

EVIDENCE SYNTHESIS BRIEFING NOTE

TOPIC: LEADING PRACTICES FOR TRAINING ALL HEALTH CARE FACILITY STAFF IN INFECTION PREVENTION AND CONTROL

Information finalized as of September 8, 2020.^a

This Briefing Note was completed by the Research, Analysis, and Evaluation Branch (Ministry of Health) based on information provided by a member of the COVID-19 Evidence Synthesis Network. Please refer to the [Methods](#) section for further information.

Purpose: This note summarizes scientific evidence associated with the development of programs designed to train all hospital staff in infection prevention and control (IPAC) strategies, and guidance on the successful implementation of such programs.

Key Findings

- **IPAC Training:** Various Canadian online and classroom-based training programs of different durations provide IPAC training to health care workers. For example:
 - *Infection Prevention and Control – Routine Practices:* A short (4 hrs.) self-paced online course from IPAC Canada is aimed at implementing standardized IPAC practices while reducing the number, duration, and severity of infections in any health care setting.
- **Multimodal Interventions:** Using a combination of interventions recommended in the World Health Organization (WHO) guidelines (e.g., alcohol-based hand rub, education, reminders, performance feedback, and managerial support) may slightly improve hand hygiene compliance, reduce colonisation rates, and improve infection rates regardless of the health care setting.
 - There is insufficient evidence to identify which strategy or combination of strategies is most effective in a given context.
- **IPAC Barriers and Facilitators:** Health care workers (HCWs) are more likely to adhere to IPAC guidelines when communication about IPAC strategies is clear and is provided via multiple platforms or methods; IPAC guidelines that are short, specific, and practical, and updated only when necessary, also support adherence.

IPAC Design Tool

- An evidence-based tool provides a set of questions to assist Ministries of Health, health care facilities, and other stakeholders design IPAC strategies for respiratory infectious diseases. The tool helps identify design needs associated with training and education programs, as well as:
 - Communicating about IPAC guidance; workload; physical environment; use of PPE and other supplies; IPAC adherence; patient relationships.

Analysis for Ontario

- The interventions in the multimodal package recommended by WHO are applicable to all settings and implementation should therefore be encouraged. However, the WHO interventions will need to be adapted to meet local needs and available resources. Different strategies or combinations of interventions may be more effective for some groups or health care settings than others.

^a This briefing note includes current available evidence as of the noted date. It is not intended to be an exhaustive analysis, and other relevant findings may have been reported since completion.

Supporting Evidence for the Successful Implementation of IPAC Training in Health Care Settings^b

The [Table 1](#) below summarizes approaches to ensuring health care workers' (HCWs) use of respiratory protection equipment (RPE) and adherence to 'standard precautions'.^c [Table 2](#) describes the evidence associated with hand hygiene compliance in patient care. [Table 3](#) provides evidence for the barriers and facilitators to health care workers' adherence to infection protection and compliance (IPAC) guidelines.

Additional details are provided in the Appendix: [Table 4](#) summarizes selected IPAC training programs designed to train staff in health care settings. [Table 5](#) provides a set of questions that were designed to help ministries of health, health care facilities, and other stakeholders to plan, implement, or manage IPAC strategies for respiratory infectious diseases. [Table 6](#) provides abstracts to the relevant documents used in this note.

Table 1: Improving Use of RPE and Adherence to standard precautions^{1,2}

Scientific Evidence	<p>There are mixed findings for the interventions that support the use of health care workers' use of RPE and adherence to standard precautions:</p> <ul style="list-style-type: none"> • A 2016 systematic review identified (low quality) evidence that behavioural interventions (e.g., various education and training programs) do not increase the numbers of workers that use respiratory protection equipment or that use RPE correctly.^d • A 2018 systematic review demonstrated that education, peer evaluation and communication interventions <i>probably</i> improved health care workers' adherence to standard precautions in health care settings:^e <ul style="list-style-type: none"> ○ Education with visualization: A 2007 study showed that education programs that feature the visualization of respiratory particle dispersion improved nurses' uses of masks during clinical interactions with patients with respiratory symptoms (post intervention only); <ul style="list-style-type: none"> ○ The intervention led to little or no difference in knowledge;^{3,f} ○ Peer evaluation: A 2000 study showed the use of peer evaluation tools improved handwashing and glove usage among 99 nursing staff (registered nurses, practical nurses, and patient care aides) in an acute care hospital in Thailand;^{4,g} and ○ Communication interventions: A 2013 study showed that use of checklists and visual cues that prompt health care workers to perform required actions improved adherence to glove use, hand hygiene, and gown use among radiology porters when transferring patients requiring contact precautions in an acute care hospital.^{5,h}
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^b The abstracts for highly relevant documents included in this section are profiled in [Table 7](#) in the Appendix.

^c 'Standard precautions' refers to a system of actions, such as using PPE or adhering to safe handling of needles, that health care workers take to reduce the spread of germs in health care settings, such as hospitals and nursing homes ([Moralejo et al., 2018](#)).

^d The systematic review did not identify any studies wherein researchers conducted and assessed incentives or interventions at the level of a whole organization ([Thanh et al., 2016](#)).

^e According to the systematic review, the evidence is unclear as to which interventions should be recommended to promote adherence to Standard Precautions ([Moralejo et al., 2018](#)).

^f Education alone and education with additional infection control support may only slightly improve adherence to Standard Precautions ([Moralejo et al., 2018](#)).

^g The peer feedback protocol was effective during the intervention period, but there was no retention of effect ([Moongtui et al., 2000](#)).

^h Data show no consistency whether using checklists alone, cues alone, or checklists and cues together improved health care staff adherence to Standard Protocols ([Moralejo et al., 2018](#)).

Table 2: Strategies for Ensuring Hand Hygiene Compliance in Patient Care^{6,7,8,i}

<p>Scientific Evidence</p>	<p>Various single intervention strategies and different combinations of WHO-recommended strategies^j may lead to increased hand hygiene compliance, reduced colonization rates, and improvements in methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) infection rates regardless of the health care setting. There was insufficient evidence to identify which strategy or combination of strategies is most effective in a given context.</p> <ul style="list-style-type: none"> • Strategies included increasing the availability of alcohol-based hand rub (ABHR); different types of education for staff; reminders (written and verbal); different types of performance feedback; administrative support; and staff involvement. For example: <ul style="list-style-type: none"> ○ Performance Feedback: Six studies suggest different types of performance feedback (e.g., wireless monitoring, personalized action planning) may improve hand hygiene compliance among HCWs in acute care hospitals and may slightly reduce infection rates; ○ Education and Training: Two studies suggested education may improve hand hygiene compliance; ○ Cues: Three studies reported cues (e.g., signs, scent) may slightly improve hand hygiene compliance; and ○ ABHR Placement: One study reported that placement of ABHR dispensers close to the point of use (i.e., on anaesthesia carts) probably slightly improves hand hygiene compliance.
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ⁱ The systematic review provided insufficient information to identify the interventions that were most effective ([Gould et al., 2017](#)).

^j The WHO report that multimodal implementation strategies are a core component of effective infection prevention and control (IPC) programmes. In practice, this means the use of multiple approaches that in combination will contribute to influencing the behaviour of the target audience (usually health care workers) towards the necessary improvements that will impact on patient outcome and contribute to organizational culture change. WHO identifies five elements for implementing infection and protection and control practices in a health care context: 1) The system change needed to enable IPC practices, including infrastructure, equipment, supplies and other resources; 2) Training and education to improve health worker knowledge; 3) Monitoring and feedback to assess the problem, drive appropriate change and document practice improvement; 4) Reminders and communications to promote the desired actions, at the right time, including campaigns; and, 5) A culture of safety to facilitate an organizational climate that values the intervention, with a focus on involvement of senior managers, champions or role models ([WHO Multimodal Improvement Strategy, n.d.](#)).

Table 3: Barriers and Facilitators Associated with Health Care Workers' Adherence to IPAC Guidelines^{9,10}

Scientific Evidence	<p>A 2018 systematic review of qualitative and mixed methods studies suggests nurses, doctors, and other health care workers in hospitals and in primary and community care settings identified numerous factors that influenced their ability and willingness to follow IPAC guidelines^k when managing respiratory infectious diseases.^l</p> <ul style="list-style-type: none"> • Organizational barriers: HCWs reported the following factors impact adherence: <ul style="list-style-type: none"> ○ A supportive management team; IPAC guidelines that were as short, specific, and practical as possible and updated only when necessary; clear communication via multiple platforms or methods; and availability of training for which the trainer does not feel that he or she is taken away from existing clinical responsibilities. • Environmental barriers: HCWs reported the following factors impact their adherence: <ul style="list-style-type: none"> ○ Adequate space, isolation facilities, ventilation, anterooms, showers, handwashing facilities, surface decontamination facilities, and adequate supplies of appropriate PPE tailored to varying needs at different stages of the outbreak. • Individual barriers: HCWs reported 10 main factors that impacted their adherence to IPAC guidance, including the following: <ul style="list-style-type: none"> ○ <i>Knowledge:</i> Learning a colleague or patient had contracted an infection; having knowledge of IPAC; and having access to evidence, rationale, and support to increase their IPAC knowledge. ○ <i>Attitudes & Beliefs:</i> Placing a high value on the importance of IPAC; and fear of infecting themselves or others. ○ <i>PPE Discomfort:</i> Discomfort of wearing PPE reduces HCWs' adherence to their use.
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Methods

The COVID-19 Evidence Synthesis Network is comprised of groups specializing in evidence synthesis and knowledge translation. The group has committed to provide their expertise to provide high-quality, relevant, and timely synthesized research evidence about COVID-19 to inform decision makers as the pandemic continues. The Cochrane Library provided evidence synthesis products that were used to develop this Evidence Synthesis Briefing Note:

- Gould, D.J., Moralejo, D., Drey, N., Chudleigh, J.H., and Taljaard, M. (2017). [Interventions to improve hand hygiene compliance in patient care](#). *Cochrane Database of Systematic Reviews*, 9.
- Burch, J., & Hammerschmidt, J. (2020). [What are the organizational, environmental, and individual barriers and facilitators affecting healthcare workers' adherence to infection prevention and control](#)

^k The study drew on the 2014 WHO guidelines, [Infection Prevention and Control Epidemic- and Pandemic-prone Acute Respiratory Infections in Healthcare](#), to define infection protection and control as: the early recognition and source control (triage, respiratory hygiene); administrative controls (i.e., isolation, spatial separation, patient 'cohorting'); environmental and engineering controls (i.e., cleaning and disinfection, ventilation); PPE donning and doffing, gowns, gloves, masks, goggles; and hand hygiene ([Houghton et al., 2020](#)).

^l Respiratory infectious diseases included severe acute respiratory syndrome (SARS), H1N1, Middle East respiratory syndrome (MERS), tuberculosis (TB), and seasonal influenza ([Houghton et al., 2020](#)).

- [\(IPAC\) guidelines for respirator infectious disease?](#) Cochrane Library.
- Burch, J., & Hammerschmidt, J. (2020). [What are the effects of multimodal campaigns to improve hand hygiene of healthcare workers?](#) Cochrane Library.
 - Burch, J., & Hammerschmidt, J. (2020). [What are the effects of performance feedback, education and olfactory/visual cues on hand hygiene of healthcare workers?](#) Cochrane Library.
 - Houghton, C., Meskell, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Chan, XHS, Devane, D., and Biesty, L.M. (2020). [Barriers and facilitators to healthcare workers' adherence with infection prevention and control \(IPAC\) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis.](#) *Cochrane Database of Systematic Reviews*, 4.
 - Moralejo, D., El Dib, R., Prata, R.A., Barretti, P., and Correa, I. (2018). [Improving adherence to Standard Precautions for the control of health care-associated infections.](#) *Cochrane Database of Systematic Reviews*, Issue 2.
 - Luong Thanh, B.Y., Laopaiboon, M., Koh, D., Sakunkoo, P., and Moe, H. (2016). [Behavioural interventions to promote workers' use of respiratory protective equipment.](#) *Cochrane Database of Systematic Reviews*, 12.

For more information, please contact the [Research, Analysis and Evaluation Branch \(Ministry of Health\)](#).

APPENDIX

Table 4: Selected IPAC Training Programs for Health Care Settings Across Jurisdictions

This table summarizes selected training programs designed to train health care workers in infection protection and control. They were identified from a search of the literature conducted by the Research Analysis and Evaluation Branch, Ministry of Health on September 23, 2020.

Program, Organization, Jurisdiction	Course / Program Features	Courses/Topics Covered
<p>IPAC Canada Novice Infection Prevention and Control (IPAC)</p> <p>Infection Prevention and Control Canada</p> <p>Canada</p>	<p>Audience</p> <ul style="list-style-type: none"> • Preference for admission will be given to novice infection prevention and control professionals (ICPs) with less than 2 years' experience. • Applications will also be considered from others working in health care and/or exploring opportunities in IPAC. <p>Timing</p> <ul style="list-style-type: none"> • Annual course runs from September to June. <p>Course Structure</p> <ul style="list-style-type: none"> • This is a distance education course and is offered entirely online. <p>Tuition</p> <ul style="list-style-type: none"> • Tuition is \$1790.00 CDN. 	<p>Program Description</p> <ul style="list-style-type: none"> • The course consists of six modules and a 12-hour Practical Application Project. • Modules vary in length from 3 to 5 weeks. <p>Certification</p> <ul style="list-style-type: none"> • Graduates receive a certificate of completion from IPAC Canada. <p>Course Listings</p> <ul style="list-style-type: none"> • Module 1: History of IPAC; IPAC Roles and Responsibilities; Teamwork in IPAC; Ethics in IPAC; Teaching and Persuasion; Technical Aspects of Presentations; Policy and Procedure Development; Chain of Infection; Hierarchy of Controls; Hand Hygiene, Routine Practices and Additional Precautions; Personal Protective Equipment • Module 2: Pathophysiology of Infection; Basic Bacteriology; Basic Virology; Interpretation of Microbiology Lab Results; Antibiotic Therapy; Antibiotic Resistant Organisms • Module 3: Common Infections: Respiratory, Surgical Site, Bloodstream, GI, Urinary Tract, Skin and Soft Tissue • Module 4: Concepts of Epidemiology; Purpose and Types of Surveillance; Data Collection and Management; Data Analysis and Interpretation; Communication Surveillance Results • Module 5: Identification of Outbreaks; Managing Outbreaks; Occupational Health • Module 6: Sterilization and Disinfection; Environmental Cleaning; Reuse Issues; Waste Management; Product Selection; Design, Construction and Renovations; Mechanical Systems; Audits and Review Processes

Program, Organization, Jurisdiction	Course / Program Features	Courses/Topics Covered
University Programs Endorsed by IPAC Canada		
<p>Infection Prevention & Control Certificate</p> <p>University of British Columbia</p> <p>British Columbia</p>	<p>Purpose</p> <ul style="list-style-type: none"> Introduces students to the principles of IPAC. Offered as stand-alone courses or as contributions toward a four-course University of British Columbia Infection Control Certificate and/or towards a MSc in Nursing or Epidemiology with the permission of the individual's appropriate university departments. 	<p>Online Infection Control Course</p> <ul style="list-style-type: none"> Basic Principles of Infection Prevention and Control. Basics of Medical Microbiology for Infection Control. Basic Epidemiology for Infection Control. <p>Clerkship</p> <ul style="list-style-type: none"> Laboratory Medicine and Infection Control
<p>Centennial College Onsite and Online Infection Control</p> <p>Centennial College</p> <p>Ontario</p>	<p>Purpose</p> <ul style="list-style-type: none"> Provides students the principles to plan, implement, manage and evaluate IPAC programs in a variety of health care settings. <p>Audience</p> <ul style="list-style-type: none"> IPAC course is designed for new IPAC Practitioners in a variety of health care facilities and settings such as: <ul style="list-style-type: none"> Acute care, community, public health, long-term care homes; retirement homes; first Responders and support services. It is taught by experienced professionals who maintain their certification in infection control (CIC). Course is aimed at health care professionals with a health sciences background. <p>Timing</p> <ul style="list-style-type: none"> Offered every fall in Toronto. Training is 90 hours in duration. <p>Requirements</p> <ul style="list-style-type: none"> Online exam, and interactive learning (i.e., case scenarios). 	<p>Online course</p> <ul style="list-style-type: none"> Course is a facilitated, interactive course offered in Spring each year, which includes recorded presentations from the onsite class. For each day of the ten-day onsite course, one week is allotted for the online version, which completes within 12 weeks. <p>Onsite Classroom Course</p> <ul style="list-style-type: none"> Includes 10 days of interactive activity. Provides face-to-face networking with fellow students and a faculty with extensive in IPAC experience.
<p>Infection Prevention & Control Online Course</p> <p>Queen's University</p> <p>Ontario</p>	<p>Purpose</p> <ul style="list-style-type: none"> Introduce participants to the practice of IPAC and to increase participants' knowledge and skills for managing the prevention and control of infections and disease. <p>Audience</p> <ul style="list-style-type: none"> Health professionals who are new to the IPAC field or are about to enter into the practice of IPAC. <p>Prerequisites</p> <ul style="list-style-type: none"> Pre-requisites include one of: <ul style="list-style-type: none"> RN, BSc or Medical Lab Technician; Other degrees or training will be considered. 	<p>Course Topics</p> <ul style="list-style-type: none"> Life-long Learning; Principles of Adult Learning; Evidence-based Medical & Literature Searching; Infectious Diseases Processes-Clinical Microbiology; Routine Practices and Added Precautions; Disinfection, Sterilization, Re-processing and Construction; Epidemiologic Investigation and Surveillance; Epidemiology of Health Care Acquired Infections; Employee and Occupational Health; Public Health and Education; and Management and Communications in Infection Prevention and Control.

Program, Organization, Jurisdiction	Course / Program Features	Courses/Topics Covered
Other Courses		
<p>Infection Prevention & Control Routine Practices</p> <p>Infection Prevention and Control Canada</p> <p>Canada</p>	<p>Purpose</p> <ul style="list-style-type: none"> Aimed at implementing standardized infection prevention and control practices while reducing the number, duration and severity of infections in any health care setting. <p>Audience</p> <ul style="list-style-type: none"> Front-line Workers, Paramedics, Nurses, Physicians, Patient Care Staff, Nurse Practitioners, Physiotherapists, Occupational Therapists, Phlebotomists, Diagnostic Imaging Technologists, Environmental Workers, Home Care Workers, Dietary Staff, Office Staff, Laundry Staff, Social Workers, Pharmacy Staff, Personal Support Workers, Dental Clinicians, Pre-hospital Services <p>Timing</p> <ul style="list-style-type: none"> Self-paced training lasts approximately 4 hours <p>Fees</p> <ul style="list-style-type: none"> \$90 <p>Accreditation</p> <ul style="list-style-type: none"> Accredited by the Société de formation et d'éducation continue (SOFEDUC) 	<p>Curriculum</p> <ul style="list-style-type: none"> Module 1: The Chain of Infection Module 2: Routine Practices Module 3: Hand Hygiene and Personal Protective Equipment Module 4: Environmental Controls Module 5: Source Control and Education Module 6: Routine Practices Application Simulations
<p>Michener Institute Online Infection Control and Epidemiology</p> <p>Michener Institute</p> <p>Ontario</p>	<p>Audience</p> <ul style="list-style-type: none"> IPAC professionals, nurses, medical laboratory technologists, public health investigators, and professionals in communicable disease control, including physicians, and those preparing for the CBIC certification (CIC) exam. <p>Timing</p> <ul style="list-style-type: none"> 16 weeks <p>Tuition</p> <ul style="list-style-type: none"> \$1,035 CDN 	<p>Course Topics</p> <ul style="list-style-type: none"> Disease process and identification; Concepts in epidemiology; Principles of immunity, and immunization; Control and prevention; Occupational health and safety; Resistant organisms; and Implementing Infection Control Program
Other Training Tools		
<p>Hand Hygiene E-learning Tool</p> <p>Infection Prevention and Control Canada</p> <p>Canada</p>	<p>Audience</p> <ul style="list-style-type: none"> Health care workers and volunteers. <p>Certificate of Completion</p> <ul style="list-style-type: none"> Participants receive a certificate of completion. <p>Timing</p> <ul style="list-style-type: none"> Training session: 15 minutes. 	<p>Course</p> <ul style="list-style-type: none"> Online hand hygiene education module.

Table 5: Evidence-Based Tool for Planning, Implementation, or Management of IPAC Strategies¹¹

The following questions were taken from the findings in the systematic review on the barriers and facilitators to health care workers' adherence to IPAC guidelines for respiratory infectious diseases. They are aimed at assisting ministries of health, health care facilities, and other stakeholders to plan, implement, or manage infection prevention and control strategies for respiratory infectious diseases.

IPAC Area	Questions
Communicating About IPAC Guidance	Deciding on and communicating about IPAC guidance: <ul style="list-style-type: none"> • Have you made sure that the guidance your staff are expected to adhere to follows national or international guidelines? • Have you tailored your IPAC guidance so that it is practical and possible to implement in your specific workplace? • Have you gathered input from different members of staff, including support staff, to help you adapt the guidance to your workplace? • Have you ensured that all members of staff, including cleaning staff, porters, kitchen staff and other support staff, have easy access to information regarding current IPAC guidance? • Have you made sure that IPAC guidance is presented in a format that is clear, unambiguous, brief and easy to follow for all members of staff? • IPAC guidelines and strategies may change quickly and often. Have you considered how changes will be communicated to all members of staff? • Have you considered using a variety of information channels to communicate about IPAC guidance, for instance through phone apps or staff meetings at the beginning of shifts?
Workload	<ul style="list-style-type: none"> • Have you assessed the extent to which new IPAC strategies, including an increased use of PPE and more time-consuming cleaning routines, will add to staff members' workloads and perhaps slow them down? • Have you considered if and how you can increase the number of healthcare workers and support staff to address these issues?
Physical Environment	<ul style="list-style-type: none"> • Does your facility have the space and infrastructure to implement the IPAC guidance? • Are there enough isolation rooms and anterooms? Do you have shower rooms for healthcare workers? If patient turnover is high, do you have enough rooms for new patients while cleaning and preparing the rooms of discharged patients? • Are practical measures in place to control people's movement in your facilities? • Have you ensured that patients with and without infections, visitors and suppliers take different routes, stay in different areas, use different elevators, etc.?
Use of PPE and Other Supplies	<ul style="list-style-type: none"> • Do staff members have good access to running water, sinks and soap, or to hand sanitizers in spaces where water is not available? • Is sanitizer easily available so staff members can decontaminate all surfaces such as phones, desks, doorknobs and elevator buttons before and after use? • Do your facilities have adequate supplies of PPE for all members of staff, including support staff? • Where you do have adequate supplies of PPE, has this been made clear to members of staff to avoid re-use or misuse? • Can you reassure staff about the quality of PPE? • PPE can be difficult to put on or remove and be very uncomfortable to wear. Can you help ensure that this equipment is of an appropriate fit and size, including arranging fit testing of equipment such as masks and eye protection?
Training and Education	<ul style="list-style-type: none"> • Have you ensured that all members of staff, including support staff, receive training and education in IPAC strategies? • Does this training and education include how to implement the IPAC guidance in practice (including how to use PPE correctly, waste disposal, etc.)? • Does this training and education include the underlying rationale of IPAC (i.e. how the infection is caused and transmitted and how the different elements of your IPAC strategy are meant to contain it)?

IPAC Area	Questions
	<ul style="list-style-type: none"> • Have you considered making IPAC training and education mandatory for all members of staff? • Do you have on-site trainers with sufficient time and skills? • Trainers need to be able to provide ongoing training to new or part-time staff and to keep up-to-date with regard to changes in guidance. Healthcare workers who are providing patient care are not likely to have enough time to train others in IPAC, particularly in outbreak situations. Consider using staff who do not have patient care duties to provide training to other staff. • Is your training model sustainable, given the availability and responsibilities of different healthcare workers?
IPAC Adherence	<p>Encouraging and ensuring IPAC adherence:</p> <ul style="list-style-type: none"> • Does your workplace encourage and support staff members' adherence with IPAC guidance? • Is it clear that staff members' safety needs are valued by managers? • Do managers and colleagues actively acknowledge others' efforts to adhere and do managers lead by example? • Do you have monitoring and evaluation strategies in place to assess staff adherence with the IPAC guidance? Are all members of staff, including support staff, included in IPAC monitoring and evaluation?
Relationships with Patients and Patients' Family Members	<ul style="list-style-type: none"> • Have you considered restricting access to visitors, at least in outbreak situations? • Where visitors are not allowed into your facility, do you have systems in place to allow patients and staff to communicate with family members and to reduce loneliness? • In some situations, healthcare workers may feel that masks and other PPE get in the way of their duty of care, for instance where patients are particularly frightened or feel stigmatised. • Do healthcare workers have strategies for dealing with these situations? And is it clear to them when they must use PPE and when they can avoid it?

Table 6: Abstracts of Relevant Documents

Type of document	Relevant to question	Abstract and link to full text
Full systematic review	<ul style="list-style-type: none"> • Hand hygiene 	<p>Interventions to improve hand hygiene compliance in patient care</p> <p>Abstract <u>Background:</u> Health care-associated infection is a major cause of morbidity and mortality. Hand hygiene is regarded as an effective preventive measure. This is an update of a previously published review. <u>Objectives:</u> To assess the short- and long-term success of strategies to improve compliance to recommendations for hand hygiene, and to determine whether an increase in hand hygiene compliance can reduce rates of health care-associated infection. <u>Search methods:</u> We conducted electronic searches of the Cochrane Register of Controlled Trials, PubMed, Embase, and CINAHL. We conducted the searches from November 2009 to October 2016. <u>Selection criteria:</u> We included randomised trials, non-randomised trials, controlled before-after studies, and interrupted time series analyses (ITS) that evaluated any intervention to improve compliance with hand hygiene using soap and water or alcohol-based hand rub (ABHR), or both. <u>Data collection and analysis:</u> Two review authors independently screened citations for inclusion, extracted data, and assessed risks of bias for each included study. Meta-analysis was not possible, as there was substantial heterogeneity across studies. We assessed the certainty of evidence using the GRADE approach and present the results narratively in a 'Summary of findings' table. <u>Main results:</u> This review includes 26 studies: 14 randomised trials, two non-randomised trials and 10 ITS studies. Most studies were conducted in hospitals or long-term care facilities in different countries and collected data from a variety of healthcare workers. Fourteen studies assessed the success of different combinations of strategies</p>

Type of document	Relevant to question	Abstract and link to full text
		<p>recommended by the World Health Organization (WHO) to improve hand hygiene compliance. Strategies consisted of the following: increasing the availability of ABHR, different types of education for staff, reminders (written and verbal), different types of performance feedback, administrative support, and staff involvement. Six studies assessed different types of performance feedback, two studies evaluated education, three studies evaluated cues such as signs or scent, and one study assessed placement of ABHR. Observed hand hygiene compliance was measured in all but three studies which reported product usage. Eight studies also reported either infection or colonisation rates. All studies had two or more sources of high or unclear risks of bias, most often associated with blinding or independence of the intervention. Multimodal interventions that include some but not all strategies recommended in the WHO guidelines may slightly improve hand hygiene compliance (five studies; 56 centres) and may slightly reduce infection rates (three studies; 34 centres), low certainty of evidence for both outcomes. Multimodal interventions that include all strategies recommended in the WHO guidelines may slightly reduce colonisation rates (one study; 167 centres; low certainty of evidence). It is unclear whether the intervention improves hand hygiene compliance (five studies; 184 centres) or reduces infection (two studies; 16 centres) because the certainty of this evidence is very low. Multimodal interventions that contain all strategies recommended in the WHO guidelines plus additional strategies may slightly improve hand hygiene compliance (six studies; 15 centres; low certainty of evidence). It is unclear whether this intervention reduces infection rates (one study; one centre; very low certainty of evidence). Performance feedback may improve hand hygiene compliance (six studies; 21 centres; low certainty of evidence). This intervention probably slightly reduces infection (one study; one centre) and colonisation rates (one study; one centre) based on moderate certainty of evidence. Education may improve hand hygiene compliance (two studies; two centres), low certainty of evidence. Cues such as signs or scent may slightly improve hand hygiene compliance (three studies; three centres), low certainty of evidence. Placement of ABHR close to point of use probably slightly improves hand hygiene compliance (one study; one centre), moderate certainty of evidence. <u>Authors' conclusions:</u> With the identified variability in certainty of evidence, interventions, and methods, there remains an urgent need to undertake methodologically robust research to explore the effectiveness of multimodal versus simpler interventions to increase hand hygiene compliance, and to identify which components of multimodal interventions or combinations of strategies are most effective in a particular context.¹²</p>
	<ul style="list-style-type: none"> • Use of respiratory protective equipment 	<p>Behavioural interventions to promote workers' use of respiratory protective equipment</p> <p>Abstract <u>Background:</u> Respiratory hazards are common in the workplace. Depending on the hazard and exposure, the health consequences may include: mild to life-threatening illnesses from infectious agents, acute effects ranging from respiratory irritation to chronic lung conditions, or even cancer from exposure to chemicals or toxins. Use of respiratory protective equipment (RPE) is an important preventive measure in many occupational settings. RPE only offers protection when worn properly, when removed safely and when it is either replaced or maintained regularly. The effectiveness of behavioural interventions either directed at employers or organisations or directed at individual workers to promote RPE use in workers remains an important unanswered question. <u>Objectives:</u> To assess the effects of any behavioural intervention either directed at organisations or at individual workers on observed or self-reported RPE use in workers when compared to no intervention or an alternative intervention. <u>Search methods:</u> We searched the Cochrane Work Group Specialised Register, the Cochrane Central Register of Controlled Trials (CENTRAL 2016, Issue 07), MEDLINE (1980 to 12 August 2016), EMBASE (1980 to 20 August 2016) and CINAHL (1980 to 12 August 2016). <u>Selection criteria:</u> We included randomised controlled trials (RCTs), controlled</p>

Type of document	Relevant to question	Abstract and link to full text
		<p>before and after (CBA) studies and interrupted time-series (ITS) comparing behavioural interventions versus no intervention or any other behavioural intervention to promote RPE use in workers. <u>Data collection and analysis:</u> Four authors independently selected relevant studies, assessed risk of bias and extracted data. We contacted investigators to clarify information. We pooled outcome data from included studies where the studies were sufficiently similar. Main results: We included 14 studies that evaluated the effect of training and education on RPE use, which involved 2052 participants. The included studies had been conducted with farm, healthcare, production line, office and coke oven workers as well as nursing students and people with mixed occupations. All included studies reported the effects of interventions as use of RPE, as correct use of RPE or as indirect measures of RPE use. We did not find any studies where the intervention was delivered and assessed at the whole organization level or in which the main focus was on positive or negative incentives. We rated the quality of the evidence for all comparisons as low to very low. <i>Training versus no training:</i> One CBA study in healthcare workers compared training with and without a fit test to no intervention. The study found that the rate of properly fitting respirators was not considerably different in the workers who had received training with a fit test (RR 1.17, 95% Confidence Interval (CI) 0.97 to 1.10) or training without a fit test (RR 1.16, 95% CI 0.95 to 1.42) compared to those who had no training. Two RCTs that evaluated training did not contribute to the analyses because of lack of data. <i>Conventional training plus additions versus conventional training alone:</i> One cluster-randomised trial compared conventional training plus RPE demonstration versus training alone and reported no significant difference in appropriate use of RPE between the two groups (RR 1.41, 95% CI 0.96 to 2.07). One RCT compared interactive training with passive training, with an information screen, and an information book. The mean RPE performance score for the active group was not different from that of the passive group (MD 2.10, 95% CI -0.76 to 4.96). However, the active group scored significantly higher than the book group (MD 4.20, 95% CI 0.89 to 7.51) and the screen group (MD 7.00, 95% CI 4.06 to 9.94). One RCT compared computer-simulation training with conventional personal protective equipment (PPE) training but reported only results for donning and doffing full-body PPE.</p> <p><i>Education versus no education:</i> One RCT found that a multifaceted educational intervention increased the use of RPE (risk ratio (RR) 1.69, 95% CI 1.10 to 2.58) at three years' follow-up when compared to no intervention. However, there was no difference between intervention and control at one year's, two years' or four years' follow-up. Two RCTs did not report enough data to be included in the analysis. Four CBA studies evaluated the effectiveness of education interventions and found no effect on the frequency or correctness of RPE use, except in one study for the use of an N95 mask (RR 4.56, 95% CI 1.84 to 11.33, 1 CBA) in workers. <i>Motivational interviewing versus traditional lectures:</i> One CBA study found that participants given motivational group interviewing-based safety education scored higher on a checklist measuring PPE use (MD 2.95, 95% CI 1.93 to 3.97) than control workers given traditional educational sessions. <u>Authors' conclusions:</u> There is very low-quality evidence that behavioural interventions, namely education and training, do not have a considerable effect on the frequency or correctness of RPE use in workers. There were no studies on incentives or organisation level interventions. The included studies had methodological limitations and we therefore need further large RCTs with clearer methodology in terms of randomised sequence generation, allocation concealment and assessor blinding, in order to evaluate the effectiveness of behavioural interventions for improving the use of RPE at both organisational and individual levels. In addition, further studies should consider some of the barriers to the successful use of RPE, such as experience of health risk, types of RPE and the employer's attitude to RPE use.¹³</p>
	<ul style="list-style-type: none"> Adherence to IPAC guidelines 	<p>Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPAC) guidelines for respiratory infectious diseases</p>

Type of document	Relevant to question	Abstract and link to full text
		<p>Abstract</p> <p><u>Background:</u> Health care-associated infection is a major cause of morbidity and mortality. Hand hygiene is regarded as an effective preventive measure. This is an update of a previously published review. <u>Objectives:</u> To assess the short- and long-term success of strategies to improve compliance to recommendations for hand hygiene, and to determine whether an increase in hand hygiene compliance can reduce rates of health care-associated infection. <u>Search methods:</u> We conducted electronic searches of the Cochrane Register of Controlled Trials, PubMed, Embase, and CINAHL. We conducted the searches from November 2009 to October 2016. <u>Selection criteria:</u> We included randomised trials, non-randomised trials, controlled before-after studies, and interrupted time series analyses (ITS) that evaluated any intervention to improve compliance with hand hygiene using soap and water or alcohol-based hand rub (ABHR), or both. <u>Data collection and analysis:</u> Two review authors independently screened citations for inclusion, extracted data, and assessed risks of bias for each included study. Meta-analysis was not possible, as there was substantial heterogeneity across studies. We assessed the certainty of evidence using the GRADE approach and present the results narratively in a 'Summary of findings' table. <u>Main results:</u> This review includes 26 studies: 14 randomised trials, two non-randomised trials and 10 ITS studies. Most studies were conducted in hospitals or long-term care facilities in different countries and collected data from a variety of healthcare workers. Fourteen studies assessed the success of different combinations of strategies recommended by the World Health Organization (WHO) to improve hand hygiene compliance. Strategies consisted of the following: increasing the availability of ABHR, different types of education for staff, reminders (written and verbal), different types of performance feedback, administrative support, and staff involvement. Six studies assessed different types of performance feedback, two studies evaluated education, three studies evaluated cues such as signs or scent, and one study assessed placement of ABHR. Observed hand hygiene compliance was measured in all but three studies which reported risks of bias, most often associated with blinding or independence of the intervention. Multimodal interventions that include some but not all strategies recommended in the WHO guidelines may slightly improve hand hygiene compliance (five studies; 56 centres) and may slightly reduce infection rates (three studies; 34 centres), low certainty of evidence for both outcomes. Multimodal interventions that include all strategies recommended in the WHO guidelines may slightly reduce colonisation rates (one study; 167 centres; low certainty of evidence). It is unclear whether the intervention improves hand hygiene compliance (five studies; 184 centres) or reduces infection (two studies; 16 centres) because the certainty of this evidence is very low. Multimodal interventions that contain all strategies recommended in the WHO guidelines plus additional strategies may slightly improve hand hygiene compliance (six studies; 15 centres; low certainty of evidence). It is unclear whether this intervention reduces infection rates (one study; one centre; very low certainty of evidence). Performance feedback may improve hand hygiene compliance (six studies; 21 centres; low certainty of evidence). This intervention probably slightly reduces infection (one study; one centre) and colonisation rates (one study; one centre) based on moderate certainty of evidence. Education may improve hand hygiene compliance (two studies; two centres), low certainty of evidence. Cues such as signs or scent may slightly improve hand hygiene compliance (three studies; three centres), low certainty of evidence. Placement of ABHR close to point of use probably slightly improves hand hygiene compliance (one study; one centre), moderate certainty of evidence. <u>Authors' conclusions:</u> With the identified variability in certainty of evidence, interventions, and methods, there remains an urgent need to undertake methodologically robust research to explore the effectiveness of multimodal versus simpler interventions to increase</p>

Type of document	Relevant to question	Abstract and link to full text
	<ul style="list-style-type: none"> Adherence to standard precautions 	<p>hand hygiene compliance, and to identify which components of multimodal interventions or combinations of strategies are most effective in a particular context.¹⁴</p> <p>Improving adherence to 'Standard Precautions' for the control of health care-associated infections</p> <p>Abstract <u>Background:</u> 'Standard Precautions' refers to a system of actions, such as using personal protective equipment or adhering to safe handling of needles, that healthcare workers take to reduce the spread of germs in healthcare settings such as hospitals and nursing homes. Objectives: To assess the effectiveness of interventions that target healthcare workers to improve adherence to Standard Precautions in patient care. <u>Search methods:</u> We searched CENTRAL, MEDLINE, Embase, CINAHL, LILACS, two other databases, and two trials registers. We applied no language restrictions. The date of the most recent search was 14 February 2017. <u>Selection criteria:</u> We included randomised trials of individuals, cluster-randomised trials, non-randomised trials, controlled before-after studies, and interrupted time-series studies that evaluated any intervention to improve adherence to Standard Precautions by any healthcare worker with responsibility for patient care in any hospital, long-term care or community setting, or artificial setting, such as a classroom or a learning laboratory. <u>Data collection and analysis:</u> Two review authors independently screened search results, extracted data from eligible trials, and assessed risk of bias for each included study, using standard methodological procedures expected by Cochrane. Because of substantial heterogeneity among interventions and outcome measures, meta-analysis was not warranted. We used the GRADE approach to assess certainty of evidence and have presented results narratively in 'Summary of findings' tables. <u>Main results:</u> We included eight studies with a total of 673 participants; three studies were conducted in Asia, two in Europe, two in North America, and one in Australia. Five studies were randomised trials, two were cluster-randomised trials, and one was a non-randomised trial. Three studies compared different educational approaches versus no education, one study compared education with visualisation of respiratory particle dispersion versus education alone, two studies compared education with additional infection control support versus no intervention, one study compared peer evaluation versus no intervention, and one study evaluated use of a checklist and coloured cues. We considered all studies to be at high risk of bias with different risks. All eight studies used different measures to assess healthcare workers' adherence to Standard Precautions. Three studies also assessed healthcare workers' knowledge, and one measured rates of colonisation with methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) among residents and staff of long-term care facilities. Because of heterogeneity in interventions and outcome measures, we did not conduct a meta-analysis. Education may slightly improve both healthcare workers' adherence to Standard Precautions (three studies; four centres) and their level of knowledge (two studies; three centres; low certainty of evidence for both outcomes). Education with visualisation of respiratory particle dispersion probably improves healthcare workers' use of facial protection but probably leads to little or no difference in knowledge (one study; 20 nurses; moderate certainty of evidence for both outcomes). Education with additional infection control support may slightly improve healthcare workers' adherence to Standard Precautions (two studies; 44 long-term care facilities; low certainty of evidence) but probably leads to little or no difference in rates of health care-associated colonisation with MRSA (one study; 32 long-term care facilities; moderate certainty of evidence). Peer evaluation probably improves healthcare workers' adherence to Standard Precautions (one study; one hospital; moderate certainty of evidence). Checklists and coloured cues probably improve healthcare workers' adherence to Standard Precautions (one study; one hospital; moderate certainty of evidence). <u>Authors' conclusions:</u> Considerable variation in interventions and in outcome measures</p>

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		<p>used, along with high risk of bias and variability in the certainty of evidence, makes it difficult to draw conclusions about effectiveness of the interventions. This review underlines the need to conduct more robust studies evaluating similar types of interventions and using similar outcome measures.¹⁵</p>
Cochrane Clinical Answers	<ul style="list-style-type: none"> Adherence to IPAC guidelines Hand hygiene 	<p>What are the organizational, environmental, and individual barriers and facilitators affecting healthcare workers' adherence to infection prevention and control (IPAC) guidelines for respiratory infectious disease?</p> <p>Abstract</p> <p>Reviewers identified studies that collated information on organizational, environmental, and individual barriers and facilitators affecting HCWs' adherence to IPAC guidelines for respiratory infectious diseases (e.g. tuberculosis [TB], severe acute respiratory syndrome [SARS], influenza A virus H1N1 [subtype], Middle East respiratory syndrome [MERS], other respiratory virus outbreaks). HCWs included clinicians (e.g. doctors, nurses, midwives, clinical managers, allied health professionals, pharmacists) and other staff members (e.g. porters, healthcare assistants) with responsibility for patient care in any hospital, long-term care, primary care, or community setting.</p> <p>Reviewers reported ten main findings related to organizational factors, which reflected HCWs' need for: a supportive management team; IPAC guidelines that were as short, specific, and practical as possible and updated only when necessary; clear communication via multiple platforms or methods; and availability of training for which the trainer does not feel that he or she is taken away from existing clinical responsibilities.</p> <p>Reviewers reported six main findings related to environmental factors, which highlighted the need for adequate space, isolation facilities, ventilation, anterooms, showers, handwashing facilities, surface decontamination facilities, and adequate supplies of appropriate PPE tailored to varying needs at different stages of the outbreak.</p> <p>Reviewers identified ten main findings related to individual HCW factors. Adherence to IPAC guidance seemed to increase when an HCW learned that a colleague or a patient had contracted the infection, when an HCW felt that high value was placed on the importance of IPAC, and when peer pressure to use IPAC was strong. HCWs appreciated they had an individual responsibility to increase their knowledge but needed the evidence, rationale, and support to do so. Knowledge of IPAC limited to specific HCWs on the team, a complacent attitude toward IPAC in the workplace, the perception that use of HCW PPE (e.g. face masks) could be frightening and stigmatizing for patients, and physical discomfort while wearing PPE were identified as barriers to adherence to IPAC guidelines.</p> <p>Of the 26 main findings, reviewers rated 21 as moderate or high confidence. Of the five findings rated as low confidence, three were barriers (difficulty implementing impractical guidance, balancing the role of IPAC trainer with existing clinical responsibilities, limiting knowledge of IPAC to specific HCWs on the team) and two were facilitators (benefit of multiple platforms or methods of communication, increased adherence after learning a colleague or a patient had contracted the infection) affecting HCWs' adherence to IPAC guidelines.¹⁶</p> <p>What are the effects of multimodal campaigns to improve hand hygiene of healthcare workers?</p> <p>Abstract</p> <p>Multimodal campaign to improve hand hygiene of healthcare workers, most commonly based on World Health Organisation (WHO) recommendations, all showed improvements in hand hygiene compliance and decreases in hospital-associated</p>

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		<p>infections with the multimodal campaign, although the measures reported varied considerably across studies and benefits were often small. One cluster-RCT reported improved hand hygiene compliance of 6% with a multimodal campaign when compared with provision of antibacterial hand rub (ABHR) at the point of care alone. Most studies were interrupted time series, with the comparison made before and after introduction of the campaign; therefore, factors other than the campaign may have changed over time. In addition, most of these cluster-RCTs used inappropriate statistical analyses. Reviewers rated all evidence as very low to low certainty, so no firm conclusions can be reached as to the benefits of such multimodal campaigns.¹⁷</p>
	<ul style="list-style-type: none"> • Hand hygiene 	<p>What are the effects of performance feedback, education and olfactory/visual cues on hand hygiene of healthcare workers?</p> <p>Abstract Researchers assessed the impact of performance feedback, education, and olfactory/visual cues on hand hygiene compliance of healthcare workers. All RCTs reported improvements in hand hygiene compliance, although some improvements were small (mostly $\leq 10\%$). One parallel RCT reported greater increases in hand hygiene compliance - from 15% to 46% with a scent cue, and to 21.7% with a sign of stern male eyes, but a decrease to 10% with a sign of female eyes; it is unclear how many healthcare workers were included in this assessment. The non-randomized trial and the interrupted time series (ITS; comparison before and after introduction of the intervention) showed larger increases in hand hygiene compliance than most of the RCTs, but the methodological limitations associated with these designs compromise the results. Reviewers rated all evidence for hand hygiene compliance of healthcare workers as low certainty, so no firm conclusions can be drawn.</p> <p>Only one study evaluated performance feedback and was rated by reviewers as providing moderate-certainty evidence; trial authors reported little to no change from baseline in the overall rate of healthcare-associated infections. Researchers observed reduced bloodstream infections with enhanced feedback and with control but noted little to no change when enhanced feedback was combined with patient participation, making it difficult to draw conclusions about the impact of such feedback.¹⁸</p>

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