCE THE EFFECTIVENESS OF HAND HYGIENE

The following factors reduce the effectiveness of hand hygiene:

- **Condition of the skin:** See Section II.4, "*Hand Care Programs*", for information about maintaining skin integrity.
- **Nails:** Long nails are difficult to clean, can pierce gloves and harbour more microorganisms than short nails. Nails must be kept clean and short.
- **Nail polish:** Only nail polish that is fresh and free of cracks or chips is acceptable.
- **Artificial nails or nail enhancements** are not to be worn by those giving care.
- **Jewellery:** Hand and arm jewellery hinder hand hygiene. Rings increase the number of microorganisms present on hands and increase the risk of tears in gloves. Arm jewellery, including watches, should be removed or pushed up above the wrist before performing hand hygiene.
- **Products:** Products must be dispensed in a disposable pump container that is not topped-up, to prevent contamination.

APPENDIX D: 'JUST CLEAN YOUR HANDS': ONTARIO'S EVIDENCE-BASED HAND HYGIENE PROGRAM

Just Clean Your Hands is the evidence-based hand hygiene program that was developed by Public Health Ontario for Ontario hospitals and long-term care homes to improve the hand hygiene compliance of health care providers, reduce negative impacts on clients/patients/residents due to health care-associated infections, and increase the performance of Ontario's health system. The provincial hand hygiene program is patterned on the World Health Organization's initiative, *Clean Care is Safer Care*, launched in 2005, and is a good example of a multifaceted hand hygiene program.

- More information about the *Just Clean Your Hands* program may be found at: <http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>.
- The *Clean Care is Safer Care* program may be found at: <http://www.who.int/gpsc/en/index.html>

The links to tools in this Appendix and in Appendices E and F are provided by the *Just Clean Your Hands* program. These tools are provided to assist in understanding how the recommendations in this best practice document can be implemented using the *Just Clean Your Hands* program.

Please note that the tools listed here are not all-inclusive and new tools are being added on an ongoing basis.

SOME TOOLS AVAILABLE FROM THE JUST CLEAN YOUR HANDS PROGRAM:

Hand Hygiene Tools for Hospitals	Hand Hygiene Tools for Long-Term Care Homes
Environmental Changes/Support System	
Hand Assessment Tool http://www.publichealthontario.ca/en/eRepository/hand-care-assessment.pdf	Hand Assessment Tool http://www.publichealthontario.ca/en/eRepository/hand-care-assessment.pdf
Hand Care Program http://www.publichealthontario.ca/en/eRepository/hand-care-program.pdf	Hand Care Program http://www.publichealthontario.ca/en/eRepository/hand-care-program.pdf
Placement Tool for Hand Hygiene Products http://www.publichealthontario.ca/en/eRepository/point-of-care-placement.pdf	Placement Tool for Hand Hygiene Products http://www.publichealthontario.ca/en/eRepository/point-of-care-placement.pdf
Training and Education Videos	
How to Handwash (video) http://az414432.vo.msecnd.net/content/English/video_6fsMDmX0aCK_30_48_720x396.mp4	Your 4 Moments for Hand Hygiene (PowerPoint) http://www.publichealthontario.ca/en/eRepository/4-moments-for-hand-hygiene-acute.ppt
How to Handrub (video) http://az414432.vo.msecnd.net/content/English/video_5zp7blv19fq_26_48_720x396.mp4	

Hand Hygiene Tools for Hospitals

Hand Hygiene Tools for Long-Term Care Homes

Your 4 Moments for Hand Hygiene (PowerPoint)

<http://www.publichealthontario.ca/en/eRepository/4-moments-for-hand-hygiene-acute.ppt>

Observation and Evaluation

Facility Level Situation Assessment

<http://www.publichealthontario.ca/en/eRepository/facility-level-situation-assessment.pdf>

How to Become a Just Clean Your Hands Observer

<http://www.publichealthontario.ca/en/eRepository/how-to-become-a-just-clean-your-hands-observer.pdf>

Hand Hygiene Compliance Observation and Analysis (PowerPoint)

<http://www.publichealthontario.ca/en/eRepository/Hand%20Hygiene%20Compliance%20Observation%20and%20Analysis.ppt>

Observation Tool Instructions

<http://www.publichealthontario.ca/en/eRepository/hand-hygiene-observation-and-analysis-tool-instructions.pdf>

Observation Tool

http://www.publichealthontario.ca/en/eRepository/Hand-Hygiene_hospital.zip

Observation Tool Form

http://www.publichealthontario.ca/en/eRepository/JCYH_Hospital_observation_tool_form.pdf

On the Spot Feedback Tool

<http://www.publichealthontario.ca/en/eRepository/on-the-spot-feedback-tool.pdf>

Facility Level Situation Assessment

<http://www.publichealthontario.ca/en/eRepository/facility-level-situation-assessment.pdf>

How to Become a Just Clean Your Hands Observer

<http://www.publichealthontario.ca/en/eRepository/how-to-become-a-just-clean-your-hands-observer.pdf>

Hand Hygiene Compliance Observation and Analysis (PowerPoint)

<http://www.publichealthontario.ca/en/eRepository/Hand%20Hygiene%20Compliance%20Observation%20and%20Analysis.ppt>

Observation Tool Instructions

<http://www.publichealthontario.ca/en/eRepository/hand-hygiene-observation-and-analysis-tool-instructions.pdf>

Observation Tool

<http://www.publichealthontario.ca/en/eRepository/Hand-HygieneLTC.zip>

On the Spot Feedback Tool

<http://www.publichealthontario.ca/en/eRepository/on-the-spot-feedback-tool.pdf>

Observation Tool Form

<http://www.publichealthontario.ca/en/eRepository/observation-tool-form.pdf>

Workplace Reminders

Your 4 Moments Poster

<http://www.publichealthontario.ca/en/eRepository/4-moments-for-hand-hygiene-poster.pdf>

How to Create a Champion Poster

<http://www.publichealthontario.ca/en/eRepository/how-to-create-a-champion-poster-cd.pdf>

4 Moments Pocket Card

<http://www.publichealthontario.ca/en/eRepository/4-moments-pocket-card.pdf>

Your 4 Moments Poster Female

<http://www.publichealthontario.ca/en/eRepository/4-moments-for-hand-hygiene-female-lg.pdf>

Your 4 Moments Poster Male

<http://www.publichealthontario.ca/en/eRepository/4-moments-for-hand-hygiene-male-lg.pdf>

How to Create a Champion Poster

<http://www.publichealthontario.ca/en/eRepository/how-to-create-a-champion-poster-cd.pdf>

Hand Hygiene Tools for Hospitals

How to Handwash Mini Poster

<http://www.publichealthontario.ca/en/eRepository/how-to-handwash.pdf>

How to Handrub Mini Poster

<http://www.publichealthontario.ca/en/eRepository/how-to-handrub.pdf>

Hand Hygiene Tools for Long-Term Care Homes

4 Moments Pocket Card

<http://www.publichealthontario.ca/en/eRepository/4-moments-pocket-card.pdf>

How to Handwash Mini Poster

<http://www.publichealthontario.ca/en/eRepository/how-to-handwash.pdf>

How to Handrub Mini Poster

<http://www.publichealthontario.ca/en/eRepository/how-to-handrub.pdf>

Senior Management Support and Program Leadership

Implementation Guide

http://www.publichealthontario.ca/en/eRepository/JCYH_Implementation_Guide_for_Hospitals_2013.pdf

5 Steps to Implementation

<http://www.publichealthontario.ca/en/eRepository/5-steps-to-implementation.pdf>

Sample Letter to Introduce Program to Senior Level Administrators

<http://www.publichealthontario.ca/en/eRepository/sample-letter-to-introduce-program-to-senior-level-administrators.pdf>

Sample Implementation Plan

<http://www.publichealthontario.ca/en/eRepository/sample-implementation-plan.pdf>

Facility Level Situation Assessment

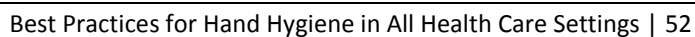
<http://www.publichealthontario.ca/en/eRepository/facility-level-situation-assessment.pdf>

Implementation Guide

<http://www.publichealthontario.ca/en/eRepository/implementation-guide.pdf>

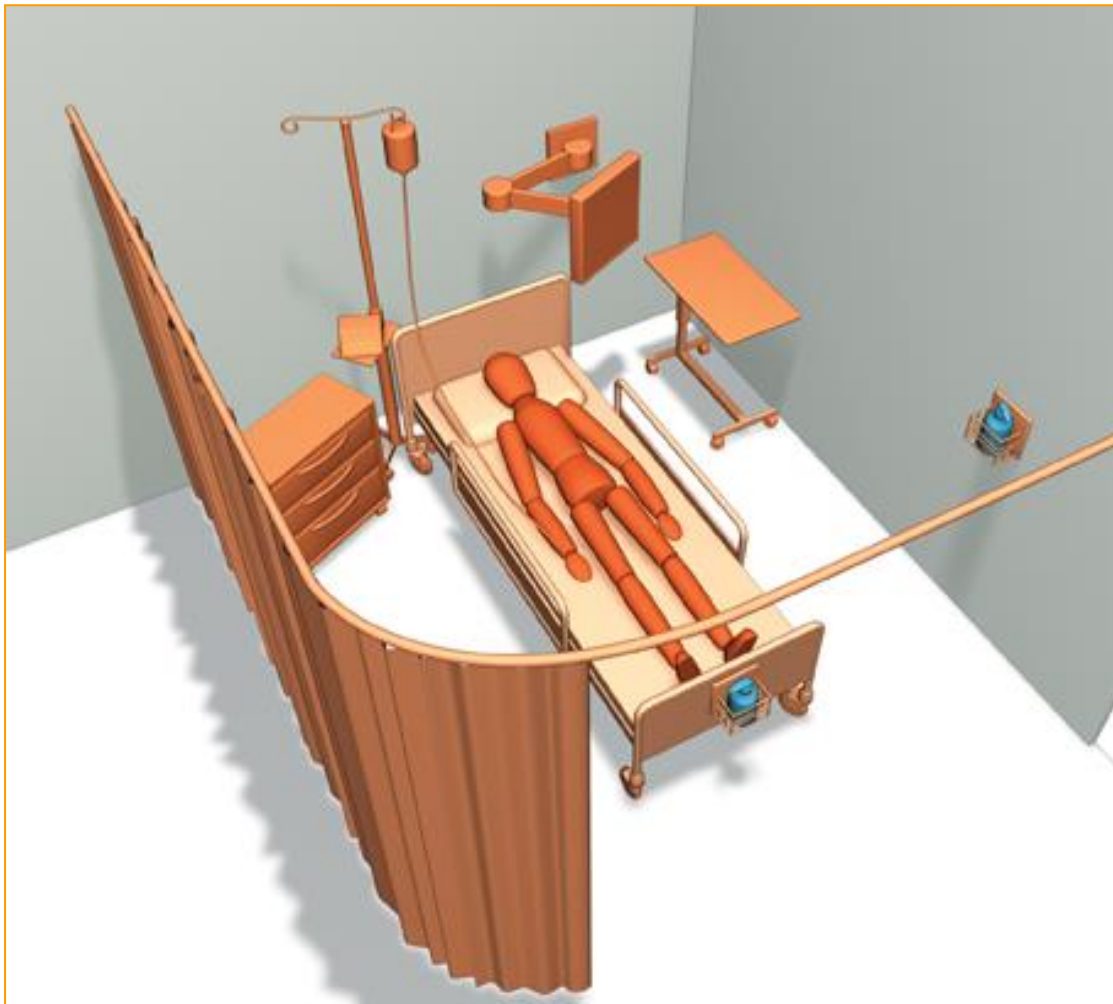
Reproduced with permission from Just Clean Your Hands, Ontario's evidence-based hand hygiene program.¹¹

<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>



APPENDIX F: ENVIRONMENT OF THE CLIENT/PATIENT/RESIDENT

The immediate space around a client/patient/resident that may be touched by the client/patient/resident and may also be touched by the health care provider when providing care. In a single room, the client/patient/resident environment is the room. In a multi-bed room, the client/patient/resident environment is the area inside the individual's curtain. In an ambulatory setting, the client/patient/resident environment is the area that may come into contact with the client/patient/resident within their cubicle. In a nursery/neonatal setting, the patient environment includes the inside of the bassinette or incubator, as well as the equipment outside the bassinette or incubator used for that infant (e.g., ventilator, monitor).



This image is reproduced with permission from Just Clean Your Hands, Ontario's evidence-based hand hygiene program.¹¹ Available at:

<http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/JustCleanYourHands/Pages/Just-Clean-Your-Hands.aspx>

APPENDIX G: SEARCH STRATEGY FOR BEST PRACTICES FOR HAND HYGIENE

PIDAC Hand Hygiene Update – Theory and Practice

Database: EBSCO CINAHL Plus with Full Text			
#	Query	Limiters/Expanders	Results
S30	S28 NOT S29	Search modes - Boolean/Phrase	522
S29	S11 OR S25 OR S26	Limiters - Published Date: 20100101- ; Exclude MEDLINE records; Language: English, French; Publication Type: Commentary, Editorial, Letter Search modes - Boolean/Phrase	30
S28	S11 OR S25 OR S26	Limiters - Published Date: 20100101- ; Exclude MEDLINE records; Language: English, French Search modes - Boolean/Phrase	552
S27	S11 OR S25 OR S26	Search modes - Boolean/Phrase	5,287
S26	(ABHR OR "alcohol based hand rub" OR "hand gel" OR "hand saniti*" OR handrub OR "surgical hand rub" OR "surgical hand scrub")	Search modes - Boolean/Phrase	334
S25	S23 AND S24	Search modes - Boolean/Phrase	2,897
S24	S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22	Search modes - Boolean/Phrase	24,638
S23	S3 OR S14	Search modes - Boolean/Phrase	66,885
S22	(glove OR gloves)	Search modes - Boolean/Phrase	2,952
S21	(MH "Gloves")	Search modes - Boolean/Phrase	2,063
S20	((dispenser OR sink) N2 (design OR placement))	Search modes - Boolean/Phrase	5
S19	(MH "Facility Design and Construction+") OR (MH "Hospital Design and Construction")	Search modes - Boolean/Phrase	10,038
S18	soap	Search modes - Boolean/Phrase	718
S17	(MH "Antiinfective Agents, Local")	Search modes - Boolean/Phrase	2,589
S16	(bracelet* OR "finger nail*" OR fingernail* OR "hand care" OR jewelry OR manicure* OR (nail N1 (polish* OR varnish* OR lacquer* OR colo#r OR fake OR acrylic OR artificial)) OR "wedding band*" OR (wrist N3 watch))	Search modes - Boolean/Phrase	936
S15	(MH "Dermatitis, Contact") OR (MH "Jewelry") OR (MH "Nail Diseases+") OR (MH "Nails") OR (MH "Nail Care") OR (MH "Skin Care")	Search modes - Boolean/Phrase	8,581
S14	S12 OR S13	Search modes - Boolean/Phrase	66,555
S13	("cross infect*" OR "disease transmi*" OR HAI OR "health care acquired infect*" OR "healthcare acquired infect*" OR "hospital acquired infect*" OR nosocomial)	Search modes - Boolean/Phrase	25,247
S12	(MH "Cross Infection") OR (MH "Infection Control+") OR (MH "Disease Transmission, Professional-to-Patient") OR (MH "Disease	Search modes - Boolean/Phrase	63,106

Database: EBSCO CINAHL Plus with Full Text			
#	Query	Limiters/Expanders	Results
	Transmission, Vertical") OR (MH "Disease Transmission, Patient-to-Professional") OR (MH "Sanitation+")		
S11	S3 AND S10	Search modes - Boolean/Phrase	2,890
S10	S4 OR S5 OR S6 OR S7 OR S8 OR S9	Search modes - Boolean/Phrase	916,484
S9	(adherence OR complian* OR observ* OR monitor* OR feedback)	Search modes - Boolean/Phrase	267,776
S8	(MH "Guideline Adherence") OR (MH "Practice Guidelines") OR (MH "Professional Compliance")	Search modes - Boolean/Phrase	47,297
S7	(campaign OR educat* OR promot* OR strateg*)	Search modes - Boolean/Phrase	593,559
S6	(MH "Health Education") OR (MH "Social Marketing")	Search modes - Boolean/Phrase	17,748
S5	((behavio#r OR habit*) N1 (change OR alter* OR modif*)) OR "positive devian*")	Search modes - Boolean/Phrase	5,943
S4	(MH "Attitude of Health Personnel+") OR (MH "Health Behavior+") OR (MH "Health Personnel+/PF") OR (MH "Motivation+")	Search modes - Boolean/Phrase	164,053
S3	S1 OR S2	Search modes - Boolean/Phrase	5,748
S2	((clean* OR disinfect* OR hygien* OR wash*) N1 hand) OR handwash*)	Search modes - Boolean/Phrase	5,690
S1	(MH "Handwashing+")	Search modes - Boolean/Phrase	4,988

PIDAC Hand Hygiene Update – Theory and Practice

Database: OVID Embase 1996 to 2013 Week 29		
#	Searches	Results
1	hand washing/Multimedia(857)	6316
2	((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$.ti. or ((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$.ab.	5526
3	1 or 2Multimedia(477)	8542
4	exp health personnel attitude/ or exp health behavior/ or exp health care personnel/ or motivation/	901991
5	((behavio?r or habit\$) adj1 (change or alter\$ or modif\$)) or positive devian\$.mp.	24737
6	exp health education/ or medical information/ or social marketing/	209335
7	(campaign or educat\$ or promot\$ or strateg\$).mp.	1712441
8	exp practice guideline/	287965
9	(adherence or complian\$ or observ\$ or monitor\$ or feedback).mp.	2708234
10	4 or 5 or 6 or 7 or 8 or 9	4792094
11	3 and 10	5992
12	limit 11 to (yr="2010 -Current" and (english or french))	2395
13	remove duplicates from 12)	2339
14	limit 13 to (editorial or letter)	155
15	13 not 14	2184
16	limit 15 to exclude medline journals	309
17	hand washing/	6316

Database: OVID Embase 1996 to 2013 Week 29		
#	Searches	Results
18	(((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$).ti. or (((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$).ab.	5526
19	17 or 18	8542
20	cross infection/ or infection control/ or infection control practitioner/ or infection prevention/ or disease transmission/ or sanitation/ or environmental sanitation/ or hospital infection/	164160
21	(cross infect\$ or disease transmi\$ or HAI or health care acquired infect\$ or healthcare acquired infect\$ or hospital acquired infect\$ or nosocomial).mp.	95974
22	20 or 21	176416
23	contact dermatitis/ or exp hand disease/ or jewelry/ or exp nail disease/ or exp nail/ or skin care/	53116
24	(bracelet? or finger nail? or fingernail? or hand care or jewelry or manicure? or (nail adj1 (polish\$ or varnish\$ or lacquer\$ or colo?r or fake or acrylic or artificial)) or wedding band? or (wrist adj3 watch)).mp.	3754
25	23 or 24	54385
26	25 and (22 or 19)	1181
27	soap.mp.	3707
28	(ABHR or alcohol based hand rub or hand gel or hand saniti\$ or handrub or surgical hand rub or surgical hand scrub).mp.	698
29	27 and 19	927
30	29 or 28	1479
31	hospital design/ or exp health care facility/	625037
32	((dispenser or sink) adj2 (design or placement)).mp.	13
33	31 or 32	625045
34	33 and (19 or 22)	23908
35	glove/ or surgical glove/	4108
36	glove.mp.	5397
37	35 or 36	5397
38	37 and (19 or 22)	1232
39	26 or 30 or 34 or 38	26604
40	limit 39 to (yr="2010 -Current" and (english or french))	9233
41	limit 40 to (editorial or letter)	501
42	40 not 41	8732
43	limit 42 to exclude medline journals	1126
44	16 or 43	1239
45	remove duplicates from 44	1238

PIDAC Hand Hygiene Update – Theory (attitude, behaviour and compliance)

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to Present		
#	Searches	Results
1	Hand Disinfection/ or Hand Hygiene/	4570
2	((((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$).ti. or (((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$).ab.	5219
3	limit 2 to ("in data review" or in process or "pubmed not medline")	337
4	1 or 2	7201
5	Attitude of Health Personnel/ or Health Behavior/ or Health Personnel/px or Motivation/	170680
6	((behavio?r or habit\$) adj1 (change or alter\$ or modif\$)) or positive devian\$).mp.	12247
7	exp Health Education/ or Health Communication/ or Social Marketing/	137337
8	(campaign or educat\$ or promot\$ or strateg\$).mp.	1785640
9	Guideline Adherence/ or Practice Guidelines as Topic/	89202
10	(adherence or complian\$ or observ\$ or monitor\$ or feedback).mp.	3211298
11	5 or 6 or 7 or 8 or 9 or 10	4848340
12	4 and 11	3516
13	limit 12 to (yr="2010 -Current" and (english or french))	1108
14	remove duplicates from 13	988
15	limit 14 to (comment or editorial or letter)	65
16	14 not 15	923

PIDAC Hand Hygiene Update – Practice (hand care, products, facilities, gloves)

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to Present		
#	Searches	Results
1	Hand Disinfection/ or Hand Hygiene/	4570
2	((((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$).ti. or (((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$).ab.	5221
3	limit 2 to ("in data review" or in process or "pubmed not medline")	339
4	1 or 2	7203
5	Cross Infection/ or Infection Control/ or Infectious Disease Transmission, Patient-to-Professional/ or Infectious Disease Transmission, Professional-to-Patient/ or Infectious Disease Transmission, Vertical/ or Sanitation/	77912
6	(cross infect\$ or disease transmi\$ or HAI or health care acquired infect\$ or healthcare acquired infect\$ or hospital acquired infect\$ or nosocomial).mp.	82536
7	5 or 6	98837
8	Dermatitis, Contact/ or Hand Dermatoses/ or Jewelry/ or Nail Diseases/ or Nails/ or exp Skin Care/	32907
9	(bracelet? or finger nail? or fingernail? or hand care or jewelry or manicure? or (nail adj1 (polish\$ or varnish\$ or lacquer\$ or colo?r or fake or acrylic or artificial)) or wedding band? or (wrist adj3 watch)).mp.	3150
10	8 or 9	34839
11	10 and (7 or 4)	796

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to Present		
#	Searches	Results
12	Anti-Infective Agents, Local/	13041
13	soap.mp.	3335
14	12 or 13	16133
15	14 and 4	1245
16	(ABHR or alcohol based hand rub or hand gel or hand sanitiz\$ or handrub or surgical hand rub or surgical hand scrub).mp.	496
17	15 or 16	1530
18	"Facility Design and Construction"/ or "Hospital Design and Construction"/	16843
19	((dispenser or sink) adj2 (design or placement)).mp.	12
20	18 or 19	16852
21	20 and (7 or 4)	583
22	exp Gloves, Protective/	4128
23	glove?.mp.	8660
24	22 or 23	8660
25	24 and (7 or 4)	1733
26	11 or 17 or 21 or 25	4235
27	limit 26 to (yr="2010 -Current" and (english or french))	710
28	remove duplicates from 27	616
29	limit 28 to (comment or editorial or letter)	33
30	28 not 29	583

PIDAC Hand Hygiene Update - Psychology

Database: Ovid PsycINFO 2002 to July Week 3 2013		
#	Searches	Results
1	((clean\$ or disinfect\$ or hygien\$ or wash\$) adj1 hand) or handwash\$.mp.	254
2	(ABHR or alcohol based hand rub or hand gel or hand sanitiz\$ or handrub or surgical hand rub or surgical hand scrub).mp.	24
3	1 or 2	265
4	limit 3 to ((english or french) and yr="2010 -Current")	131

References

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3. Provincial Infectious Diseases Advisory Committee (PIDAC). Routine Practices and Additional Precautions in All Health Care Settings. Annex A: Screening, Testing and Surveillance for Antibiotic-Resistant Organisms (AROs). 2013 [cited May 15, 2013]. Available from: http://www.publichealthontario.ca/en/eRepository/PIDAC_IPC_Annex_A_Screening_Testing_Surveillance_AROs_2013.pdf.
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