

**An Infection Prevention and Control Orientation Module for
Public Health Nurses Working With Communicable and Infectious Diseases**

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A Practicum Report submitted

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Abstract

Background: All Public Health Units (PHUs) in Ontario must have an active IPAC program to ensure that Public Health Nurses (PHNs), staff, clients and the community are protected from the spread of infectious and communicable disease (Public Health Ontario, 2012; 2013). PHNs working in communicable disease control (CDC) programs care for clients in a variety of settings by helping to develop and maintain internal IPAC programs and control outbreaks. PHNs are considered experts in IPAC and are often consulted to provide guidance to the health care team and the general public.

Purpose: The purpose of this practicum was to identify IPAC learning needs and develop an IPAC orientation module for CDC PHNs. The planning process of the PRECEDE-PROCEED model was used to guide the project.

Methods: A comprehensive review of the literature was completed along with consultations and an environmental scan. The data informed the development of an orientation learning module for CDC PHNs with five key areas of learning identified: occupational health; general IPAC principles; hand hygiene; routine practices, additional precautions and personal protective equipment (PPE); and cleaning, disinfection and sterilization.

Results: The findings revealed the need for a specially designed orientation module for CDC PHNs, and supported the development of a module that would meet the learning needs of the CDC PHNs. Each of the five key areas identified was addressed in a separate section with a combination of self-directed and interactive activities to meet the needs of an adult learner.

Conclusion: There is a need for a specially designed IPAC orientation module for CDC PHNs. An orientation module was developed based on the findings from the literature review, consultations with key stakeholders and the environmental scan.

Key words: Infection prevention; infection control; public health nurses; orientation

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Introduction

The Communicable Disease Control (CDC) program within the North Bay Parry Sound District Health Unit (NBPSDHU) is responsible for responding to communicable disease outbreaks and individual reports of reportable diseases in an effort to reduce the risk of transmission of infections within the community. In this role, CDC PHNs require extensive knowledge about specific infections and infection control principles to educate the case(s) and contact(s) about reducing the risk of transmission of infections to others and how to protect herself/himself from becoming infected. CDC PHNs are often presented with circumstances that require her/him to come into direct contact with clients that have or are suspected of having a diagnosed infectious disease. The PHNs must have the skills and knowledge to protect themselves, other clients and staff, and the general public when faced with encounters in a variety of settings including health care facilities and community settings. In addition to responding to outbreaks and reportable infections, CDC PHNs are also members of Infection Prevention and Control (IPAC) Committees at district acute and long-term facilities. The role IPAC committee member requires CDC PHNs to have substantial knowledge of IPAC principles in different health care settings to be able to provide expert advice to the Infection Control Practitioners at district facilities. It is apparent that CDC PHNs require a specially designed learning plan during orientation to prepare for the role of knowledgeable IPAC professional. The goal of this project is to explore the learning needs of CDC PHNs and develop an IPAC orientation module for CDC nurses.

The NBPSDHU is one of 36 health units within Ontario. Each Ontario health unit is independently run and while all health units are mandated to offer certain services, the delivery of these services is based on local epidemiology, demographics and community needs. The

NBPSDHU CDC program is comprised of PHNs, program assistant and program manager. Each CDC PHN has similar responsibilities and therefore should have a similar IPAC knowledge base. The current PHNs' orientation learning is provided by the NBPSDHU Occupational Health Nurse and senior CDC nurses. This paper will provide an examination of existing IPAC orientation, current literature, and CDC PHN feedback to determine IPAC topics that should be included in a CDC PHN orientation module. In addition, this paper will provide a discussion on the Canadian Nurses Association's (CNA) Advanced Nursing Practice (ANP) competencies and how this project meets the four competencies.

Objective

The goal of this project was to develop an orientation module that encompasses the IPAC knowledge PHNs require to fulfill the role of CDC PHN at NBPSDHU. In relation to this the goal of the practicum was also to demonstrate the CNA ANP competencies, which include clinical, research, leadership, and consultation and collaboration competencies. To accomplish this goal, a needs assessment was performed to identify topics of interest as well as desired delivery of the module. The program planning was guided by the PRECEDE-PROCEED model although this practicum focuses on the development of the educational module utilizing only the first four steps of the model, the PRECEDE. The PROCEED, last four steps of the model, focus on implementation and evaluation which are not part of this practicum.

Methods

To identify the IPAC topics that were to be addressed in the orientation module, a needs assessment was first performed. A complete discussion of the needs assessment including the literature review, environmental scan, and key informant interviews is provided in Appendix A.

Key informant interviews were conducted with NBPSDHU CDC PHNs, CDC program manager and Occupational Health Nurse. These interviews were semi-structured face-to-face interviews conducted at the health unit on a one-to-one basis. An additional key informant that was interviewed was an IPAC expert to help identify current IPAC education that is offered within Canada that may be appropriate for CDC PHN orientation learning needs. This interview was conducted over the telephone based on a consultation guide similar to the one utilized for the internal interviews. An environmental scan of other health units in Ontario was also conducted electronically with a short questionnaire.

The interviews, environmental scan, and literature review guided the development of the CDC PHN orientation module. Five topics of interest were identified and learning objectives were established. Current IPAC resources and education resources were reviewed to determine which, if any, could be included in an orientation module to meet the learning objectives of CDC PHNs. The orientation module including learning objectives and resources is presented in Appendix B.

Summary of Literature Review

A literature review was conducted to examine current knowledge related to PHN IPAC orientation and overall IPAC needs. Electronic databases CINAHL and Pubmed were both searched with a variety of terms. The initial search was for research specific to PHNs and IPAC which failed to produce many results and demonstrated a lack of research addressing IPAC needs of PHNs. The search was expanded to IPAC in community and clinic settings as CDC PHNs work in both of these settings. There was limited research in this area with most research focusing on acute care settings. The databases, CINAHL and Pubmed were also searched for

research focusing on IPAC education and orientation. A limited number of research articles were found related to IPAC education modules for nursing but again, current research focuses on education in acute care settings.

The literature review also included reviewing best practice and recommendation documents. There are a number of literary articles that discuss the importance of infection control in the community (Kenneley, 2007; Kenneley and Madigan, 2009) and clinics (Ashrafet al, 2012; Hancock-Allen, J. B., Janelle, S. J., Lujan, K., & Bamberg, W. M., 2016; Macedo et al., 2005; Puhl, Reinhart, Puhl, Selinger & Injeyan, 2011; Radcliffe et al., 2012) or provide guidance to community health care providers (Flanagan, E., Chopra, T., & Mody, L., 2011; Swanson & Jeanes, 2011; Ward, 2002; Unsworth, 2011; Storr & Kilpatrick, 2012) as well as best practice guidance documents (Provincial Infectious Disease Advisory Committee, 2012; Public Health Ontario, 2012; Public Health Ontario, 2013). The lack of research but abundance of best practice documents and recommendations indicates that there is a need for specially designed IPAC education for CDC PHNs.

Summary of Consultations

NBPSDHU CDC PHNs were interviewed to provide insight on current IPAC education provided at orientation as well as to determine topics that were beneficial to the CDC PHN role. In total, semi-structured interviews were conducted with nine CDC PHNs, one program manager, and one occupational health nurse. CDC PHNs were asked about their awareness of IPAC education provided during orientation to CDC, topics that would be beneficial to the role of CDC PHN, and preferred method of delivery.

The majority of CDC PHNs interviewed considered the current orientation lacking in information and felt it did not adequately prepare a new PHN for the role of IPAC specialist in CDC. All staff preferred a combination of self-directed and interactive activities to learn new information and skills. Five themes emerged related to IPAC topics that were requested for inclusion into an IPAC orientation module: occupation health, general IPAC principles, hand hygiene, routine practices and additional precautions, and, cleaning and disinfection.

An external IPAC specialist was also consulted to establish what, if any IPAC orientation programs for PHNs are available in Canada and if any of the programs available are appropriate for and accessible to CDC PHNs. While a variety of IPAC programs were identified, most were available for a fee, which would be beyond the CDC program budget for orientation.

Summary of Internal and Environmental Scan

Internal Scan

An internal scan of IPAC policies and procedures at the NBPSDHU was completed to determine an IPAC baseline at the health unit. There is currently no official IPAC program in place at the health unit. There was also no one person that was identified as responsible for internal IPAC. There is an occupation health nurse who is responsible for general orientation for all staff, which includes hand hygiene, and PPE but the focus of the training is on staff safety and protection. An IPAC program for CDC PHNs must also consider client safety. All other IPAC related education is determined by and at the discretion of the individual program manager.

There were only six policies that were identified related to IPAC and all policies identified are written for all staff and do not contain program-specific content or examples. The

internal policies are all written from an occupational health standpoint and focus on staff safety versus an infection control approach.

Environmental Scan

An environmental scan of health units within Ontario was conducted to assess what IPAC processes were in place and what IPAC education was provided to staff. An electronic questionnaire was sent by email to Ontario health units. The writer introduced the purpose of the questionnaire during a teleconference meeting of a provincial IPAC peer group. The IPAC peer group consists of health unit staff with IPAC responsibilities that meet quarterly by teleconference to discuss current and emerging IPAC concerns and topics. Following the teleconference, a brief questionnaire was forwarded to all members of the group with a deadline for responses. Participants were asked to describe current IPAC training provided to staff, who delivers the training, if IPAC training is program specific, and if an annual review of IPAC education is required.

Responses were received from five health units. All of the five health units responded that program-specific IPAC training is provided in the individual programs, and program managers determine the content of the training. There was no apparent consistency in the training program being delivered across those five units.

IPAC Orientation Module

An IPAC orientation module for CDC PHNs was developed based on the literature review, consultations, and the environmental scan. The teaching learning approaches were guided by Knowles Adult Learning Principles, which consists of six principles: self-concept, experience, readiness to learn, orientation to learning, motivation to learn, relevance (Conaway

& Zorn-Arnold, 2015). Adult learners are more self-directed and appreciate being able to guide their own learning rather than a traditional lecture type of learning. The orientation module was designed to incorporate self-directed online learning tools and activities that can be completed based on the learners own time schedule. The modules begin with basic IPAC principles and progress to more advanced topics. This allows the adult learner the opportunity to build on his or her own experiences. Each module also contains interactive aspects for the learners to practice new skills and opportunities to interact with experienced PHNs to explore real life situations that PHNs encounter. This allows the new PHN to learn from others' experiences as well as provide an immediate application of the new knowledge.

The IPAC orientation module developed for CDC PHNs includes five different modules: occupational health; general IPAC principles; hand hygiene; additional precautions and PPE; and, cleaning, disinfection, sterilization and reprocessing (Appendix B).

Occupational Health and Safety

The first section of the orientation module will be related to occupational health and safety and the need for personal safety. The new CDC PHNs will first meet with the Occupational Health Nurse (OHN) to review vaccination status and receive any vaccinations that are missing or not up-to-date. The OHN will also conduct mask fit testing for respirators and perform a Tuberculosis (TB) skin test. While this is important for occupational safety it also provides an opportunity to form the basis of why IPAC is essential for a new CDC PHN. CDC PHNs must have all relevant vaccinations as they may be in contact with clients that have vaccine preventable diseases such as mumps or pertussis and immunization is an important control measure to reduce the risk of transmitting infections to others. CDC PHNs may also be in contact with clients with active TB and require proper respirator fitting to protect them from

becoming infected with TB. A baseline TB skin test is also important for testing if the PHN is inadvertently exposed to TB to determine if they are at risk of developing active TB.

The OHN will also introduce the new PHN to the internal IPAC policies and procedures that are in place at the Health Unit. It is important for all staff to be familiar with workplace policies and procedures so he or she can be certain of what is expected as part of employment. The PHN will then be expected to review the internal IPAC policies and procedures on her own. Meeting with the OHN provides the learner with an interactive experience and builds on prior experiences. The review of the policies and procedures is a self-directed activity that can be completed within the learner's own schedule. The occupational health section also has an immediate relevance to the learner's new job and provides relevance so the learner knows why they need to learn more about IPAC.

General IPAC Principles

The second section of the orientation module is a review of general IPAC principles. The CDC PHN will complete Public Health Ontario (PHO) Core Competencies modules, which are self-directed modules, delivered on-line and can be completed at the learner's own pace (Appendix B). There are five different IPAC modules to be completed: chain of transmission, microbiology review, health care provider controls, environmental controls, administrative controls. The course is offered free of charge and each module contains a mix of reading, videos and interactive quizzes.

The general IPAC principles section will also include a self-directed activity related to microbiology to provide more advanced knowledge of interpreting laboratory reports (Appendix B). CDC PHNs are responsible for determining if case definition is met based on laboratory and physician reports so it is important for a CDC PHN to understand and be able to interpret

laboratory reports. This activity is self-directed and consists of reading material and short activities to ensure understanding of material presented.

Hand Hygiene

It is imperative that a IPAC orientation program for CDC PHNs have a section on hand hygiene as frequent and proper hand hygiene is the most important element in reducing transmission of infections. The CDC PHN orientation module will have an online module as well as an interactive component. The online portion will be self-directed and explore the moments of hand hygiene, technique and frequency, explain when to use soap and water versus when to use ABHR and proper technique for both (Appendix B).

The hand hygiene section will also contain an interactive component that provides the new PHN the opportunity to practice and demonstrate what was learned in the self-directed component. In addition to demonstrating proper hand hygiene technique, the new PHN will learn about the equipment that CDC PHNs use when teaching hand hygiene to other health care providers and community members. The PHNs will also review scenarios they may encounter when providing care in different settings (e.g. home visits, school visits) where hand hygiene facilities may not be readily available. This provides essential knowledge for PHN's own practice as well as tools to use for educational duties of the CDC PHN role.

Additional Precautions and PPE

A sound understanding of additional precautions and PPE is essential for CDC PHNs to protect themselves and clients from infections but it is also essential for the role of providing education and advice to other health care providers. The initial learning about additional precautions will be an on-line, self-directed module to explore the principles of additional precautions and importance of PPE (Appendix B). This online module also includes a definition

of PPE, what PPE should be used in different situations and proper sequence of donning and doffing PPE. The CDC PHN will also review Public Health Agency of Canada algorithms to become familiar with decision making for choosing appropriate PPE in different instances (Appendix B).

The CDC PHN will also meet with an experienced CDC PHN for a demonstration of donning and doffing PPE and have the opportunity to practice. The experienced PHN will also review scenarios that PHNs have encountered to illustrate what PPE is required for specific infections as well as different settings (e.g. what PPE is required for a home visit with a client with active TB, where should the PPE be put on and removed, where to discard the PPE). The new PHN will also be introduced to the “Community Backpack Kit” that is referred to in an internal policy. The experienced PHN will review what should be in the Kit, where it is stored, and ensure that the contents are checked before taking the kit to a community visit.

Cleaning, disinfection, sterilization and reprocessing

The final mandatory section of the IPAC orientation module relates to cleaning, disinfection, sterilization and reprocessing. The new PHNs will review the PIDAC best practice document which will provide a knowledge base of expectations in all health care settings and will be self-directed (Appendix B). This module will also contain an interactive online learning component to provide more practical information about the different types of cleaning (e.g. hotel versus hospital clean) and procedures for sterilization and reprocessing (Appendix B). The online learning is comprised of readings, presentations, audio, video and short quizzes. This portion of the module provides a foundation of learning that will be expanded in the interactive part of the module. It also provides practical information for PHN’s own practice of cleaning and disinfecting clinic rooms between clients.

The new CDC PHN will also have the opportunity to tour local acute care facilities and complete a short activity exploring local cleaning, disinfection, sterilization, and reprocessing practices. The CDC program does not use equipment that requires sterilization and reprocessing so the information provided is not directly related to the role of CDC PHN. However, CDC PHNs are expected to be active members of district facilities' IPAC committees. The interactive portion of this module will assist the new PHN to become more familiar with district facilities' processes to prepare the PHN for their role on external IPAC committees.

ANP Competencies

The Canadian Nurses Association (2008) defines Advanced Practice Nursing as “an umbrella term describing an advanced level of clinical nursing practice that maximizes the use of graduate education preparation, in-depth nursing knowledge and expertise in meeting the health needs of individuals, families, groups, communities and populations” (p.13).

APNs have graduate educational preparation, which provides these nurses with the basis to provide more extended care to patients (DiCenso et al., 2010).

The two recognized APN roles in Canada are clinical nurse specialist (CNS) and nurse practitioner (NP). Both APN roles require a graduate degree in nursing to provide advanced skills and knowledge in leadership, research, and clinical skills. NPs are able to provide primary care services and CNSs can assist care teams with planning nursing interventions as well as providing education to clients regarding preventative care (Canadian Nurses Association, 2008; Higuchi, Hagen, Brown & Zieber, 2006). The role of NP is more formalized with a protected title and regulatory requirements. A CNS has advanced education and clinical skills and must

demonstrate the four core competencies of APN: clinical, research, leadership, and, consultation and collaboration. The development of an IPAC orientation module for CDC PHNs demonstrates the APN core competencies with planning, researching, and development of the program.

Clinical Competencies

Clinical competencies require an “expertise in a specialized area of nursing” and involve working with other team members to solve problems and develop new programs and education to enhance clients’ experiences within the organizational resources (CNA, 2008, p.22). This project utilized my extensive knowledge and experience as a PHN working in a CDC setting at a Public Health Unit. It also allowed me to use data collected from multiple sources to plan an education program for CDC PHNs that will have health implications for clients and PHNs by reducing the risk of infection by increasing PHN knowledge about IPAC. The need for an educational program for new CDC PHNs also anticipates potential health risks that may occur for clients and staff if CDC PHNs are not knowledgeable in IPAC principles. Organizational budgets and human resources were also considered when choosing the IPAC modules learning goals and online activities. For instance, the self-directed portions can be completed by the new CDC PHN within their own time constraints in order to maximize skill specific learning opportunities and expensive IPAC courses were not chosen due to organizational budget constraints.

Research Competencies

Research competencies refer to identifying research opportunities, collecting data, critiquing and interpreting research, and disseminating results. Throughout this project, I demonstrated research competencies. Initially, I identified a need for new CDC PHNs to have a

more comprehensive IPAC orientation to meet the demands of the role. The literature review conducted illustrated competencies in critiquing, interpreting and applying knowledge gathered from previous findings. Collecting new data and interpreting results was done with the consultations and environmental scan. Finally, the research competencies also involve disseminating new knowledge, which will be accomplished by sharing the orientation module with staff and management at NBPSDHU as well as with other health units that have expressed an interest in viewing the final results.

Leadership Competencies

Leadership competencies encompass all aspects of being a leader in the organization and nursing overall. Being a leader in nursing practice involves advocating, mentoring, advising, evaluating, and identifying opportunities for growth within the organization. This project exemplifies many aspects of leadership from conception to completion. At the outset, I identified a gap in the orientation program for CDC PHNs, which identified a learning need of new CDC PHNs. A learning program was then developed to meet the learning needs identified by the literature and best practice guidelines. The program was created with input from other nurses while still taking into account the resources of the organization. The recommendations of the project to provide continued IPAC learning opportunities for CDC PHNs beyond orientation also advocates for professional growth to ensure that maintaining current IPAC knowledge continually protects the health of clients and staff.

Consultation and Collaboration Competences

The final ANP competency is consultation and collaboration, which involves collaborating with colleagues throughout the health care team and at all levels. I demonstrated this competency by consulting colleagues throughout the organization as well as throughout the

province. In addition, I consulted a national IPAC expert for input related to IPAC orientation programs available throughout the country. The information gathered from the consultations and environmental scan were utilized to develop a comprehensive IPAC orientation program that meets the learning needs identified from CDC PHNs, the literature review, and best practice guidance documents.

Conclusion and Next Steps

Best practice guides and current recommendations are clear that IPAC is essential in all health care settings to protect staff, clients, and the general public from the spread of infectious and communicable diseases, especially health care acquired infections. The global burden of HCAs on the health care system is extensive with increased hospital stays, increased costs and fatalities (CDC, 2010; WHO, 2009b). The College of Physicians and Surgeons of Ontario (2009) estimate that one in nine Canadian patients will acquire a HCAI and more than 8,000 deaths a year can be attributed to HCAs. Routine and additional practices have been introduced and implemented in all health care settings as a means to decrease the risk of infection transmission.

Orientation programs for PHNs working in communicable infection disease programs must include a comprehensive IPAC component so CDC PHN's are aware of HCAI causes, rates, and modes of transmission. In addition, CDC PHNs work in a variety of settings and different roles (provide care to individual clients and provide guidance to clients, facilities, general public to reduce the risk of transmission of infections) and therefore, require a unique IPAC education to fulfill these roles. A combination of self-directed and interactive learning is key to teaching adults new knowledge and skills.

Once the orientation module is implemented, it must be evaluated. As new nurses complete the orientation module, they should be asked if the program helped to prepare for their new role as a CDC PHN and to identify any gaps in information provided. The CDC program manager should also be re-interviewed for her opinion on the orientation and the knowledge it has provided to new staff. The orientation module should continually be evaluated and modified if gaps are identified as well as to meet new best practice guidelines and evolving IPAC practices.

Orientation is just the beginning and IPAC education should be ongoing to ensure that knowledge is current and expanding as IPAC principles are always evolving with new research and technology. As CDC PHNs gain experience in the role of CDC PHN, the need for new knowledge does not end. Annual IPAC education should be offered to all staff to increase IPAC knowledge and ensure that it is current and reflects best practices.

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Appendix A: Needs Assessment

**A Needs Assessment for Infection Prevention and Control Orientation Module for
Public Health Nurses Working With Communicable and Infectious Diseases**

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Abstract

Background: All Public Health Units (PHUs) in Ontario must have an active IPAC program to ensure that Public Health Nurses (PHNs), staff, clients and the community are protected from the spread of infectious and communicable disease (Public Health Ontario, 2012; 2015). PHNs working in communicable disease control (CDC) programs care for clients in a variety of settings by helping to develop and maintain internal IPAC programs and control outbreaks. PHNs are considered experts in IPAC and are often consulted to provide guidance to the health care team and the general public.

Purpose: The purpose of this needs assessment was to assess current knowledge and practices of IPAC programs in PHUs to determine if an IPAC orientation program was beneficial to CDC PHNs as well as to provide insight into topics of interest.

Methods: A comprehensive review of the literature was completed along with consultations and an environmental scan.

Results: The literature review revealed a lack of current research in IPAC outside of the acute care setting although the studies that have been conducted provide evidence of infection transmission in all health care settings. Best practice documents recommend all health care settings have an active IPAC program, which includes IPAC education and training for all health care workers. Consultations with CDC PHNs uncovered gaps in the current orientation delivered and provided insight into topics of interest that would help prepare the CDC PHNs for the role of IPAC specialist.

Conclusion: The findings revealed the need for a specially designed orientation module for CDC PHNs, and supported the development of a module that would meet the learning needs of the CDC PHNs.

Key words: Infection prevention, infection control, public health nurses, orientation

Introduction

Public health nurses' who work in Communicable Disease Control (CDC) Programs have the responsibility to help with the prevention and control of communicable and infectious diseases. CDC nurses must respond to reports of certain communicable diseases according to Ontario infectious disease protocols (MOHLTC, 2016) and internal policies to help prevent further spread. CDC nurses works with child care centers, schools, hospitals, long-term care facilities and work places to develop and maintain internal IPAC programs and control outbreaks. CDC nurses are members of facility IPAC committees that meet regularly to develop and review IPAC policies. In addition, CDC nurses are often seen as the IPAC expertise to answer questions and provide guidance on IPAC issues. In addition to working with other IPAC committees, CDC nurses also have individual clients that are seen at the NBPSDHU or in client homes.

Public Health Ontario (PHO) released infection prevention and control (IPAC) guidelines for clinical office practice, *Infection Prevention and Control for Clinical Office Practice* (2013) and recommends that all health care settings have an active IPAC program. IPAC principles should be developed, followed and practices to ensure that staff, clients and the community are protected from the spread of infections. An important aspect of an IPAC program is staff training (PHO, 2012). The purpose of this paper is to assess the current IPAC education for CDC PHNs and identify any gaps in the current orientation offered by NBPSDHU. A literature review was conducted to assess the need for IPAC education for PHNs. CDC PHNs were consulted to identify their perceived needs for orientation. In addition, other health units in the province were contacted to establish what is currently included in orientations programs for CDC PHNs throughout the province.

Communicable Diseases Control Nurses

The NBPSDHU is one of thirty-six Public Health Units in the province of Ontario and it serves a population of approximately 127 000 resident, with sixty cities, towns and villages (NBPSDHU, 2011; 2014). The unit employs public health nurses (PHNs) in the communicable disease control program (CDC) where they practice within the community health care team to prevent and control the spread of communicable and infectious diseases. The CDC nurses' practice is governed by the Health Promotion and Protection Act, 1990 R.S.O., c. H. 7 (HPPA) which dictates the programs and services CDC nurses are required to provide, including programs for communicable and infectious disease prevention and control.

CDC nurses respond to reports of communicable and infectious diseases according to the Ontario Infectious Disease Standards and Protocols for practice (MOHLTC, 2016) as well as internal NBPSDHU disease specific policies guiding case and contact management. CDC nurses work with child care centers, schools, hospitals, long term care facilities and work places to develop and maintain internal infection prevention and control (IPAC) policies and programs and to control community outbreaks. CDC nurses are members of internal IPAC committees that meet regularly to develop and review IPAC policies. In addition, CDC nurses are viewed as the IPAC experts and are expected to answer questions and provide guidance on IPAC issues. In addition to working with other IPAC committees, CDC nurses have individual clients that are cared for at the unit or in the client's homes. CDC nurses have an important role in IPAC. It is clear that there is a need for a specially designed IPAC module for PHNs orienting to a communicable disease and control program, to help them prepare for the demands of practicing as a CDC nurse.

CDC nurses' practice in Ontario is also guided by the professional practice standards of the Public Health of Ontario's (PHO) infection prevention and control (IPAC) guidelines for clinical office practice (2013). Those guidelines recommend that all health care settings have an active IPAC program that supports principles and practices to ensure that staff, clients and the community are protected from the spread of infections. One important aspect of an IPAC program is staff education (PHO, 2012), which is the focus of this practicum.

CDC nurses working in public health units have unique needs that require a specially designed IPAC orientation program. They care for clients of all ages, and all socioeconomic groups with little or no advance knowledge of the clients' health history or infectious disease status prior to administering care. CDC nurses are also responsible for environmental controls such as disinfecting the clinic rooms between clients. In addition, CDC nurses often meet with clients in a variety of settings including homes, hospitals, schools, child care centers, and long-term care homes. The variety of clients and settings necessitates comprehensive and distinctive IPAC knowledge for CDC PHNs. The purpose of this practicum was to develop a specially designed IPAC module for CDC nurses, to be included in their orientation program.

Global, community and facility outbreaks of infectious diseases have refocused attention on the importance of IPAC programs for CDC PHNs. It is recommended that all public health care organizations have IPAC programs and a variety of guidelines exist to assist in the development of an effective program. The primary focus of current IPAC education and research has been with nurses in the acute care settings, but PHNs are also required to have IPAC knowledge and follow best practices in the community. PHNs who work in communicable disease control programs are especially in need of an IPAC orientation module tailored to suite

their teaching and learning needs. The following is a discussion of the evidence to support the required content for an IPAC orientation module for CDC PHNs.

Chain of Infection Model

PHNs working in communicable disease prevention and control programs are in need of in-depth knowledge of the Chain of Infection Model as part of their orientation to the program. The Chain of Infection Model is used in infection prevention and control to illustrate how infections are transmitted. The model consists of six points of action: infectious agent; reservoir; portal of exit; mode of transmission; portal of entry, and susceptible host (Provincial Infectious Disease Advisory Committee [PIDAC], 2012). All six principles must be present for an infection to be transmitted. The goal of infection prevention and control for PHNs is to intercept the process or “break the chain” at any one of these points of action. If the chain is broken, infection cannot be transmitted from host to host. PHNs working in communicable disease control programs must have in-depth knowledge of the Chain of Infection Model and how to intervene at critical points to break the chain.

The following is a discussion of the content needed in IPAC orientation programs for CDC PHNs including: infectious agents; reservoir, portal of exit; mode of transmission; portal of entry, and susceptible host (PIDAC, 2012).

Infectious Agents. The infectious agent is a microorganism that is capable of causing infection, including bacteria, virus, fungi or parasite. The success of a microorganism to cause an infection is partially dependent on the characteristics of the microorganism, including the ability to multiply and the number of microorganisms required to cause disease. Some microorganisms such as *Shigella* (Heymann, 2008) require only a few cells to cause infection

where others such as *Listeria monocytogenes* (Heymann, 2008) require a large number of cells to cause infection in the host. The chain of infection can be broken at the point of the infectious agent, through the PHN implementing activities that eliminate the infectious agent such as disinfection, sterilization and antibiotic therapy for the infected individual.

Reservoir. Infectious agents need a reservoir, or a place where the microorganism or infectious agent typically lives and multiplies. Reservoirs can include people, animals and environmental reservoirs such as standing water. Microorganisms that have human reservoirs are those that can live and multiply in humans and can be transmitted from person to person such as measles, mumps and hepatitis A. A human reservoir may be symptomatic with the infection but can also be asymptomatic and still capable of transmitting infection. For instance, children infected with hepatitis A often have no symptoms (Heymann, 2008) but they are still capable of infecting others with the virus. Some individuals may initially have an acute illness and after recovering can continue to be a chronic carrier of the microorganism such as with hepatitis B.

Animals can also be the reservoirs for microorganisms such as when dogs become the reservoir for the rabies virus, which can then be transmitted to humans. Like humans, animals may be symptomatic or asymptomatic carriers of infectious agents. There are also microorganisms that can live and multiply in environmental reservoirs such as legionella naturally found in water and the fungus that causes histoplasmosis naturally found in soil. PHNs need to be aware of the common reservoirs for infectious diseases in order to help families and communities break the reservoir link in the chain of infection. PHNs can break the chain by implementing environmental controls such as proper food storage, water treatment and environmental cleaning and disinfection.

Portals of Exit. PHNs need content in their orientation programs to help them to develop the knowledge and skills needed to address the portals of exit in the chain of infection. The portals of exit are how the microorganism leaves the reservoir. Common portals of exit in humans include respiratory track, skin, gastrointestinal tract, urinary tract, blood, and mucous membranes. Pregnant women can also pass infectious organisms to their unborn babies through the placenta. PHNs can break the portal of exit link by practicing and promoting proper hand hygiene, respiratory etiquette including covering cough and sneezes, and proper disposal of waste contaminated by bodily secretions.

Modes of Transmission. Once an infectious agent has exited its reservoir it must have a method to travel to another host. Orientation programs for PHNs must address the content area of the modes of transmission of infection and how to prevent transmission. Transmission of infection usually occurs by direct contact, indirect contact, droplet, or airborne route. Direct contact transmission occurs through direct physical contact with an infected individual such as the transmission of hepatitis C through contact with blood, the transmission of Chlamydia through sexual contact or the transmission of mononucleosis through kissing. Indirect contact transmission occurs when the microorganism is transmitted from one person to another through an inanimate object or surface. Indirect contact transmission frequently occurs by use of shared equipment without cleaning, disinfecting or sterilizing the objects in between use as well as by multiple uses of single use equipment. Indirect transmission through contaminated equipment has been attributed in health care-associated outbreaks of infection such as hepatitis B (Sachdeva, Green, Arthur & Andonov, 2012) and hepatitis C (Centers for Disease Prevention and Control, 2008).

Contact precautions would be put in place for infections caused by microorganisms that can be transmitted through contact with the patient such as *Clostridium difficile* or MRSA. Policies and procedures concerning posting of signs, client placement, environmental controls and equipment considerations will vary depending on the setting. For instance, a client placed on contact precautions in an acute care facility and long term care facility will both have signs posted advising staff that contact precautions are to be used with the client but a client in an outpatient or homecare setting will not have signs posted. Procedures may also be different for pediatric versus adult clients. Health care workers should wear gloves and a gown for any direct care with clients placed on contact precautions.

Droplet transmission occurs when an infected individual expels droplets containing the infectious agent into the air by coughing, sneezing, singing or talking and these droplets come into contact with another person's mucous membranes. The large and heavy droplets typically travel less than 2 meters and do not stay suspended in the air for long but can land on surfaces and remain infectious for a period of time that varies among infectious agents. While on surfaces and still infectious these droplets can infect others and thus become transmitted by indirect contact. Examples of infections that are spread by droplet transmission include pertussis and mumps.

Droplet precautions would be used for clients with infections such meningococcal and pertussis. In addition to routine practices, health care workers should wear a mask and eye protection when within two meters of the client and any equipment used for the client should not be used with another client if possible. If the equipment must be used with another client, it should be cleaned and disinfected upon removal from the infectious client's environment. Client placement and signage will depend on the setting.

Airborne transmission occurs when microorganisms are carried through the air by small droplet nuclei or dust. These particles are smaller than droplets and therefore can travel longer distances and stay suspended in the air for much longer periods of time. Infections that are spread by airborne transmission include tuberculosis and measles. Other modes of transmission that are applicable to the transmission of infections in the community include contaminated foods (*e-coli* from community turkey dinners), and vector borne (e.g. west Nile virus or malaria transmitted by mosquitoes). PHNs can break the chain of infection at the transmission link by practices and promoting proper hand hygiene, respiratory etiquette, environmental controls such as proper air filtration and cleaning, and disinfection and sterilization of equipment.

Airborne precautions are used for clients with infections that are carried through the air such as tuberculosis and measles. In an institutional setting, these clients should be placed in a negative pressure room and a client in the community would be asked to self-isolate at home and if possible, sleep in a room by themselves and open windows in the home. Health care workers caring for a client placed on airborne precautions should wear a properly fitted N95 mask in all interactions with the client.

There are some infections that require a combination of precautions such as chicken pox and influenza. Chicken pox requires both airborne and contact precautions because chicken pox can be transmitted by contact with the drainage from lesions and by the airborne route. Influenza requires a combination of droplet and contact precautions as influenza can be spread by direct contact with respiratory secretions and indirect contact with objects in the client's environment that may be contaminated with the virus from respiratory secretions being expelled by the client coughing and sneezing.

Portal of Entry. The next step in the chain of infection is the portal of entry, which is the means that an infectious agent enters the body of its new susceptible host. The portals of entry are similar to the portals of exit and most agents will enter the new host as it exited the original host. For instance, influenza virus and tuberculosis bacteria exit one host by means of the respiratory tract and will enter the new host through the respiratory tract and hepatitis C virus exits through the blood of one host and enters through the blood of the next host. Other infectious agents will exit through one portal and enter through another portal such as hepatitis A virus or giardia parasite that are spread by the fecal-oral route. The infectious agent is shed in an infected person's stool and spread when the infected person fails to wash hands properly/adequately and contaminates an object, food or water. The agent then enters a new host through the mouth. PHNs can break the chain of infection at the portal of entry into a new host by hand hygiene and appropriate use of personal protective equipment (PPE) such as gloves, masks and gowns.

Susceptible Host. The final chain in the chain of infection is the **susceptible host**. A person has to be susceptible to the infectious agent to become infected by that agent. A number of things can affect susceptibility such as age, general health, immunization status and immune status. Generally, the very young, the very old and the immunocompromised are more susceptible to acquiring most infections as their immune systems are less able to fight infection. Hosts that are immune due to vaccination or previous infection are not susceptible to that particular infection. For instance, a person who has received vaccination for hepatitis B will not be susceptible to that virus even if exposed to an infected person. The PHN can break the chain of infection by recognizing the susceptible host and implementing a vaccination review / update,

and promoting chemoprophylaxis for high risk individuals such as antibiotic therapy for close contacts of invasive group A streptococcus infections.

Based on the evidence presented, an orientation program for PHNs working in a communicable disease and prevention program should promote an in-depth understanding of the Chain of Infection Model and strategies to break the chain at key points. The content should include all six principles of the model that must be present for an infection to be transmitted. With an understanding of these principles, the PHNs can focus on the goal of infection prevention and control practice which is to intercept the process or “break the chain” at one of the critical points of infection transmission.

Health Care Associated Infections

An orientation program for PHNs working in communicable disease programs should promote knowledge of the current statistics on health care associated infections. Global disease outbreaks such as Ebola, the SARS epidemic and H1N1 pandemic have increased awareness of infection transmission and the role of infection prevention and control principles and practices in reducing infection transmission. Localized outbreaks of health care associated infection (HCAI) such as *Clostridium difficile* infection and the emergence of antibiotic resistance infections (e.g. MRSA, VRE) have increased awareness of the importance of IPAC among PHNs. HCAs are defined as “infections that patients acquire during the course of receiving health care treatment for other conditions” (Centers for Disease Prevention and Control [CDC], 2010). The World Health Organization (WHO) estimates that “at any given time, the prevalence of health care-associated infection in developed countries varies between 3.5% and 12%” (WHO, 2009a).

The global burden of HCAs on the health care system is extensive with increased hospital stays, increased costs and fatalities (CDC, 2010; WHO, 2009b). The College of Physicians and Surgeons of Ontario (2009) estimate that one in nine Canadian patients will acquire a HCAI and more than 8,000 deaths a year can be attributed to HCAs. HCAI can be further defined as “...an infection that is acquired during the delivery of health care” (PIDAC, 2012). Routine and additional practices have been introduced and implemented in all health care settings as a means to decrease the risk of infection transmission. Orientation programs for PHNs working in communicable infection disease programs must be aware of HCAI causes, rates, and modes of transmission

Routine Practices and Additional Precautions

All health care workers including PHNs must be aware of and practice the accepted professional standards for routine practices and additional precautions when caring for all clients (PHAC, 2012). Routine practices are based on the principle that all clients may be harboring potentially infectious microorganisms. Accepted standards of practice should be applied to minimize the risk of transmitting microorganisms from the client to the PHN and possibly from the PHN to another client. PHNs are expected to assess the risk of exposure to infections and identify strategies to reduce the risk of exposure and prevent transmission of infections. PHNs can use a variety of strategies to reduce the risk of transmission including promoting hand hygiene, conducting a risk assessment of the potential of exposure to infection, the use of personal protective equipment (PPE), environmental controls and administrative controls (PIDAC, 2012).

The term universal precautions, refers to the same principles as routine practices. Bennett and Mansell (2004) distributed a questionnaire survey to community nurses in one Welsh Health Authority (n=379) to explore the perceptions and experiences of using universal precautions in practice. Survey results were analyzed using descriptive statistics and non-parametric tests for comparisons between variables. Topics explored included sharps disposal and injuries and use of gloves. Topics of interest for this report include the topics of hand hygiene and knowledge of infection prevention and control practices.

The researchers found that only 65% of participants had received initial education or information about universal precautions and only 20% had received updating sessions. Of those surveyed, 29.3% (105 of 358) felt their perceived knowledge was inadequate although those that had received training about universal precautions had a statistically significantly higher level of perceived knowledge. Researchers also found that the majority of respondents (65%) reported having difficulty performing hand hygiene due to a lack of facilities or unclean facilities available in the homes. The authors report limitations of the study due to the nature of self-reported data as well as noting that the survey was conducted in only one health authority. Key findings from this study include the lack of existing guidelines specific to the unique needs of community nursing and the lack of infection prevention and control training provided to community nurses.

Hand Hygiene

Proper and frequent hand washing among health care workers is the single most effective method to reduce HCAI. Hand hygiene refers to cleaning of the hands and includes the removal of visible dirt and invisible microorganisms by the use of soap and water or alcohol-based hand rubs (ABHR). Hand hygiene best practice indicates that ABHR should be used for hand hygiene

for most situations. Hand hygiene should be performed with soap and warm water after using the bathroom, when hands are visible soiled and after caring for a client known or suspected to be infected with norovirus or *Clostridium difficile*. (Newfoundland Labrador, 2009; PIDAC, 2010; Public Health Agency of Canada [PHAC], 2012; Prince Edward Island [PEI] Canada Health and Wellness, 2012).

Research has shown that improving infection control practices such as hand hygiene compliance rates and isolation practices can reduce the number of HCAI reported (Kirkland et al, 2012; Marsteller et al, 2012; Aragon, Sole & Brown, 2005; Ebnother et al, 2007). Despite the growing number of organizations recognizing the importance of routine practices and the growing number of recommendations, studies of infection control practices in the hospital (2009b) found that research studies reported an overall average of 38.7% compliance with hand hygiene recommendations.

Health care workers should perform hand hygiene properly and frequently. The World Health Organization (WHO) has developed the five moments of hand hygiene which include before touching a client, before performing an aseptic procedure, after exposure to body fluids, after touching a patient and, after touching a patient's environment (WHO, 2009). In addition, health care workers should perform hand hygiene before eating or drinking, prior to preparing or serving food and, following personal hygiene such as using the bathroom and blowing their nose (PEI Canada Health and Wellness, 2012; PHAC, 2012). Orientation programs for PHNs should promote proper and frequent hand hygiene policies and procedures.

Risk Assessment

As part of an orientation program to address infection prevention and control, PHNs must be able to conduct an accurate risk assessment prior to interacting with any client or their environment (PIDAC, 2012; PEI Canada Health and Wellness, 2012; Manitoba, 2012). The purpose of the risk assessment is to determine what risks are present for transmission of infection and what measures can be taken to protect the client and the health care worker from exposure to infections. PHNs should identify what procedures will be performed and the risk associated with the procedure that may place the health care worker at risk to being exposed to bodily fluids or secretions. Considerations should include patient symptoms such as coughing, sneezing, vomiting, diarrhea, and incontinence as well as the procedure being performed such as risk of exposure to sharps with injections or intravenous therapy or risk of exposure to bodily fluids during a dressing change or catheter insertion. PHNs should use an accepted risk assessment process to guide choosing the appropriate PPE to utilize during the encounter.

Personal Protective Equipment

The appropriate PPE to utilize during an encounter may include gloves, gowns and / or masks to help protect the health care worker from being exposed to and potentially infected by blood and body fluids. The PHN must select the appropriate PPE to ensure that infectious microorganisms are not carried on the PHNs body or clothing when they come in contact with another vulnerable patient. The PPE that the health care worker chooses for routine practices is based on the risk assessment. For instance, a PHN may choose not to use PPE if going into a room to conduct counseling with a client if the client was not exhibiting any symptoms of infection but may choose to wear gloves, masks and eye protection when taking blood on the same patient due to the potential risk of being splashed by the patient's blood.

Environmental controls include strategies such as maintaining a clean environment and equipment; appropriate patient placement; appropriate placement of sharps containers and hand hygiene products; and properly working ventilation systems. Administrative controls include ensuring infection prevention and control policies and procedures are in place and that staff are properly educated and able to comply with policies and procedures (PIDAC, 2012). Additional precautions are used in addition to routine practices when a client is known to have or suspected to have an infectious disease. PHNs must be aware of the need for additional precautions and base their practice on the accepted standards of practice. Additional precautions can be classified as contact, droplet and airborne and are based on the mode of transmission of the microorganism.

Infection Control in the Community

The importance of standardized infection prevention and control practices has been well established for both acute care and the community. There are a number of research articles that discuss the importance of infection control in the community (Kenneley, 2007; Kenneley and Madigan, 2009) and outpatient clinics (Ashrafet al, 2012; Hancock-Allen, J. B., Janelle, S. J., Lujan, K., & Bamberg, W. M., 2016; Macedo et al., 2005; Puhl, Reinhart, Puhl, Selinger & Injeyan, 2011; Radcliffe et al., 2012) and provide guidance for community health care providers (Flanagan, E., Chopra, T., & Mody, L., 2011; Nazarko, 2009; Swanson & Jeanes, 2011; Ward, 2002; Unsworth, 2011; Storr & Kilpatrick, 2012).

It is critical for PHNs to understand IPAC practices and implement them in the community. This is particularly important for PHNs who are caring for patients receiving homecare services, because research shows that these patients have a significantly higher risk for developing HCAs including methicillin-resistant *Staphylococcus aureus* (MRSA) infections

(Tambyah et al, 2003; Lescure et al, 2006). HCAs occurring outside of acute care settings provide evidence that infection control practices are important for all health care workers in all settings, and especially important for PHNs working in the CDC programs in the community.

Infection Control in Outpatient Clinics

PHNs practicing in Outpatient Clinics are also required to adhere to the standards of practice for IPAC including injection safety policies, and hand hygiene. Outpatient clinics are not immune to infectious and communicable disease outbreaks. There have been multiple reports of infectious disease outbreaks in outpatient clinics including outbreaks of *Mycobacterium mucogenicum*, a bloodstream infection (Ashrafat al, 2012; Hancock-Allen, J. B., Janelle, S. J., Lujan, K., & Bamberg, W. M., 2016). Thompson, Bowdey, Brett and Cheek (2016) studied IPAC policies and practices at a fifteen different outpatient clinics to identify educational and quality improvement opportunities. The researchers assessed adherence to IPAC policies through direct observations and interviews with staff. A checklist was used to assess practice and guide the direct observation of practices including injection safety practices and hand hygiene. Although most of the recommended IPAC policies were in place, there was only a 65% staff compliance rate to injection safety policies and only 65% of the staff complied with hand hygiene policies. On a positive note 100% of the clinics had hand hygiene supplies (soap and paper towels) readily available for staff to utilize, despite the observed low compliance rate.

Compliance rates for hand hygiene can be influenced by environmental controls such as the availability of alcohol based hand rub (ABHR). Stenske KuKanich, Kaur, Powell and Freeman (2013) studied the effects of a hand hygiene campaign on hand hygiene compliance rates in staff from two outpatient clinics. The researchers obtained baseline hand hygiene rates

prior to implementing a hand hygiene campaign that consisted of an educational poster and ABHR. Hand hygiene rates were again collected immediately following the intervention and one month later. There was a significant increase in hand hygiene compliance at the two clinics following the intervention (36% vs 11% and 54% vs 21%) and the rates remained improved one month following the intervention. Another key finding was the perceived barriers to hand hygiene among survey respondents, which included skin irritation, forgetfulness, insufficient supplies, insufficient time, and insufficient training.

Felembam, St. John and Shaban (2012) studied hand hygiene practices of home visiting nurses from two non-profit home care agencies in Queensland, Australia. Eight nurses participated in the study that took place over four months in 2010. A questionnaire was distributed to the nurses to collect demographic information and to “explore clinicians’ perspectives on hand hygiene” (Felembam, St. John & Shaban, 2012, p.154). In addition, the researchers accompanied the nurses for one day to observe hand hygiene adherence and technique during the home visits. The World Health Organization’s (WHO) “Five Moments for Hand Hygiene” introduced in 2009 was used by the researchers. The Five Moments include before touching a client, before performing an aseptic procedure, after exposure to body fluids, after touching a patient and, after touching a patient’s environment (WHO, 2009). The questionnaire was researcher-administered and the two tools were used to collect hand hygiene observations. Descriptive statistics were used to analyze data.

A total of 103 hand hygiene moments were identified with 61 hand hygiene actions performed. The researchers found that overall compliance to the “Five moments’ was poor (mean = 59.2%) although hand hygiene technique used was “mostly” appropriate when using soap and water. The technique when using alcohol-based hand rub (ABHR) was more

problematic with few nurses covering all hand surfaces (21.3%), rubbing hands vigorously (13.1%) and using proper duration of hand rub (27.9%).

Key findings indicate that hand hygiene compliance in the home care setting was not based on current knowledge and policies. Questionnaire results indicated that the majority of the community nurses in the study did not understand the Five Moments for Hand Hygiene (75%) and had not attended hand hygiene education updates (62.5%). In addition, the current recommendation is to use ABHR unless hands are visibly soiled and the majority of the home care nurses studied (75%) indicated that they preferred to use soap and water. The researchers were unable to compare results of this study to other studies as similar studies were not found. However, the researchers surmise that hand hygiene supplies may be an issue in home health care with the nurses dependent on the clients' supply of soap, hand towels and hand washing facilities. The researchers also conclude that education is necessary for home health nurses regarding current hand hygiene knowledge and recommended practices.

This research shows there are both environmental and behavioral factors that influence PHNs compliance with hand hygiene policies and practices in the community.

Risk for Cross Contamination in the Community

Gould et al (2000) studied the potential for cross contamination during home nursing visits and if this could be reduced by the use of an antiseptic cream. The research was conducted in the United Kingdom and data was collected from 17 nurses employed within two trusts of the NHS. All data was collected by two research assistants using a combination of three methods; observations of nursing activities and working conditions, a clinical trial of the antiseptic cream, and hand hygiene audits. The research assistants accompanied the nurses on visits and counted

the number and types of nursing procedures that were performed and reported on the conditions of the homes visited. The conditions of the homes were found to be generally poor and the nurses were entirely reliant on the supplies provided by the home care clients for hand hygiene. The data collectors found that this reliance and the poor conditions led to the nurses being unable to perform proper hand hygiene during almost half of the visits. The nurses used soap and water to perform hand hygiene at 53% of visits, utilized just water at 21% of visits, and were unable to wash their hands at all during the remainder of the visits.

The nurses' hands were also tested for bacteria at the start of each day and at the beginning of each visit and results were compared to determine the number of bacteria present. The bacteriological study "indicated that nurses' fingers were frequently contaminated with large numbers of transient bacteria of the type that can cause iatrogenic infections" (Gould et al, 2000, p.98). The research report fails to mention if the number and type of bacteria changed throughout the day or after performing hand hygiene. The initial bacteriological study was followed by a clinical trial of the antiseptic cream to determine if the cream reduced the number of bacteria present on the nurses' hands. The results of the study found that the use of antiseptic cream reduced the number of bacteria present on hands at the start of each visit. The researchers do not indicate what tests were used to analyze data but do state that "median counts at the start of the second and subsequent visits each day were 23.2 in control experiments and 16.2 on days when the antiseptic cream was used [and] this difference was highly significant" (Gould et al, 2000, p.98).

Hand hygiene audits were conducted to determine if problems with adherence to hand hygiene were limited to: certain geographical areas; nurses working in clients' homes; nurses' working in urban areas that tended to consist of client's living in poor conditions. All nurses that

worked in clients' homes and clinics were invited to participate and those that returned questionnaires were included in the data analysis (n=126). A self-administered questionnaire was provided to the nurses to ascertain perceptions of hand hygiene and determine how many times during a shift hand hygiene was performed. Nurses' were also questioned about the hand hygiene supplies available to them and the skin condition of hands. Hand hygiene compliance was compared to the Centers for Disease Prevention and Control (CDC) recommendation that hand hygiene occur at least 10 times per shift (current recommendation at the time of the study). Results indicate that hand hygiene was performed more frequently in the clinics versus clients' homes and the poor conditions of some homes prevented the nurses from performing proper hand hygiene. Key findings of this research study supported early studies that found proper hand hygiene is dependent on the condition and supplies available in the client's home rather than a poorly motivated and apathetic staff.

Multidrug Resistant Organisms

Kenneley (2012) conducted a descriptive exploratory study to determine how many home health care personnel acquired a multidrug resistant organism (MDRO) and whether the infections had been transmitted to a household member. The study was conducted in the United States and participants (n=423) were asked to complete a researcher-developed 22-item survey including a section that allowed for narrative answers (Kenneley, 2012, p.238). Although recruitment methods were expansive, the response rate was only 9.2% but the sample contained participants from 44 of the 50 states. The sample also contained home health care personnel from a variety of disciplines (RN, LPN, APN, Physical Therapy) with the majority of respondents representing RNs (n=389). Kenneley (2012) found that 5.9% of respondents had been "diagnosed with an occupationally acquired infection caused by an MDRO" (p.239) and

none of those reported transmitting the infection to a household member. The survey administered also contained questions related to general infection control policies and procedures within the home care agency that participants were employed.

Findings from that study indicate that policies vary among the agencies and that there is a lack of commonality in infection prevention and control policies in the field of home health care. Key findings include differences reported in having written policies regarding MDRO colonization, MDRO infection, dedicated equipment for those with MDRO infection and lack of consistency of bringing nursing bags into homes. It is interesting to note that the researcher found that 79% of participants report that their agency employs a full-time Infection Preventionist. Kenneley notes several limitations to the study including the fact that self-reported data may not be entirely reliable and results may not be generalizable to all home health care personnel. In addition, the author notes that this is the first study of this kind and study would need to be repeated to compare results.

Homecare Nursing

One study was located that addresses potential contamination of the homecare nurse's bag. Bakunas-Kenneley and Madigan (2009) conducted a prospective cohort study comparing the bacteria present on the outside of nurses' bags with the bacteria present on the inside of the bag. The study was conducted in Ohio from January 2005 to August 2006 and the sample consisted of nurses from four different home health care agencies (n=126). The nurses were asked to routinely submit their nursing bags to be cultured for bacteria. Results of the cultures found that 83.6% of the outside of the bags were positive for human pathogens (15.9% were MDROs), 48.4% of the inside of the bags were positive (6.3% were MDROs), and 43.7% of the equipment stored inside the bags were positive (5.6% were MDROs).

Key findings indicate that the inside of the bag was 2.24 times more likely to be positive for human pathogens if the outside was positive and patient equipment was 3.43 times more likely to test positive if the inside of the bag tested positive. The researchers also found that bags made of leather were less likely to be positive and bags cleaned with health care cleaners rather than household cleaners were less likely to be positive. The researchers conclude that homecare agencies should have policies regarding nurses' bags (material used, cleaning frequency and products). In addition, the authors call for further research into infection prevention and control within the home health care field.

Kenneley (2010) published a second report that further explains the initial cohort study of the bacteria present on nurses' bags. This report provides more detail such as the total number of cultures collected (n=351) and the differences that were found between the four agencies. One agency had a policy in place that advocated for a monthly cleaning schedule of bags and two of the other agencies (which require nurses to supply their own bags) showed results that were significantly higher for contamination. In addition, one agency that did have specific policies related to the nursing bags showed significantly higher numbers of positive cultures on the inside of the bags which was attributed to the use of household rather than health care cleaners.

Kenneley (2010) also addresses other areas of environmental contamination including hand hygiene and notes that cultures were also taken from the nurses' hands, pant cuff, sleeve cuff, and shoes. The report does not indicate when these cultures were taken and which participants had cultures taken (n=40) but does report that 95% of the cultures were positive for *S. aureus* and *E. coli*. Kenneley (2010) suggests future research be conducted on the link of between nursing bags and nurses' hands to determine "whether existing hand hygiene protocols are adequate and appropriate" (p. 200).

IPAC Education Programs

While IPAC policies and procedures are important to have in place, organizations must ensure that IPAC education programs for nursing staff is comprehensive and based on best practices and up to date knowledge. Yun Yun et al. (2015) studied the effects of an IPAC education program on the rates of health care associated blood stream infections in a PICU in Malaysia. The training program was delivered to PICU physicians and nurses and focused on hand hygiene, PPE, elimination of multiple use vials, and aseptic techniques. Physicians were assessed following the initial two hour training program to determine if they were following the IPAC measures included in the training program and training was repeated until it was determined that that the IPAC standards had been met. The researchers found there was a significant reduction of the number of health care associated blood stream infections following the intervention (41 per 1,000 admissions following intervention compared to 88 per 1,000 admissions at baseline). The researchers noted that an IPAC training program is relatively low cost compared to the costs associated with health care associated infections.

Singh et al., (2012) studied the effects on an IPAC training program on the rates of HCAI and costs in India. An IPAC training program was provided to all hospital staff over two half-day sessions. The training sessions included information regarding hand hygiene, routine practices, additional precautions, aseptic technique and surveillance. The training program was developed with the help of an international IPAC expert and was evaluated with pre- and post-testing immediately following the training and again three months later. Researchers found that staff IPAC knowledge increased significantly and HCAI rates decreased significantly following the training program. In addition, the authors noted that there was a significant cost saving associated with the decreased HCAI. It is important to note that this study took place in a

developing country and the health care staff had no previous training or knowledge regarding IPAC.

Busy nurses need a variety of IPAC teaching and learning approaches and current research is pointing towards the effectiveness of self-directed education. Attack and Luke (2008) studied the knowledge increase of Canadian health care professionals after completing self-directed online IPAC training modules. The study consisted of 67 health care professionals from four Canadian hospitals that completed a pre- and post-test questionnaire. The intervention included three self-directed modules with topics including hand hygiene, chain of transmission, and routine practices. The researchers found a significant increase in knowledge after completion of the educational modules and found that the majority of participants were satisfied with the training material and acknowledged that learning had occurred. Although this study indicates that IPAC knowledge increased, there was no attempt to determine if the increased knowledge had an effect on clinical practice or HCAI.

PRECEDE-PROCEED Model

The PRECEDE-PROCEED model has been widely used as a framework for the development of a multitude of health promotion program planning since its development in 1973 (Castellanos & Abrahamsen, 2014; Ranjbaran, Dehdari, Sadeghniat-Haghighi & Majdabadi, 2015; Li et al., 2009; Yeo, Berzins & Addington, 2007; Mirtz, Thompson, Greene, Wyatt & Akagi, 2005; Chiang, Huang, & Lu, 2003). The model was chosen as a framework for this project because it is widely used in Public Health programming and is familiar to Public Health staff and managers. The PRECEDE-PROCEED model is most often used for health promotion programs in an effort to influence behavioral change but has been used to develop education

programs for health care professionals (Cannick, et al., 2007; Larson, Cohn, Meyer & Boden-Albala, 2009; Sharma, Joshi, Shah, Macaden & Lundborg, 2015; Tapley & Patel, 2016).

The PRECEDE-PROCEED model consists of eight steps of program development. The name of the model is an acronym that stands for predisposing, reinforcing, and enabling constructs in educational/environmental diagnosis and evaluation and policy, regulatory, and organizational constructs in educational and environmental development (Crosby & Noar, 2011). This practicum focuses on the development of an educational module utilizing the first four steps of the PRECEDE-PROCEED model. The PROCEED, last four steps of the model, focus on implementation and evaluation which are not part of this practicum.

Step 1: Social Assessment

The PRECEDE-PROCEED model works backwards in the sense that the initial step is to identify the desired outcome and then work backwards to achieve that outcome (McKenzie, Neiger & Thackeray, 2013). The program planner can "pre-identify" a need that is likely to have an impact on the community but there still must be involvement from the community to determine if the need is one that is valued by that community (Crosby & Noar, 2011). In this project, the pre-identified need is to increase infection prevention and control knowledge among PHNs working in the CDC program ensure safe high quality care to clients in all settings. Effective program planning should involve the community in all stages of planning.

During the social assessment, program planners should attempt to determine what is important to the community and this can be done through activities such as surveys, questionnaires, interviews and focus groups. Consultations with CDC PHNs provided insight into the need for an IPAC orientation program by asking the PHNs if the current orientation

provided was adequate preparation to perform the role of a CDC PHN (Appendix A). In addition to obtaining information, involving stakeholders early in the process can also help ensure that the program being planned will ultimately be useful to the community and therefore supported by the community.

Step 2: Epidemiological Assessment

The epidemiological assessment aims to identify factors that may contribute to the problem identified in phase 1 and planners look at current statistics related to the issue (McKenzie, Neiger & Thackeray, 2013). A literature review was undertaken to examine how IPAC lapses can affect clients and staff including the resulting costs of health care associated infections. The literature review was expanded to include IPAC topics in all health care settings as CDC PHNs work with their own clients in community and clinic settings as well as work with other health care facilities to develop and maintain IPAC programs.

Step 3: Educational and Ecological Assessment

Step 3 involves determining the educational and ecological factors that contribute to IPAC knowledge among CDC PHNs. During this stage, planners must consider the predisposing, reinforcing and enabling factors. Predisposing factors include knowledge, attitude, beliefs and perceptions (McKenzie, Neiger & Thackeray, 2013; Crosby & Noar, 2011). To determine predisposing factors, CDC PHNs were interviewed to ask about current IPAC knowledge and perceived gaps in IPAC education currently provided in orientation. An environmental scan was also undertaken to assess what orientation education is provided at other provincial health units.

Reinforcing factors include feedback that individuals in the target group receive to ensure that the IPAC knowledge is being used in the PHN role (McKenzie, Neiger & Thackeray, 2013; Crosby & Noar, 2011). Enabling factors are those that enable or impede the target population from engaging in the program (McKenzie, Neiger & Thackeray, 2013; Crosby & Noar). CDC PHNs were asked in interviews what topics they would like to be included in an orientation program and about the ideal method of program delivery.

Step 4: Administrative and Policy Assessment and Intervention Alignment

An internal scan was conducted to identify internal IPAC policies currently in place and participants were asked if they were aware of these policies. A literature review of current IPAC recommendations was completed to ensure that the proposed intervention met best practice guidelines.

The intervention alignment involves identifying interventions that will bring about the change in behavior that was identified in earlier steps and will result in the program meeting objectives that were also identified in earlier steps (McKenzie, Neiger & Thackeray, 2013; Crosby & Noar, 2011). This program aims to increase IPAC knowledge among CDC PHNs at orientation.

Methods

Environmental scan

An environmental scan of 35 health units in Ontario was conducted by email. The purpose and intended questions of the questionnaire were introduced by the writer during a teleconference meeting of a provincial IPAC peer group that holds quarterly teleconferences to discuss current and emerging IPAC concerns and topics. Following the meeting, a brief

questionnaire was forwarded to all members of the groups with a deadline for responses. Participants were asked to describe current IPAC training provided to staff that delivers the training, if IPAC training is program specific, and if an annual review of IPAC education is required. Responses were received from five health units.

Consultations

A discussion guide was utilized to interview nine CDC PHNs, one CDC manager, and the NBPSDHU Occupational Health Nurse that currently provides general IPAC training to all staff (Appendix B). The nine CDC PHNs had a variety of experience as PHNs. Three PHNs had less than one year of experience as a PHN, three had between one and five years of experience, and three had greater than five years of experience. The Occupational Health Nurse had 18 years of experience at NBPSDHU, with nine years of experience as the Occupational Health Nurse. The CDC program manager had 15 years of experience as a manager at NBPSDHU, with 8 of those years in CDC.

A modified discussion guide was used to interview an expert about current IPAC education available to PHNs in Canada (Appendix B). The discussion guide was used during semi-structured face-to-face interviews with NBPSDHU staff participants and the expert interview was completed electronically by e-mail. The IPAC expert consulted is regional IPAC specialist providing expert advice to health care facilities throughout the region and is a former Chapter President of a national IPAC organization.

All of the interviews were conducted in private by the author. Participants were asked about their awareness of IPAC education specifically for CDC PHNs, preferred content for IPAC education for CDC PHNs, and preferred delivery of IPAC education. The NBPSDHU nurses and manager were also asked to identify any gaps in IPAC education that was provided during

orientation. The CDC PHNs were additionally asked what IPAC education they would have liked to receive during their own orientation.

Internal scan

An internal scan of current NBPSDHU IPAC policies was also conducted. Six policies related to IPAC were identified. The IPAC policies identified were written for all NBPSDHU staff and not specific to CDC PHNs. During interviews, CDC PHNs were asked about their knowledge and awareness of the policies.

Results

Environmental scan

All five-health units that responded to the environmental scan questionnaire reported they provide some form of IPAC training for staff. One health unit used the PHO Core Competency modules that are available online from the Ministry website. The core competencies modules are required to be completed by all staff and provide a general overview of IPAC principles. One health unit is intending to include the PHO Core Competencies in future IPAC training materials. Another health unit has developed an internal online IPAC training module for all staff. One health unit provides bi-monthly IPAC educational events and in addition sends staff to reprocessing courses. One health unit does not provide any general IPAC education. All five health units responded that program-specific IPAC training is provided by individual programs and the content is determined by the program manager with no official or consistent training program being delivered. Only one health unit requires annual IPAC training.

Internal scan of policies

An internal scan of NBPSDHU policies identified six policies related to IPAC. The policies included: routine screening for infectious illnesses; prevention and management of ill personnel; respiratory protection program; infection prevention and control practices within the workplace; personal protective equipment; and, cleaning and disinfection in the workplace. All policies identified are written for all staff and do not contain program-specific content or examples.

Prevention and management of ill personnel is a policy for managers related to exclusion periods for ill employees. Infection prevention and control practices within the workplace examines cough etiquette (i.e. cover your cough and sneeze and wash hands after using a tissue) and general hand hygiene including proper procedure for using soap and water and ABHR as well as identifying the five moments of hand hygiene. Personal protective equipment includes safety equipment such as hearing protection, safe footwear, sunscreen, and helmets but also includes a section on PPE listing the intended use of PPE and proper order for donning and doffing PPE. This policy also states that the Occupational Health Nurse “will provide education/training on the proper use of PPE for infection prevention and control purposes following qualitative fit testing” and does not include a written explanation of when to use what PPE. Cleaning and disinfection in the workplace provides minimal information for health care staff on cleaning work spaces and clinic areas and the majority of the procedures included are for the night cleaning staff of the building.

Expert consultation

A variety of IPAC education programs were identified by the expert consultation but the majority of the programs were provided at a fee and offered through Canadian Universities and

Colleges. One affordable online course offered through Georgian Brown College is offered for a small fee of \$35.

The PHO Core Competencies were identified as well. The Core Competencies are offered online for free and consist of six individual modules: occupational health and safety; chain of transmission and risk assessment; health care provider controls; control of the environment; administrative controls; and, additional precautions. Each module takes between 20 and 40 minutes to complete and participants do not have to complete the modules in one sitting. Each module also has a test at completion and participants obtain a printable certificate. The modules are for all individuals working in a health care setting and are not specific to one setting or one health care profession.

Another program identified was the IPAC Canada Online Novice Infection Prevention and Control Course. This course is offered annually from September to June with applications due in March to start in September of that year. The course is offered entirely online with a combination of online discussion, quizzes, take-home exam, assignments and a practicum. There are a limited number of spaces available each year with preference given to those working as a facility Infection Control Practitioner with less than two years of experience.

Internal consultations

Awareness of IPAC Education. The majority of the NBPSDHU staff consulted was aware of IPAC education. Most of the staff identified the Georgian Brown College online IPAC course and PHO Core Competencies and one identified a course titled “Hit the Ground Running” but no other staff was aware of this course and an online search failed to find results for an IPAC course with this title. One staff identified internal IPAC policies as an education IPAC resource. Two

participants were unable to identify any IPAC education available for CDC nurses at NBPSDHU.

All staff that identified the Georgian Brown College course and PHO Core Competencies commented that the information provided was very general and not specific to CDC PHNs. Comments included: “good review”, “no new information”, “very repetitive”, “very basic”. Staff that had done both commented that the information provided in each was very similar and that both should not be required nor recommended. One staff identified that these online modules were missing practical information such as examples for different settings.

Only one participant had detailed knowledge and awareness of internal NBPSDHU IPAC policies. Most participants were aware that there were policies but were unable to identify the topics and content and did not recall having read the policies.

Delivery of IPAC Education. All staff would like a combination of strategies used to receive IPAC education. The most common formats identified included: online modules with a combination of reading, videos and audio and staff presentations with demonstrations and opportunities to practice skills. Most staff preferred self-directed learning that works for their workload rather than strict timelines. Approximately half of the participants said they would like short quizzes included to ensure an understanding of information presented.

All participants felt that regular refresher IPAC education would be helpful. Participants with greater than five years of experience as a CDC PHN also stated that IPAC education should be offered continually with more advanced content offered for those with more IPAC experience and knowledge. One participant also stated that all staff should be encouraged to obtain a Certification in Infection Control (CIC®) as the preparation for the exam was valuable in increasing IPAC knowledge and skill.

IPAC Education Topics

Hand Hygiene

All but two of the participants identified hand hygiene as a topic that should be included in IPAC education for CDC PHNs. Participants with more than five years of experience felt that IPAC orientation should include a detailed component on hand hygiene with identification of the five moments of hand hygiene, proper hand hygiene technique for soap and water and ABHR, practical demonstrations and practice, and hand hygiene information for different settings (e.g. clinic visit vs home visit vs school visit). Participants with less experience felt that hand hygiene is important but that they did not require training on proper technique or the five moments. These participants wanted demonstrations of teaching tools that are available to be used when teaching hand hygiene to health care facility staff and the general public.

Routine Practices and Additional Precautions including PPE

Routine practices and additional precautions were identified by all but one participant as a desired topic to be included in IPAC education for CDC PHNs. Participants felt it would be beneficial to include a basic refresher on the chain of transmission and routine assessment of clients. Participants with less experience requested disease specific information for additional precautions (e.g. TB clients to be on airborne precautions). Included in routine practices and additional precautions were suggestions related to PPE, specifically information on what PPE to use in certain situations and correct donning and doffing procedures with demonstration and practice opportunities. Participants with more than one year of experience also felt that getting specific PPE information would be beneficial for CDC PHNs including instructions of when and where to don and doff in community settings and how and where to dispose of used PPE when visiting a client in the community.

During the internal scan, it was identified that “community backpack kits” are available for staff to take when visiting clients in the community. The kits include PPE, ABHR, and garbage bags for disposal of used equipment. There is also an attachment to the internal policy, personal protective equipment that lists the required contents of the bags. Approximately half of the staff was aware of the kits but none were aware of the policy list of contents or who was responsible for stocking the bags and ensuring contents were not expired content.

Cleaning, Disinfection, Sterilization and Reprocessing

All participants identified cleaning, disinfection and/or sterilization and reprocessing as a priority. Cleaning and disinfection of equipment and surfaces was identified as required information for staff to utilize following client visits in NBPSDHU clinics and community settings. Participants also requested more in-depth cleaning and disinfection information to help when participating on facility IPAC committees and providing advice to clients and the public. Participants identified specific topics including cleaning and disinfecting products (e.g. low level vs high level disinfectants), how to use specific products, and when to use specific products.

Sterilization and reprocessing was also a common theme, although NBPSDHU CDC PHNs do not use equipment that requires sterilization and reprocessing. The participants identified this as a recommended topic due to participation on facility IPAC committees and requests for information from local health care facilities.

Epidemiological Principles and Best Practice Documents

Two other topics that were identified by two or more of the participants included basic epidemiological concepts and a list of best practice documents with internet links.

Conclusion

This needs assessment addressed current practices of IPAC education for CDC PHNs at through a comprehensive literature review of current research and best practice documents, consultations and an environmental scan. The literature review revealed a lack of research in IPAC practices outside of the acute care setting but also provided evidence of the expectations that every health care facility engage in IPAC activities. Consultations with CDC PHNs explored topics of interest and importance to the development of an IPAC orientation program. Through consultations, it was discovered that the CDC PHNs felt that the current IPAC training provided is not adequate to prepare for the demands of the role of IPAC specialist. This needs assessment provides evidence to support developing a specially designed IPAC orientation module to address the learning needs of a new CDC PHN as well as provide an understanding of relevant topics that should be included in the program.

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Appendix A: Discussion Guide for Consultations with PHNs

The Development of an Infection Prevention and Control Orientation Module for Public Health Nurses in a Communicable Disease Control Program

Discussion Guide for Consultations

1. Are you aware of any IPAC education for CDC nurses at NBPSDHU? (If no skip to 2)
 - a. If so, could you describe that education?
 - b. How helpful was that education? Were there any gaps or repetition in content?
 - c. Was there anything specific about that education that was designed to help PHNs prepare to practice in the CDC program?
2. What content or topics would you like to see covered in IPAC education for PHNs orienting to the CDC program at NBPSDHU?
3. What IPAC education would you like to have received during your orientation program (if applicable)?
4. How would you like IPAC education to be delivered to CDC nurses?
5. Do you have any other comments about IPAC education for CDC nurses?

Appendix B: Environmental Scan Questions

I am currently completing a practicum project as partial requirement for a Master of Nursing Program at Memorial University. The purpose of the project is to develop an orientation module for CDC PHNs. As part of this practicum project, I would appreciate your feedback on the following questions. Please contact Sherri Gurini, PHN at 705-474-1400 x 2235 if you have any questions or require further information.

Please send your responses to sherri.gurini@nbpsdhu.ca

Thank you for your participation.

Environmental Scan

Public Health IPAC Orientation

1. What IPAC training does your staff receive (orientation and ongoing)?
 - a. Who delivers the training?
 - b. Do you provide annual review of IPAC materials?
 - c. Do you provide different IPAC training for different groups (e.g. PHNs, PHIs, Dental) and different programs (e.g. VPD PHN vs Sexual Health PHN)?
2. Is there someone we can contact if we have questions or require further details?
3. Are there any additional comments you would like to share?

Appendix C: Discussion Guide for Consultations with OHN and CDC Program Manager

The Development of an Infection Prevention and Control Orientation Module for Public Health Nurses in a Communicable Disease Control Program

Discussion Guide for Consultations – CDC program manager and OHN

1. Are you aware of any IPAC education for CDC nurses at NBPSDHU? (If no skip to 2)
 - a. If so, could you describe that education?
 - b. Was there anything specific about that education that was designed to help PHNs prepare to practice in the CDC program?
2. What content or topics would you like to see covered in IPAC education for PHNs orienting to the CDC program at NBPSDHU?
3. How would you like IPAC education to be delivered to CDC nurses?
4. Do you have any other comments about IPAC education for CDC nurses?

Appendix D: Discussion Guide for Consultations with IPAC Expert

The Development of an Infection Prevention and Control Orientation Module for Public Health Nurses in a Communicable Disease Control Program

Discussion Guide for Expert Consultations

1. Are you aware of any specific IPAC education programs for PHNs who are practicing in CDC programs in Canada?
 - a. If so, could you describe that education and the strategies used to implement the program?
 - b. Is there anything about that education that was specifically designed to help PHNs prepare to practice in a CDC program?
2. What topics or content do you think should be included in IPAC education for PHNs orienting to a CDC program?
3. Do you have any suggestions about how IPAC education could be delivered to CDC nurses?
4. Do you have any other comments about IPAC education for CDC nurses?

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The North Bay Parry Sound District Health Unit (NBPSDHU) employs Public Health Nurses (PHNs) within a variety of programs including communicable disease control, vaccine preventable disease, sexual health, genetics, and family health. This orientation module is designed to enhance the orientation of PHN to the communicable disease control (CDC) program at NBPSDHU. The purpose of this module is to provide a base of knowledge to prepare new PHNs for their role as infection prevention and control (IPAC) specialist in the CDC program.

The learning objectives include:

1. Differentiate and understand the modes of transmission of infectious agents.
2. Identify methods to ensure the safety of clients and PHNs.
3. Identify the different methods of precautions and when each should be used.
4. Identify transmission risks associated with different types of healthcare settings and methods to reduce the risks in each setting.
5. Identify the appropriate use and purpose of Personal Protective Equipment and when each type should be used.
6. Identify appropriate environmental strategies and techniques used to prevent the transmission of infectious agents.

This orientation module is designed to incorporate self-directed online learning tools and activities that can be completed based on the learners own schedule and learning needs. A checklist is provided to monitor progress and track completion of the module (Appendix A). The modules begin with basic IPAC principles and progress to more advanced topics such as sterilizing and disinfecting equipment. Each section

contains practical advice for the PHNs to practice new skills and supports opportunities to interact with experienced PHNs to explore real life situations. This allows the new PHN to learn from others' experiences as well as provide an immediate application of the new knowledge.

This orientation module includes the following five sections:

1. Occupational Health Review
2. General Infection Prevention and Control Principles
3. Hand Hygiene for PHNs
4. Additional Precautions and PPE and,
5. Cleaning, Disinfection, Sterilization and Reprocessing

Section 1: Occupational Health Review

Learning Objectives:

1. Identify precautions that each PHN must undertake to protect themselves from infectious agents.
2. Identify internal policies and procedures that staff must follow.

Review of Vaccinations and Mask Fit

The new PHNs will first meet with the Occupational Health Nurse (OHN) to review vaccination status and receive any vaccinations that are missing or not up-to-date. The OHN will also conduct mask fit testing for respirators and perform a Tuberculosis (TB) skin test. While this is important for occupational safety it also provides an opportunity to form the basis of why IPAC is essential for a new CDC PHN. CDC PHNs must have all relevant vaccinations as they may be in contact with clients that have

vaccine preventable diseases such as mumps or pertussis and immunization is an important control measure to reduce the risk of transmitting infections to others. CDC PHNs may also be in contact with clients with active TB and require proper respirator fitting to protect them from becoming infected with TB. A baseline TB skin test is also important to determine if the PHN has been exposed to TB and to determine if they are at risk of developing active TB.

Internal Policies

The OHN will also introduce the new PHN to the internal IPAC policies and procedures that are in place at the Health Unit. It is important for all staff to be familiar with workplace policies and procedures so he or she can be certain of what is expected as part of employment. The PHN will then be expected to review the internal IPAC policies and procedures.

Meeting with the OHN will provide the learner with an interactive experience and will build on prior experiences. A review of the policies and procedures is a self-directed activity that can be completed within the learner's own schedule. The occupational health section also has an immediate relevance to the learner's new job and provides relevance so the learner knows why they need to learn more about IPAC.

Section 2: General IPAC Principles

Learning Objectives:

1. Explain the chain of transmission and identify methods to break the chain.
2. Demonstrate proficiency at reading and interpreting lab reports.

Core Competencies

The new PHN will complete Public Health Ontario (PHO) Core Competencies modules (Appendix B). The self-directed modules are delivered on-line and can be completed at the learner's own pace. There are five different modules to be completed: chain of transmission, microbiology review, healthcare provider controls, environmental controls, and administrative controls. The course is offered free of charge and each module contains a mix of reading, videos and interactive quizzes.

General IPAC Principles

The general IPAC principles section will also include a self-directed activity related to microbiology to provide more advanced knowledge of interpreting laboratory reports (Appendix B). CDC PHNs are responsible for determining if case definition is met based on laboratory and physician reports so it is important for a CDC PHN to understand and be able to interpret laboratory reports. This activity is self-directed and consists of reading material and short activities to ensure understanding of material presented.

Section 3: Hand Hygiene

Learning Objectives:

1. Identify the moments of hand hygiene.
2. Identify when to use soap and water versus alcohol-based hand rub (ABHR).
3. Identify challenges and solutions with hand hygiene when providing care in different healthcare settings.
4. Demonstrate proper technique of hand hygiene using both ABHR and soap and water.

Techniques and Frequency

Frequent and proper hand hygiene is the most important element in reducing transmission of infections. The CDC PHN orientation module will have an online module as well as an interactive component. The online portion will be self-directed and explore the moments of hand hygiene, technique and frequency, explain when to use soap and water versus when to use ABHR and proper technique for both (Appendix D).

Interactive Practice

The hand hygiene section will also contain an interactive component that provides the new PHN the opportunity to practice and demonstrate what was learned in the self-directed component. In addition to demonstrating proper hand hygiene technique, the new PHN will learn about the equipment that CDC PHNs use when teaching hand hygiene to other healthcare providers and community members. An experienced PHN will also review scenarios the PHNs may encounter when providing care in different settings (e.g. home visits, school visits) where hand hygiene facilities may not be readily available. This provides essential knowledge for PHN's own practice as well as tools to use for educational duties of the CDC PHN role.

Section 4: Additional Precautions and PPE

Learning Objectives:

1. Identify types of PPE and when each should be used.
2. Identify precautions that should be used for common infectious agents.
3. Identify challenges and solutions for using PPE in different healthcare settings.
4. Demonstrate proficiency of donning and doffing PPE.

Additional Precautions and PPE

A sound understanding of additional precautions and PPE is essential for CDC PHNs to protect themselves and clients from infections but it is also essential for the role of providing education to other healthcare providers. The initial learning about additional precautions will be self-directed to explore the principles of additional precautions and importance of PPE (Appendix B). This online module also includes what is PPE, what PPE should be used in different situations and proper sequence of donning and doffing PPE. The new PHN will also review Public Health Agency of Canada algorithms to become familiar with decision making for choosing appropriate PPE in different instances (Appendix F).

Donning and Doffing Demonstration

The new PHN will also meet with an experienced CDC PHN for a demonstration of donning and doffing PPE and have the opportunity to practice. The experienced PHN will also review scenarios that PHNs have encountered to illustrate what PPE is required for specific infections as well as different settings (e.g. what PPE is required for a home visit with a client with active TB, where should the PPE be put on and removed, where to discard the PPE). The new PHN will also be introduced to the “Community Backpack Kit” that is referred to in an internal policy. The experienced PHN will review what should be in it, where it is stored, and ensure that contents are checked before taking the kit to a community visit.

Section 5: Cleaning, Disinfection, Sterilization and Reprocessing

Learning Objectives:

1. Explain the differences between types of cleaning and when each should be used.
2. Identify commonly used cleaning and disinfection products and when each should be used.
3. Differentiate between cleaning, disinfecting and sterilization.
4. Identify methods of sterilization and reprocessing used within district facilities.

Best Practices

The final section of the IPAC orientation module relates to cleaning, disinfection, sterilization and reprocessing. The new PHNs will review the PIDAC best practice document (Appendix B), which will provide a knowledge base of expectations in all healthcare settings and will be self-directed. This module will also contain an interactive online learning component to provide more practical information about the different types of cleaning (e.g. hotel versus hospital clean) and procedures for sterilization and reprocessing (Appendix B). The online learning is comprised of reading presentations, audio, video and short quizzes. This portion of the module provides a foundation of learning that will be expanded in the interactive part of the module. It also provides practical information for PHN's own practice of cleaning and disinfecting clinic rooms between clients.

Tour of Facilities

The new PHN will also have the opportunity to tour local acute care facilities and complete a short activity exploring local cleaning, disinfection, sterilization and reprocessing practices. The CDC program does not use equipment that requires sterilization and reprocessing so the information provided is not directly related to the role of CDC PHN. However, CDC PHNs are expected to be active members of district facilities' IPAC committees and the interactive portion of this module will assist the new PHN to become more familiar with district facilities' processes to prepare the PHN for their role on external IPAC committees.

Appendix A: Checklist for IPAC Orientation

Topic	Activity	Date Completed
Occupational Health Screening	Review vaccinations	
	N95 mask fit testing	
	TB testing	
	TB testing second step (if required)	
	Review of internal policies: <ul style="list-style-type: none"> - Routine Screening for Infectious Illnesses - Prevention and Management of Ill Personnel - Respiratory Protection Program - Personal Protective Equipment - Cleaning and Disinfection in the Workplace 	
Review of General IPAC Principles	Public Health Ontario Core Competencies Online Modules PHO Core Competencies	
	Microbiology review: https://www.picnet.ca/wp-content/uploads/02-Microbiology.pdf	
Hand Hygiene	Hand hygiene e-learning module https://learninghub.phsa.ca/Course/CourseDetail?CourseID=5360%20	
	Hand hygiene demonstration by CDC staff	
	Return demonstration by employee	
	Demonstration of hand hygiene teaching materials used by CDC	
	Return demonstration by employee	
Routine Practices, Additional Precautions and PPE	Routine practices e-learning modules http://ipac-canada.org/e-learning-tool.php	
	Review of PPE decision trees from Public Health Agency of Canada	
	Demonstration of PPE donning and doffing	
	Return demonstration by employee	
	Presentation by CDC staff including examples of past client situations	
	Review of CDC “Community Backpack Kit”, list of kit contents and where kits are stored	
Cleaning, Disinfection, Sterilization and Reprocessing	Review of Provincial Infectious Disease Advisory Committee Best Practice Document PIDAC Cleaning, Disinfection & Sterilization	
	Cleaning and Disinfection Module (p. 1-5) https://www.picnet.ca/wp-content/uploads/09-Cleaning-Disinfection.pdf	
	Tour of local acute care facilities	
	Complete above cleaning and disinfection module (p. 6-12) during tour	

Appendix B: PHO Core Competencies

ABOUT US BROWSE BY TOPIC SERVICES & TOOLS DATA & ANALYTICS LEARNING & DEVELOPMENT

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Infection Prevention and Control

Online Learning

Core Competencies

Course

Resources for trainers

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Reprocessing in the Community

Technical FAQs

PIDAC

Antimicrobial Stewardship

Hand Hygiene

News

Contact Us

IPAC Core Competencies Course

Please be sure to use Internet Explorer (8, 9 or 10) as your browser to complete the IPAC Core Competencies modules. The course is not optimized for use with Chrome, Firefox, or Safari.

Before printing your completion certificate:

1. refresh the course page.
2. be sure you have completed the module (you will see a checkmark as confirmation)

If you still experience problems try generating the certificate again the next day or contact us at: ipac@oahpp.ca.

Infection Prevention and Control (IPAC) Core Competencies are basic skills and knowledge all Ontario health care workers need to understand about IPAC. The Core Competencies help protect workers, their patients, and co-workers from infections; regardless of their role, position, education, and experience. This course is based on [Provincial Infectious Diseases Advisory Committee \(PIDAC\)](#) best practices and focuses on:

- **Routine Practices:** IPAC practices that are used routinely during all activities, for all clients, patients and residents in all health care settings to help prevent and control the spread of infectious agents.
- **Additional Precautions:** practices used **in addition** to Routine Practices for certain pathogens or clinical presentations based on the mode of transmission: contact, droplet, and/or airborne.



Contact Us

Course modules description

Occupational Health and Safety	
Chain of Transmission and Risk Assessment	
Health Care Provider Controls	
Control of the Environment	
Administrative Controls	
Additional Precautions	

General Information

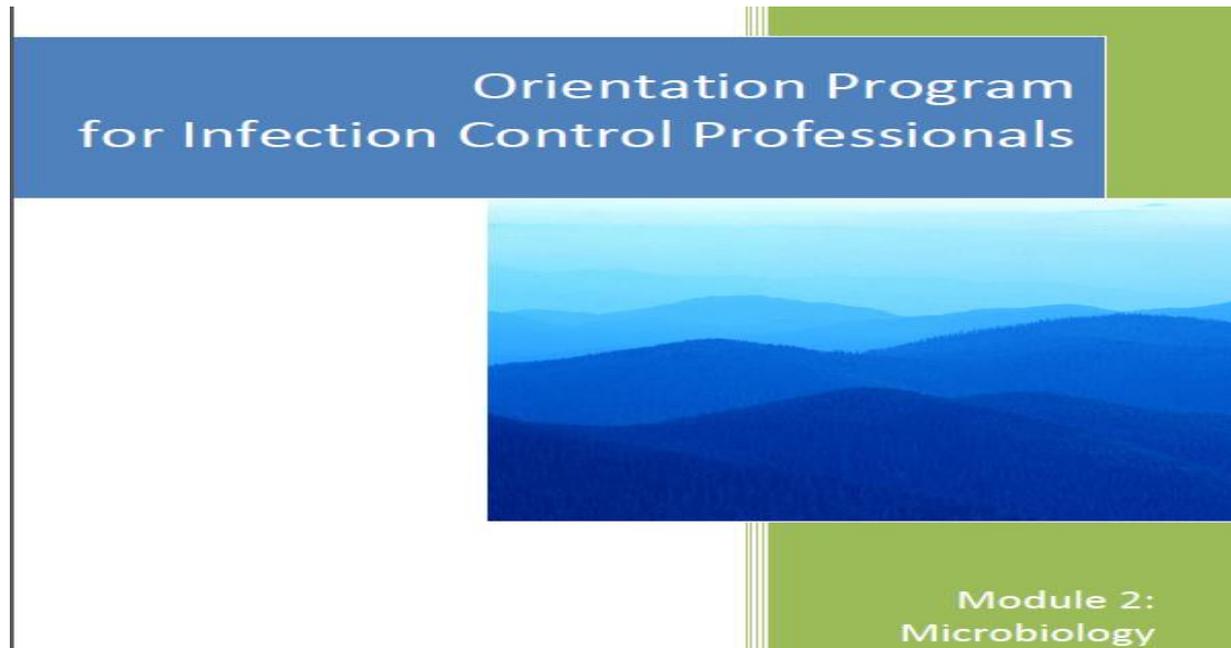
Module duration
Between 20 - 40 minutes

Stop and resume
You can stop and resume your learning anytime. The course will record your progress automatically and you will be able to restart the component you were last reviewing.

Certificate of completion
Each module includes a short test. You must score 100% in test at the end of each module to receive a certificate of completion. Once you have successfully completed a module, click the certificate icon to print your certificate.

FAQs
Course FAQs provide additional information on the course components. Please check our [Technical FAQs](#) if you are logged in and unable to view the components listed above.

Appendix C: Microbiology Review



Module 2: Microbiology

Objectives

At the completion of this module, the ICP will:

1. Describe basic elements of microbiology that are pertinent to Infection Prevention and Control
2. Provide information about specimen collection
3. Identify and interpret microbiology laboratory tests which have an impact on infection prevention and control

Number of hours

- Key Concepts - 3 hours
- Methods - 4 hours

Required readings

- Information available in Appendix A
- CHICA-Canada presentation for novice practitioners- Introduction Microbiology
- http://www.chica.org/Members/members_conf_presentations.php
- APIC Text of Infection Control & Epidemiology 2nd or 3rd Edition – Chapters 14, 15, 16, 17, 24, 25 & 63

Required text

- APIC Text of Infection Control & Epidemiology 2nd or 3rd Edition – Chapters 14, 15, 16, 17, 24, 25 & 63
- Bennett JV & Brachman PS. Bennett & Brachman's Hospital Infections. 5th ed. Ed. William R Jarvis: Philadelphia, PA, 2007 – Chapter 22

Appendix D: Hand Hygiene Resources

PROVINCIAL HAND HYGIENE BASICS - PICNET

Course Info eLearning Course  [REGISTER FOR CREDITS](#) [START COURSE](#)

Health, Safety & Wellness

Provincial Hand Hygiene Basics - PICNet

This online training course, which was developed by the Provincial Hand Hygiene Working Group, should be completed by all healthcare providers and auxiliary staff. In this module you will learn about:

- The role that hand hygiene plays in preventing infections.
- When and how to properly clean your hands to prevent the spread of infection.

(Duration: 15-20 minutes)

Online Access

Access Period	90 Days
Access Date	From Apr 4, 2017 to Jul 2, 2017

Target Audience	All healthcare providers and auxiliary staff
Course Length	1 hours

Best Practices for Hand Hygiene

In All Health Care Settings, 4th edition

Provincial Infectious Diseases Advisory Committee (PIDAC)

Published: May 2008
Second Revision: June 2009
Third Revision: December 2010
Fourth Revision: April 2014



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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

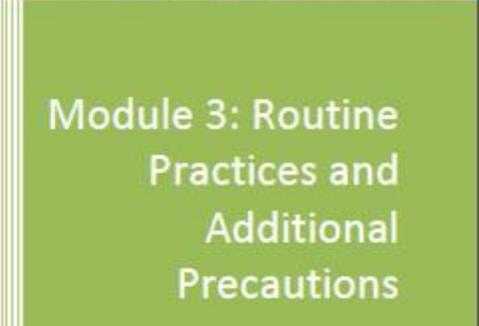
The best practices for hand hygiene set out in this document must be practiced in all settings where care is provided, across the continuum of health care. This includes settings where emergency (including pre-hospital) care is provided, hospitals, complex continuing care facilities, rehabilitation facilities, 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>.



Orientation Program for Infection Control Professionals



Module 3: Routine
Practices and
Additional
Precautions

Module 3: Routine Practices and Additional Precautions

Objectives

At the completion this module the ICP will:

1. Identify the key components of Routine Practices & Additional Precautions (RPAP)
2. Demonstrate an understanding of the application of RPAP in the clinical areas using the case scenarios provided in terms of:
 - Considerations for point of care risk assessment
 - Indications for hand hygiene
 - Placement of patients
 - Use of personal protective equipment
 - Handling of sharps, linen, dishes, and waste
 - Information for visitors

Number of hours (estimated)

- Key Concepts – 4 hours
- Methods – 4 hours

Required readings

- Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care – Revision of Isolation and Precautions Techniques PHAC (1999).
<http://www.collectionscanada.gc.ca/webarchives/20071124130634/http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/99vol25/index.html>

Required text

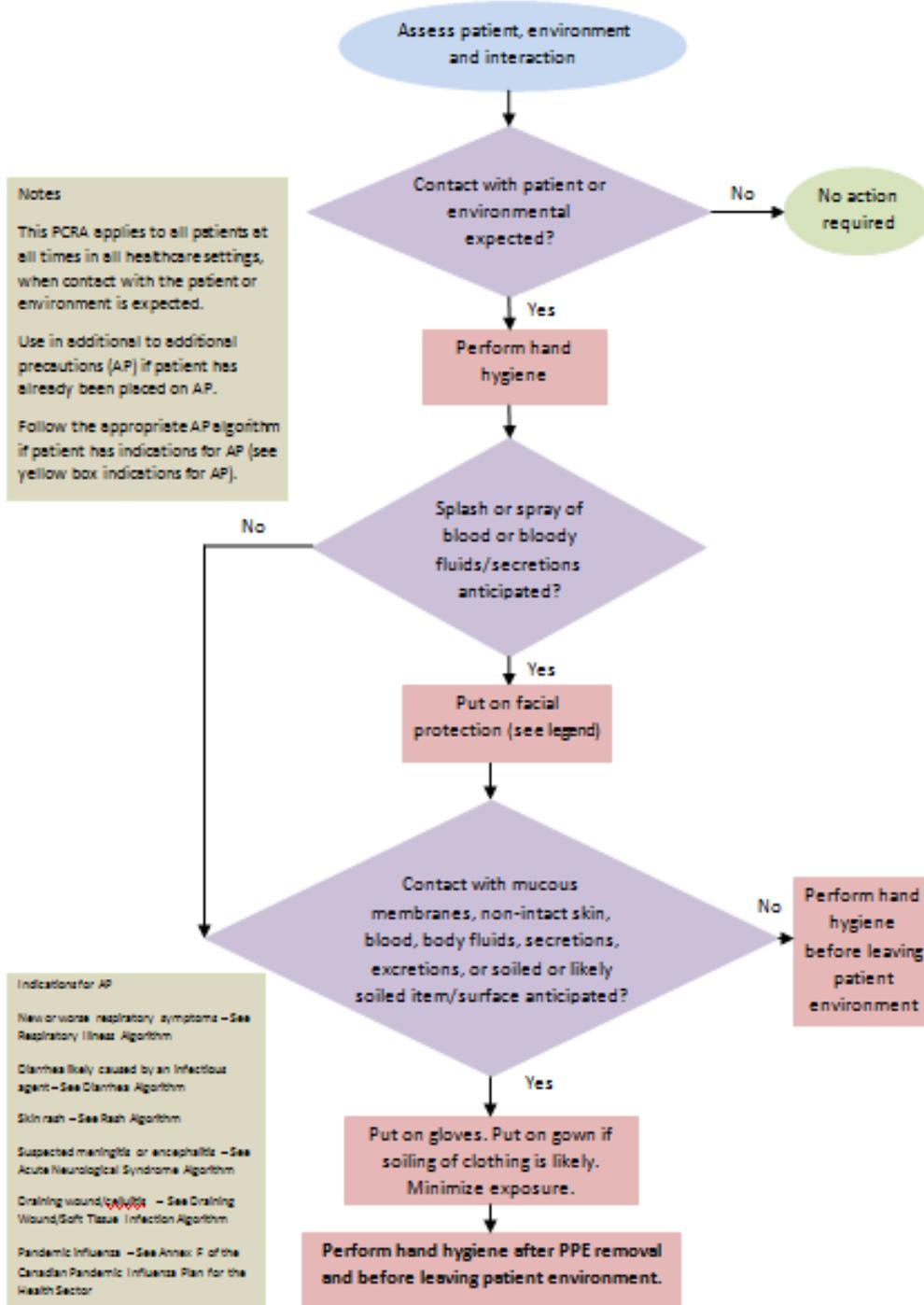
- APIC Text of Infection Control & Epidemiology; 2nd or 3rd Edition
- Bennett JV & Brachman PS. Bennett & Brachman's Hospital Infections; 5th ed. Ed. William R Jarvis: Philadelphia, PA, 2007

Other readings

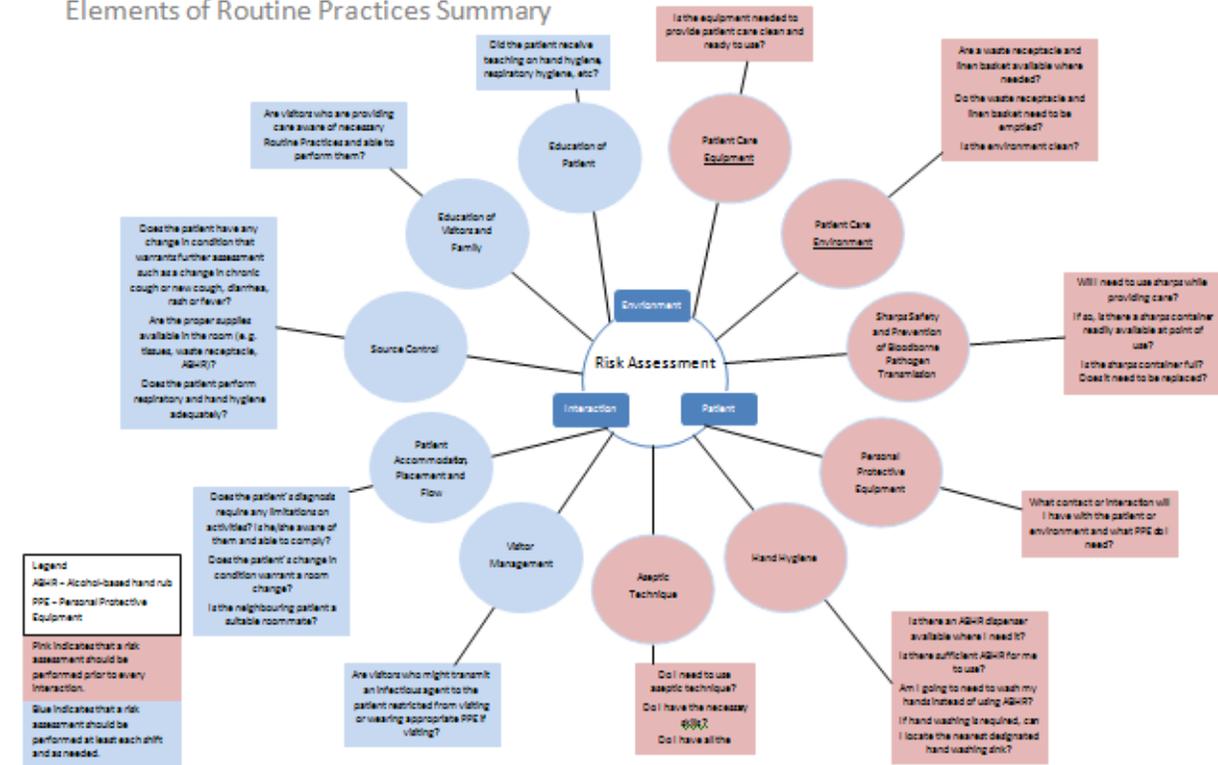
- Ontario Ministry of Health and Long-Term Care/Public Health Division/Provincial Infectious Diseases Advisory Committee (PIDAC) - Best Practices for Hand Hygiene in all Health Care Settings Routine Practices and Additional Precautions in all Health Care Settings (May 2010) at
<http://www.oahpp.ca/resources/pidac-knowledge/best-practice-manuals/routine-practices-and-additional-precautions.html>
- Presentations from 2007 CHICA-Canada National Education Conference –The Principles of Routine Practice, which is available at
http://www.chica.org/Members/2007conference/conf_presentations07.html

Appendix F: Routine Practices and Additional Precautions Algorithms

Point of Care Risk Assessment (PCRA) for Routine Practices Algorithm:
Appropriate use of Personal Protective Equipment (PPE)



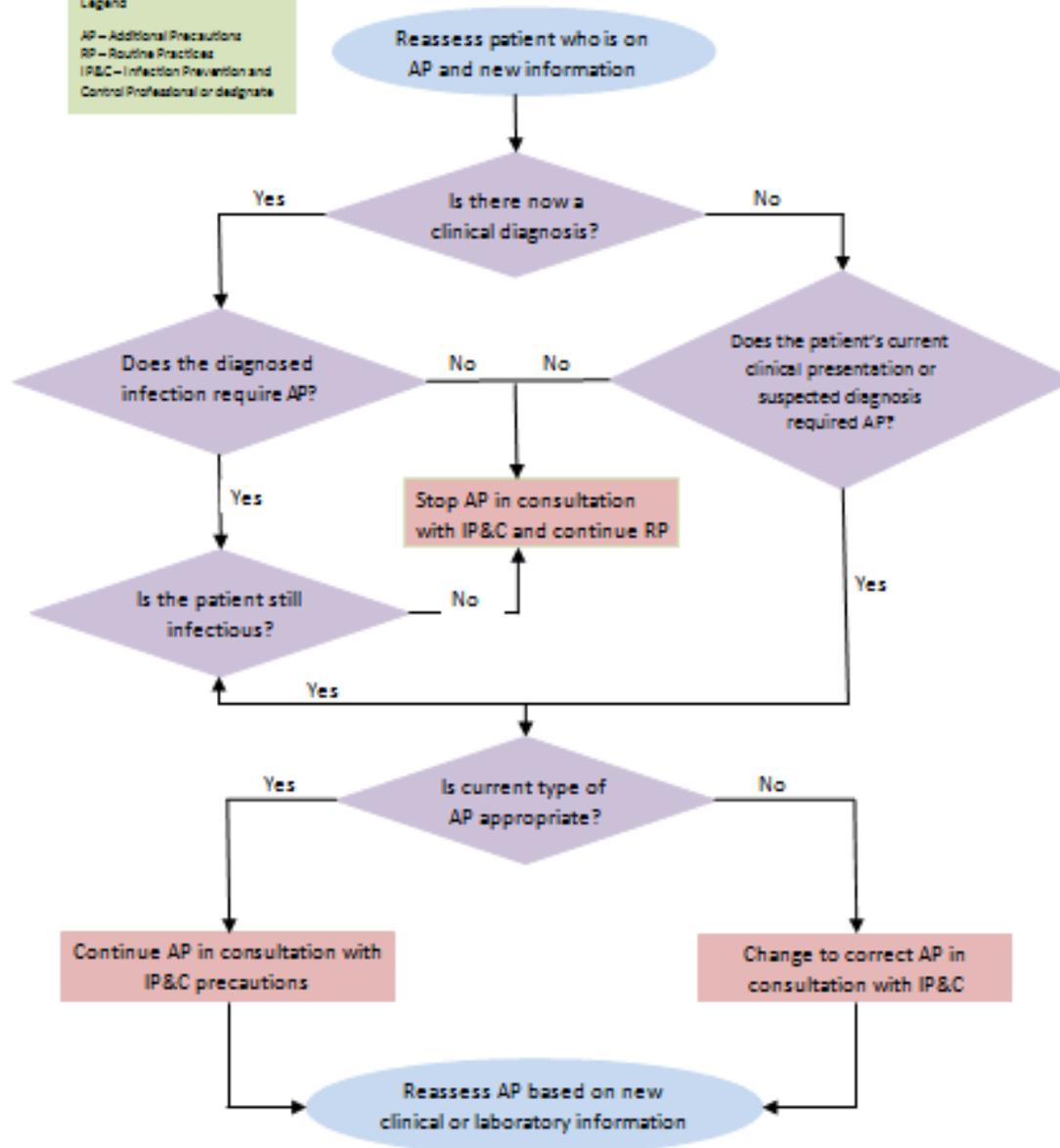
Elements of Routine Practices Summary



Stopping or Changing Additional Precautions Algorithm

Legend

AP – Additional Precautions
 RP – Routine Practices
 IP&C – Infection Prevention and Control Professional or designate

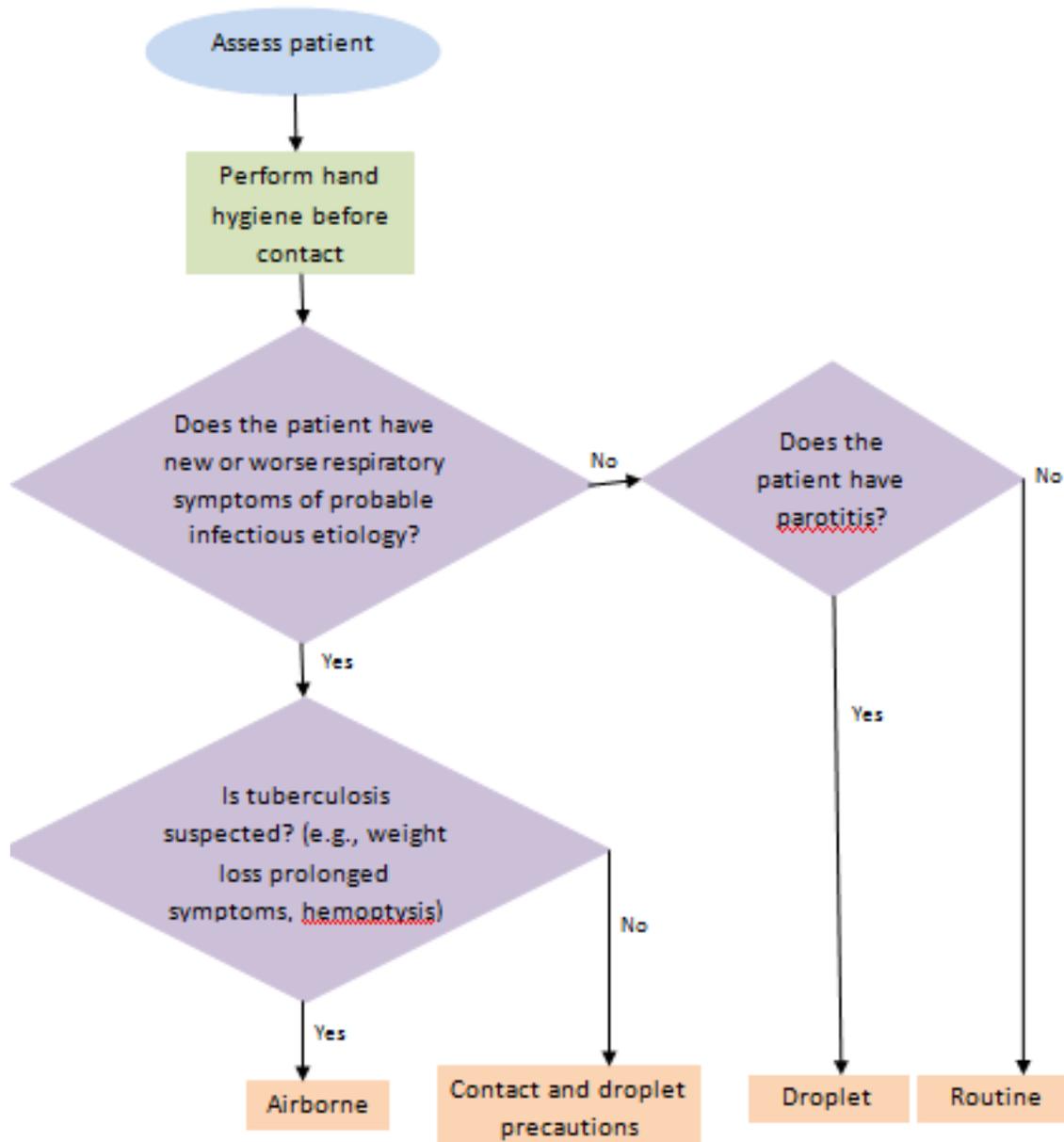


The patient is likely still infectious if one of the following is present

- The cultures/smears are still positive;
- The patient is still in the period of communicability;
- The patient still has the symptoms for which he/she was put on AP or the symptoms are worse;
- The patient has not been on the appropriate treatment for a sufficient length of time

Adapted from Public Health Agency of Canada – Routine Practices and Additional Precautions Assessment and Educational Tools (2012)

Additional Precautions Algorithm: Respiratory Illness

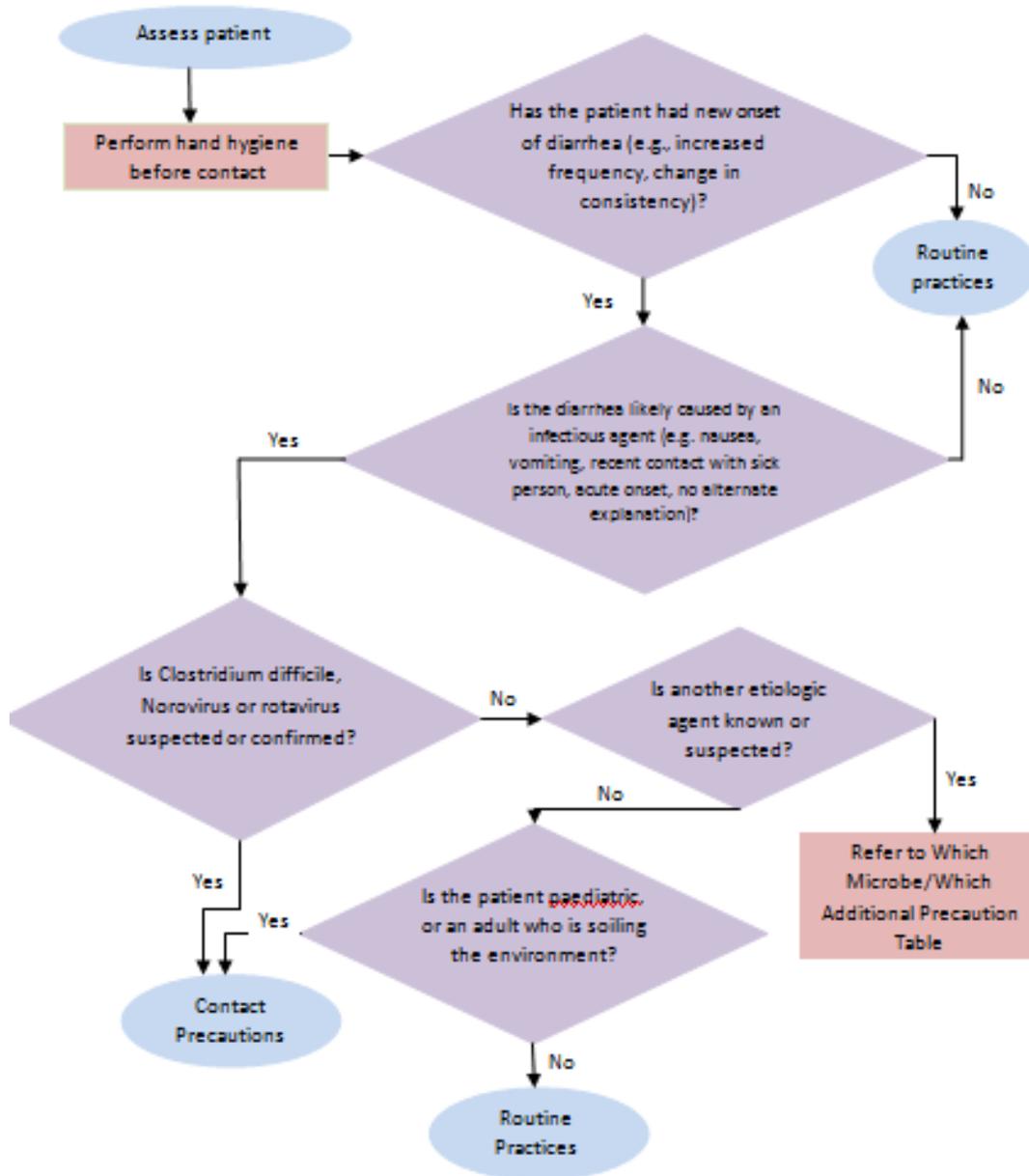


If there is a public health advisory in effect, (e.g. travel advisory, emerging respiratory infection, or pandemic declaration) follow the recommendations of the advisory.

Reassess additional precautions on an ongoing basis as new information (e.g., clinical, laboratory) becomes available.

Refer to the Stopping or Changing Additional Precautions Algorithm for the steps involved in this process.

Additional Precautions Algorithm: Diarrhea



Reassess additional precautions on an ongoing basis as new information (e.g., clinical, laboratory) becomes available. Refer to the Stopping or Changing Additional Precautions Algorithm for the steps involved in this process

Best Practices for Cleaning, Disinfection and Sterilization of Medical Equipment/Devices

In All Health Care Settings, 3rd edition

Provincial Infectious Diseases Advisory Committee (PIDAC)

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Orientation Program
for Infection Control Professionals



Module 9: Cleaning,
Disinfection, and
Sterilization of
Medical Equipment
and Devices

Module 9: Cleaning, Disinfection, and Sterilization of Medical Equipment and Devices

Objectives

At the completion of this module, the ICP will:

1. Demonstrate a basic knowledge of cleaning, disinfection and sterilization of medical equipment/devices by completing the exercises in this module.
2. Describe the Spaulding Classifications System and give examples of each category.
3. Outline the key points for workflow, transportation and storage of medical equipment/devices for Sterile Processing Department (SPD), Operating Rooms (OR) and Endoscopy departments

Number of hours

- Key Concepts – 4 hours
- Methods – 4 hours

Required reading

- Best Practices for Cleaning, Disinfection and Sterilization of Medical Equipment/Devices, BC Ministry of Health
- <http://www.health.gov.bc.ca/library/publications/year/2011/Best-practice-guidelines-cleaning.pdf>

Additional readings

- Hospital Infections Bennett & Brachman's 5th Edition, Chapter 20; p 303
- APIC Text- 3rd Edition-Volume 1 Chapter 21. Cleaning, Disinfection, and Sterilization in Healthcare Facilities.
- Decontamination of Reusable Medical Devices. Canadian Standards Association.
- CSA-Z314.8-08
- Regional Infection Control Network (RICN), SPD Tour Activity List, pg 29. Available at: <http://ricn.on.ca/photos/custom/TCICNfiles/Acute%20Care%20ICP%20Orientation%20Binder.pdf>
- Infection Prevention and Control Guideline for Flexible Gastrointestinal Endoscopy and Flexible Bronchoscopy found at: <http://www.phac-aspc.gc.ca/nois-sinp/guide/endo/index-eng.php>

Instructions

Read the material. Write out your answers to the questions and discuss them with your mentor. Your Manager should contact department managers to arrange tours.