INFECTION PREVENTION AND CONTROL

2014 – 2015

Annual Report

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TERMINOLOGY AND ABBREVIATIONS

ADT: Admission, Discharge, and Transfer
Affiliate: Facility that has a contract with Island Health to provide specific services.
Annual Target: A goal that is set on a yearly basis.
ARO: Antibiotic Resistant Organism.
BC: British Columbia.
BCCDC: British Columbia Centre for Disease Control.
Benchmark: A point of reference for judging value, quality, change, standard to which others can be compared.
BSI(s): Bloodstream infection(s).
CA: Community-Associated.
CABG(s): Coronary artery bypass grafts
CAUTI(s): Catheter Associated Urinary Tract Infection(s)
CDH: Cowichan District Hospital.
CDHAC: Cowichan District Hospital Acute Care.
Clostridium difficile Infection (CDI): *Clostridium difficile* is an antibiotic resistant micro-organism that produces a toxin that can cause diarrhea and serious illness of the gastrointestinal tract.
CNISP: Canadian Nosocomial Infection Surveillance Program.
CI: Confidence Interval. 95% confidence interval is a range of values within which the "true" value of the rate is expected to occur (with 95% probability). The CI is generally used to indicate the range of values in which there is confidence that the identified rate will fall.
CIC: Certification in Infection Control
CPO: Carbapenemase-producing Organisms. A group of bacteria that have become resistant to antibiotics including carbapenems via production of enzymes encoded for resistance genes that destroy carbapenems.
CRH: Campbell River Hospital.
CRHAC: Campbell River Hospital Acute Care.
ESS: Environmental Support Services.
HA: Healthcare Associated.
HAI: Healthcare Associated Infections. Infections patients get while staying in any healthcare facility, which include micro-organisms from other patients, the environment, or staff.
ICP(s): Infection Control Professional(s).
ICU: Intensive Care Unit(s).
ICD: Implantable cardioverter-defibrillator. An implantable cardioverter-defibrillator is a device combining a cardioverter and a defibrillator into one implantable unit. The device is programmed to detect cardiac arrhythmia and correct it by delivering a brief electrical impulse to the heart.
Indicator: A measurement that shows how well something is working or operating.

ILI: Influenza Like Illness. Acute onset of respiratory illness symptoms that are similar to influenza, but are usually caused by other viruses or bacteria (http://medical-dictionary.thefreedictionary.com/influenza-like illness).
Internal Alert: An Internal Alert is issued when the number of cases in a unit or facility is above the pre-determined threshold (2 standard deviations) or there is suspected transmission.
IPAC(s): Infection Prevention and Control(s).
LMGIH: Lady Minto Gulf Islands Hospital.
LOS: Length of stay.
MRSA: Methicillin-resistant Staphylococcus aureus. Staphylococcus aureus is a micro-organism that is normally found on the skin and in the nose. It can cause minor skin infections such as boils or infections in a surgical incision site. MRSA is a type of Staphylococcus aureus that is resistant to antibiotics commonly used to treat infections.
Methodology: The methods, principles, and rules used to for the activity or result.
MHO(s): Medical Health Officer(s).
MoH: Ministry of Health.
Norovirus: A ribonucleic acid (RNA) virus that is the leading cause of epidemic non-bacterial outbreaks of gastroenteritis around the world. Norovirus affects people of all ages. It is transmitted through food and water contaminated with feces or by person-to-person contact and by aerosolization of the virus on contaminated surfaces(http://encyclopedia.thefreedictionary.com/norovirus).
NRGH: Nanaimo Regional General Hospital.
NRGAC: Nanaimo Regional Hospital Acute Care.
OH&S: Occupational Health and Safety.
PICNet: Provincial Infection Control Network– a collaborative group of healthcare professionals who aim to prevent and control healthcare associated infections. (http://www.picnetbc.ca).
PPE: Personal Protective Equipment
Pseudomembranous colitis: Inflammation of the colon that occurs in some people who have taken antibiotics. Pseudomembranous colitis is sometimes called antibiotic-associated colitis or *C. difficile* colitis. The inflammation in pseudomembranous colitis is almost always associated with an overgrowth of the bacterium *Clostridium difficile*.
Q&S: Quality and Safety.
Residential Care: Long Term Care Facilities.
RJH: Royal Jubilee Hospital.
RJHAC: Royal Jubilee Hospital Acute Care.
S. *aureus:* *Staphylococcus aureus.*
SJHAC: St. Joseph Hospital Acute Care.
SPH: Saanich Peninsula Hospital
SPHAC: Saanich Peninsula Hospital Acute Care.
SSI: Surgical site infection.
TAVI: Trans-catheter aortic valve implantation.

TGHAC: Tofino General Hospital Acute Care.
Trend: The general movement or direction of change.
UTI(s): Urinary tract infection(s).
VGH: Victoria General Hospital.
VGHAC: Victoria General Hospital Acute Care.
WCGH: West Coast General Hospital.
WCGAC: West Coast General Acute Care.
WHO: World Health Organization.

EXECUTIVE SUMMARY

The Infection Prevention and Control (IPAC) Program's 2014/2015 Annual Report highlights the achievements and continued challenges facing infection control practices in Island Health. This report summarizes the progress of programs, projects and initiatives undertaken within Island Health from April 1, 2014 to March 31, 2015 and addresses developments in education, communication, and outbreak management. The IPAC Program has been involved in a number of major projects and initiatives this fiscal year, as well as a significant number of developmental activities and accomplishments.

The progress of the 2014 Accreditation Canada survey, education, emerging pathogens, environmental best practices, influenza, enhanced use of health informatics, hand hygiene strategy, and the collaboration with Heart Health and residential care are summarized with key highlights reported. The continued success of the refreshed hand hygiene strategy initiative "Patients as Observers" was commended by Accreditation Canada for an innovative Leading Practice. Also of note in this past year was the WHO declaration in August 2014 of the Ebola outbreak as a Public Health Emergency of International Concern.

The acute care HAI rates continue in 2014/15 to remain at or below provincial rates. Approximately 32% of all incident cases of MRSA were infections, a decrease from 51% reported during 2013-14. The proportion of new MRSA cases categorized as infections varied between acute care facilities in 2014-15 from a low of zero percent at SPH to a high of 42% at CDH and NRGH.

The annual rate for healthcare associated CDI rates for Island Health acute care facilities steadily decreased between 2010-11 and 2013-14 from 5.0 to 2.9 per 10,000 patient days. The slight rate increase in 2014-15 to 3.2 per 10,000 patient days was not statistically significant.
Hand Hygiene rates increased significantly between 2013-14 and 2014-15 at all of the acute care facilities, this is due in part to the multiple initiatives in the Refreshed Hand Hygiene Strategy. Island Health exceeded the 80% Provincial Target this year achieving 82% up from 76% for 2013-14. Substantial increases of hand hygiene rates for healthcare providers were noted in all groups Physicians (15%), Support Services/Other (16%), Clinical/Diagnostic Services (12%), and Nursing staff (8%) from 2013-14 to 2014-15.

The SSI rate following a CABG and/or valve repair surgery performed at RJH decreased from 6.3 to 4.6 per 100 procedures between 2013-14 and 2014-15. The collaboration with heart health and significant quality improvement initiatives may have had a positive impact in lowering this rate. However, the pacemaker rate increased from 0.8 per 100 procedures in 2013-14 to 1.2 per 100 procedures in 2014-15 which exceeds the NHSN benchmark 0.4 per 100 procedures. SSI rates for total joint replacement surgeries have increased slightly to 1.3 per 100 procedures which is lower than the CNISP benchmark of 2.5 per 100 procedures.

The annual report describes the four action areas for moving forward: enhanced data quality for IPAC reporting, evaluation of new technology and products for environmental cleaning and disinfection, Cerner IHealth Lighthouse infection control module and the new clinical governance structure. The IPAC program will aim to accustom stakeholders to incrementally embed data and insights into everyday decision making. Our approach will be to engage managers to be a part of a quality and safety improvement process that gives them simple ways to use relevant data versus "one-size fits all" to build knowledge and awareness among staff and stakeholders through a data to action plan. It is anticipated that broadening the IPAC audience and increasing the knowledge of IPAC practices through these strategic initiatives will build capacity across Island Health and increase collaboration to address infection control issues more efficiently and effectively.

INTRODUCTION

Infection Prevention and Control (IPAC) is a regional integrated program across Island Health, as part of the Quality, Safety and Experience Portfolio. IPAC's overarching goal is to prevent infections and as a result improve patient care and staff health in hospitals, other health care facilities, and the community by the following:

- initiating and coordinating effective communication and cooperation among all disciplines united by infection control activities;
- supporting, developing and standardizing effective and rational infection control practices;
- promoting research in areas related to infection control;
- promoting and facilitating infection control education for our own infection control professionals as well as healthcare personnel, patients and their families;
- obtaining, managing and disseminating critical data and information, including surveillance for infections; and
- providing consultation and outbreak management support to all acute care hospitals, health centres, residential care facilities and community programs owned/operated by Island Health.

The prevention of healthcare associated infections is an organizational wide responsibility. The 'ownership' of infection prevention and control practices and principles rests with functional departments and front line staff, but supported by expert input from IPAC staff. During 2014-15, the IPAC program has continued to support processes that promote shared accountability, strengthen the infrastructure for integrated infection prevention and control, and maintain and strengthen linkages with programs that promote infection prevention and control practices (i.e. Public Health, OH&S, Laboratory [Microbiology], Pharmacy, ESS, to name a few). The goal is to empower healthcare providers to understand and incorporate the principles of infection prevention and control in their daily work.

The risk-based model, which focuses attention on patients who pose the highest risk of transmitting infections, continues to be highly effective at detecting and reducing direct and indirect transmission in health care facilities – residential and/or acute. This continues to have a positive impact on duration of outbreaks and number of people affected. IPAC's objective is to create sustainable improvement through education and by providing continuous feedback to clinical areas, based on best practice provincial, national and international infection control standards.

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PROGRAMS AND INITIATIVES

Accreditation Canada

In April 2014, Island Health was surveyed by Accreditation Canada. IPAC participated in infection control practice tracers at 4S at RJH, WCGH, ED at NRGH, Glengarry and the Ambulatory Cancer Clinic at CDH.

The IPAC team was noted for adopting a progressive robust surveillance system which continues to evolve. There continues to be an emphasis on syndromic surveillance leveraging clinical care electronic health record data in order to detect potential infections in real time. Epidemiologically significant organisms are selected and tracked on a continuous basis. The IPAC comprehensive education program includes policies and procedures that are readily available on the intranet and internet. IPAC has a wide variety of community partners including the PICNet, CNISP, IPAC Canada, BC Cancer Agency, BC Ambulance Service, the BCCDC and the MoH.

Unmet Criteria from the April 2014 Accreditation Canada on-site survey that became a priority for the IPAC program included:

7.3 High Priority Criteria Information provided to clients and families is documented in the client record.

- Working with IHealth data analysts to ensure on the new Lighthouse IPAC Module that there is a field where the ICPs can chart their patient information. Currently, the ICPs record on the Professional Service Consultation Form which is placed in the patient's chart.

12.22.1 Required Organizational Practices (ROP) Major. The organization monitors its processes for reprocessing equipment, and makes improvements as appropriate. There is evidence that reprocessing and systems are effective.

- This evidence was submitted by the date required (September 11, 2014), however it is still unmet because of the move to the new storage area was not completed at time of submission and will not be updated until September 2015.

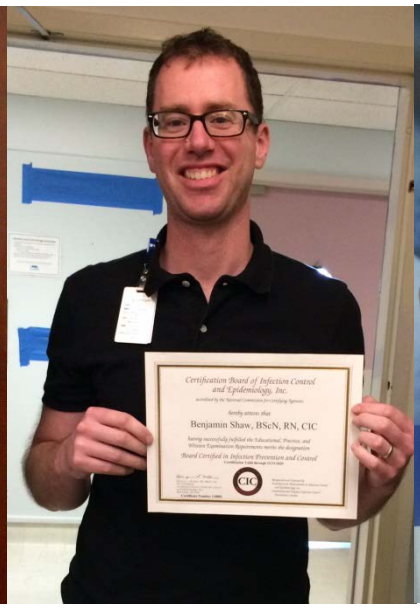
Education

An integral part of the IPAC program is the ongoing education, training and support in IPAC by ICPs to all Island Health employees, physicians, volunteers and contract employees. The IPAC Online Reference Guide is updated to stay current with best practices in infection control. Education sessions run continuously at various sites throughout the year on subjects such as hand hygiene, outbreak management, managing *C. difficile*, AROs, and PPE.

Some of the highlights of the IPAC Program for this year include:

- Submission of articles in the Weekly highlighting, Hand Hygiene, Enterovirus D68, and Ebola;
- Presentations at Infectious Disease and Quality Rounds on CPO, Patients as Observers, Hand Hygiene, SSI and Heart Health Collaboration, Advanced Analytics in *C. difficile* Surveillance, and Ebola;

- Poster Presentation at Quality Forum include, Hand Hygiene Practices Can Be Improved, Sustaining and Spreading Hand Hygiene Improvement, Volunteers and Patients as Hand Hygiene "Partners in Care", Island Health's Multipurpose Approach For Improving Hand Hygiene Through Culture Change, and An Innovative Electronic Approach to Identify Potential Transmission of Healthcare Associated Infections in Acute Care Settings;
- Attendance by two staff members at the CSA Z8000 Canadian Health Care Facilities - Planning, Design and Construction;
- Attendance by seven staff members to the PICNET 2015 Conference in Vancouver;
- Attendance by one staff member to the IPAC Canada 2014 Education Conference in Halifax;
- Certification in Infection Control (CIC) through the Certification Board of Infection Control by two Consultants and the Director.



- Initiation of a one hour weekly training session for those ICPs who wish to write the CIC exam. There are at least seven ICPs who will be writing the CIC exam during 2015-16. This successful initiative was initiated by the staff as a Gallup Goal in 2014.

Emerging Pathogens

An emerging pathogen can be a recently diagnosed microorganism such as Ebola or an organism that has under gone changes such as antimicrobial resistance for instance CPO. These organisms can present significant risk to population health and have an enormous impact on the healthcare system. In 2014-15, IPAC spent considerable time and resources developing responses to two emerging pathogens.

Ebola

The recent outbreak in West Africa is the largest and most complex Ebola outbreak since the virus was first discovered in 1976. On August 8, 2014 the World Health Organization Director-General declared this outbreak a Public Health Emergency of International Concern. In partnership with national and provincial experts such as Public Health of Canada, the BC Centre for Disease Control and the Ministry of Health, IPAC worked with individual Island Health program areas and sites to ensure staff and physician learning and safety needs were addressed. ICPs initiated PPE training to appropriate front line staff on the appropriate use of low risk PPE for Ebola utilizing a train-the-trainer model. To date 385 staff have been trained with anticipated re-training for competency and introduction of new level IV hoods excepted to take place during the first quarter of the 2015-16 fiscal year.

In collaboration with a multi-disciplinary team IPAC also developed a comprehensive and dynamic on-line reference site, including care and triage protocols, emergency response instructions, donning (Appendix A) and doffing (Appendix B) PPE and other reference materials. The director and medical director participated on the Provincial Expert Group where standards of practice were established and valuable lessons learned going forward for new organisms on the horizon. Some of the takeaways for Island Health as a go forward include the following:

- Establish an infection control training schedule for normal operations, including regular training and on-line training modules. Consistent training in basic infection control is required to improve staff confidence when new organisms appear.
- Provide on-going support for annual training, particularly pertaining to donning and doffing of PPE and levels of precautions required for infections that staff come into contact with on a daily basis.
- Provide guidelines and training on how precautions will be escalated or applied for a serious new or emerging infection threat.

Carbapenemase Producing Organisms

Gram-negative bacilli are among the most frequent bacterial isolates recovered from inpatient infection sites.[i] This group of bacteria can cause serious healthcare associated infections including but not limited to UTIs, respiratory infections, SSIs, wound infections, and bloodstream infections. The rapid increase in

antimicrobial resistance, particularly to carbapenem antibiotics, represents a very serious healthcare issue. The carbapenem group of antibiotics has been an effective treatment for severe gram-negative bacterial infections when resistance to other classes of antibiotics is present. When resistance to carbapenems occurs, there are often few alternative treatments available.[ii]

Carbapenem resistant bacteria are a public health concern not only because of the ability to cause healthcare associated infections but because of the potential for colonizing both inpatient and outpatient populations and creating a reservoir of bacterial resistance.[iii] CPO is endemic in various regions of the world, but it is gradually showing up in Canadian hospitals. While still uncommon in the province, transmission has occurred in a number of hospitals in the greater Vancouver area. In September 2014, the Provincial Infection Control Network of British Columbia (PICNet) released a Toolkit for the management of CPOs. This document identified a number of measures BC Health Authorities should implement to prevent and control CPOs in health care facilities, including screening on admission to acute settings, precautions and preventive measures in hospital, surveillance and directions to contain outbreaks and endemic transmission.

After review of the PICNet document and additional documents from the Center for Disease Control, other regions in BC and other provinces, IPAC determined that new procedures were needed. A procedures document was drafted to provide guidelines on managing patients who test positive for CPO. This document outlines when a patient should be placed on additional precautions, the type of precaution that should be initiated, how specimens should be collected, and when contact screening should occur. IPAC also worked with Environmental Support Services to implement new enhanced cleaning processes to address environmental contamination and challenges with current cleaning products.

Island Health's screening protocols were revised and a new ARO Screening Questionnaire (Appendix C) was developed and implemented to identify patients who may be colonized with CPO. Those patients who have undergone a medical or surgical procedure off Vancouver Island are screened and they remain on contact precautions until the test result is known. Moreover, all known contacts of an admitted patient who test positive are screened for CPO to identify unrecognized CPO colonization. Laboratories established protocols for quickly notifying clinical and/or infection prevention personnel when CPO is identified from clinical or surveillance cultures.

A CPO surveillance system including surveillance protocols and an IPAC surveillance manual was developed. A new database was developed in Research Electronic Data Capture (REDCap) - a versatile secure data management tool used to support surveillance projects across Island Health. Surveillance results can be found in the Surveillance Section of this report.

Active Screening for Extended Spectrum Beta Lactamase (ESBL)

Island Health's policy for the management of AROs was updated and screening protocols were modified. Screening for CPO began in July, 2014. At the same time, active screening for patients colonized with ESBL was discontinued. Patients colonized with ESBL are no longer placed on additional precautions. IPAC's approach is risk-based, focusing attention on identifying and managing high-risk situations. A great deal of time and physical resources were used to implement additional precautions for ESBL

colonization, yet, data confirms that there is a low risk of ESBL transmission when routine precautions are in place and continent patients have good standards of personal hygiene. This change provides more flexibility in managing patient placement, especially during times of over census. However, patients with ESBL infections will continue to be placed on additional precautions appropriate to the infection.

Environmental Cleaning Best Practices

Interdisciplinary working groups consisting of staff from IPAC and Environmental Support Services (ESS) were formed to review best practices for environmental cleaning to prevent and control infections in healthcare facilities. This review included a gap analysis of existing Island Health's cleaning practices. The collaboration developed into a full, formal review of environmental cleaning in all Island Health acute and residential sites undertaken by ESS, with support from IPAC, between January and March 2015. As we review the gap analysis action plans are being formulated to address the gaps identified.

The British Columbia *Clostridium Difficile* Toolkit and Clinical Management Algorithm document recommends the use of sporicidal disinfectants for environmental cleaning in the room of any patient diagnosed with CDI. ESS and IPAC reviewed the options for hospital-grade sporicidal disinfectants for environmental cleaning. A bleach-based product was chosen for its relative ease of use and safety on surfaces in hospitals. From September to December 2014, this product was trialed in three Island Health acute care facilities: two small sites with increased incidence of CDI and one regional hospital to evaluate the product and procedures. The product had good acceptance from staff and patients.

ESS trained all staff in Island Health acute and residential sites and began using the sporicidal product across Island Health in January 2015. A unique additional precautions poster is used to identify rooms in which sporicidal cleaning is used while maintaining confidentiality for patients. IPAC continues to work closely with ESS to ensure that the appropriate disinfectant is used in rooms of patients with CDI and ensure effective communication occurs with the nursing in the management of these patients.

Influenza

During the Influenza outbreaks that occurred in the region this winter it became apparent that the staffing algorithms in IPAC's Influenza and Influenza-like Illness Toolkit were highly detailed and resulted in inconsistent comprehension of the content. As we had not recently experience this level of Influenza outbreaks in acute care prior to this winter, we had not utilized the existing algorithms with the new provincial influenza policy in place. In review of lessons learned, we are in the process of dividing the outbreak algorithms into Acute Care (Appendix D) and Residential/Congregate living (Appendix E) as the areas have alternative approaches for staff placement and prophylaxis. Working in collaboration with

OH&S the use of cardboard figure cut out of Island Health Board Members was successfully implemented across the island to alert anyone entering our acute care facilities during the influenza season suggesting that if you haven't had an influenza immunization that you put on a mask. Often volunteers were present with information material about the influenza immunization and masks and hand hygiene products.

Board Member: Matthew Watson

Board Member: Jean Wheeler

Daily Influenza Reporting

Influenza is a seasonal illness which tends to occur during the winter. Every year during influenza season additional patients are admitted to inpatient and/or ICU requiring appropriate allocation of healthcare resources. At Island health, the inpatient admissions due to influenza started slowly in October 2014 but rapidly surged during the Christmas and New Year holidays with the first peak hit Island Health acute care facilities on December 31, 2014 (16 admitted patients diagnosed with influenza on that day). Meanwhile, the number of influenza outbreaks declared at both Island Health facilities and affiliated sites increased dramatically. From January 1 to January 20, 2015, there were more than 10 active outbreaks reported on each day. On January 7, 2015, the total number of active outbreaks reached the maximum with 19 outbreaks reported on the day. Enhanced surveillance and a daily report were

requested by Island Health Executives, MHOs as well as urgent capacity management team to help them manage the surge.

An automated electronic reporting system was built using the Island Health data warehouse solution. Patients who had positive influenza lab tests results and admitted to Island Health inpatient unit were linked to ADT databases in the data warehouse. All the information associated with patient's influenza hospitalization (e.g. admission, discharge, transfer, LOS, Death etc.) was retrieved for reporting. Data linkage and data visualization was accomplished using business intelligence tools to automate the reporting process. The end product of this electronic reporting system was a daily report that contained comprehensive and up-to-date information on the numbers of patients admitted, new patients diagnosed, their demographics and outcomes e.g. discharged home/death. The report also identified patients who had been transferred from a different Island Health facility, including transfers between residential and acute care facility. Public health used the same information for reporting to the BCCDC. Island Health MHO were able to describe clearly the current situation, including the numbers of all admitted cases requiring hospitalization, the impact on critical care beds and in-hospital mortality rates. This report allowed information sharing about facility outbreaks including transfer of patients to other facilities. The MHO used the reports extensively for media calls and communications with BCCDC.

Enhanced Use of Health Informatics

Effective use of information technology can increase efficiency of surveillance and reporting. IPAC developed a few electronic surveillance and reporting tools in the past year to support IPAC best practices as well as corporate operational management. One tool as outlined below has become a standard tool in supporting of the investigation of increased HAI incidence in the IPAC program.

Location Mapping Tool for Increased Incidence

Health care facilities are frequently over census and patients are often transferred within/between units due to increasing pressure on access and flow. This presents an increased risk of transmission of healthcare associated infections (HAIs). When an internal alert is triggered by increased incidence of HAI, ICPs needs timely information of patients' movements to develop and implement appropriate interventions. The existing process of manually mapping patients' location history (e.g. unit/room/bed) was both labour intensive and time-consuming, so an innovative electronic solution was created.

This electronic mapping tool was to track patient's location history during their stay in hospital based on the Island Health data warehouse solution. The patients under surveillance (e.g. confirmed CDI or MRSA cases) are selected from the IPAC surveillance database and are linked to the hospital ADT database in the data warehouse where the patient's location history (unit/room/bed) is stored. Dashboard reports containing both epidemiological data and graphic presentation of patient's movement are created to help identify risk of potential transmissions in the hospital. An action plan is then developed to mitigate risk in collaboration with all stakeholders including ESS, access and flow, clinical areas and unit or site manager. This electronic tool greatly improved efficiency of IPAC practice on managing increased incidence and worked effectively in preventing HAI outbreaks.

Collaboration with Heart Health

IPAC has worked closely with Heart Health in many areas of quality and patient safety including SSI surveillance, environmental audits, reprocessing audits, best practice guidelines for the Heart Catheter Lab for intra cardiac device implants, design and construction of the TAVI lab and well as construction in the Electrophysiology lab. In October 2014, IPAC noticed an increase in SSI rates for cardiac surgery performed at Island Health. Concurrently, IPAC was approached by the Heart Health Program to look at infection rates for open heart surgeries performed at RJH. A collaborative project was launched between IPAC and Heart Health with multidisciplinary teams (e.g. IPAC, Heart Health, Cardiac Surgeons, Anesthesia, OR CNE, and Wound Care Specialist). The project utilized both IPAC SSI surveillance and Cardiac Registry data to examine the pattern of SSIs for open heart surgery at RJH across time. The SSI surveillance data with Cardiac registry data were linked to explore and describe associations of known risk factors (e.g. BMI, diabetes, renal failure etc.) and SSI rates.

The collaboration reflected multidisciplinary team efforts. This offered a shared understanding of the availability and quality of cardiac surgery data as well as the gaps that needed to be addressed to improve SSI rates. Most importantly, it provided baseline data for education and future quality improvement. Review of the data was instrumental in developing next steps and strategies for closing gaps in data collection and prioritizing action plans for improving quality and patient safety. This collaborative project won Island Health 2015 Celebration of Excellence (CoE) – Collaborative Partnership Award.

Anthony Leamon, Sandra Dunford and Kathy MacNeil

Increased Support to Residential Care Facilities

The Infection Prevention and Control team at Island Health provides support for all Island Health residential care facilities in the following areas: ongoing surveillance, education and support to front line staff who manage the care of residents. Ongoing active surveillance provides a means to quickly detect changes that affect the quality and safety of residents; this is a shared role between front line staff at each site and the ICPs. Surveillance of MRSA, ESBL, CDI and outbreaks are reported quarterly to the organization.

Environmental auditing routine practice audits occurred at a number of residential care facilities in Macro Geography 3 and 4. Routine education was provided throughout the year and includes topics such as hand hygiene, appropriate donning and doffing of PPE, outbreak management, influenza education prior to influenza season, and cleaning and managing the resident environment. In addition the ICP works in a consultative role with FMO and the Site Manager to advise on IPAC standards in construction design in residential care facilities. These education sessions are developed and led by an ICP and coordinated with the site manager and clinical leader.

IPAC's goal with regards to outbreak management is to bring a timely conclusion to the outbreak. Strategies include - outbreak declaration, daily updates, on the spot education and support, gathering the relevant epidemiological data, completion of a debriefing meeting and a final outbreak report including recommendations to the site manager which is forwarded to the Quality Council.

IPAC endeavored to have an ICP visit each residential care facility five to ten times depending on the size of the facility during fiscal year 2014-15. The visits comprised of auditing routine practice, outbreak support and education. Visits will be planned during outbreaks for additional support to the frontline staff. In January we arranged for additional workspace for ICPs in Macro Geography 4 (Victoria). This enabled a stronger working relationship with the frontline staff to enhance education opportunities. We are in the midst of expanding this process across the Island.

Refreshed Hand Hygiene Strategy

Sustainable hand hygiene improvement is a key strategic initiative at Island Health. Island Health's new strategy was made up of several key elements to enable behaviour and culture change, and create a sustainable culture of safety, collaboration and learning through engaging health care providers and the organization to sustainably improve hand hygiene practices. A multi-dimensional program was developed and delivered using a positive and supportive approach in order to motivate staff to willingly increase their hand hygiene participation. Five key areas were addressed to support success and sustainability:

1. Education, including 'in-the-moment feedback' for staff, patient and volunteers; SharePoint site and new hand hygiene website.
2. New hand hygiene products, which include new Island Health branding.
3. Measurement, with a focus on data quality, using new hand hygiene auditing software and hand hygiene quality improvement reports for practical use by clinical staff.
4. Expansion into residential and ambulatory care areas.
5. Support from senior leadership.

University Co-operative Students

A 2014 objective of the IPAC program was to implement and oversee a refreshed hand hygiene program. University students from both Simon Fraser University and the University of Victoria Co-operative program in health sciences were hired to work as hand hygiene observers and ambassadors; they also acted as conduits for change in the transition from a punitive to a positive hand hygiene environment. With the knowledge that hand hygiene observations alone do not improve hand hygiene practices, their roles were expanded from the traditional role of a hand hygiene observer, who solely observes and monitors hand hygiene practices, to an expanded scope that would support the planned change by integrating various levels of influence known to affect behavioral change. They have been instrumental in the establishment of consistent auditing data, and providing a baseline benchmark in Acute and Residential Care facilities. The benefits have been abundant, as the students have provided

expertise in software testing, document and program development helping to advance training materials, and assist in the promotion of Hand Hygiene across Island Health, and rolling out a real time reporting software system. Co-op students say the experience gained by working at Island Health cannot be replicated in a classroom. Working side by side with health professionals, and benefitting from experts across a diverse organization, is an invaluable perk of co-op placement. Going forward, the vision is now to hand the auditing piece back to frontline staff so they can further own their hand hygiene practice. To facilitate the shift, staff observers are being recruited and trained, and the Co-ops will take on a training and support role, providing ongoing training, and support data quality by doing scheduled audits in each area.

In recognition of the quality of co-op opportunities provided by Island Health, the University of Victoria Co-operative Education Program and Career Services named Island Health Co-op Employer of the Year for 2014.

Patients as Observers

Patient engagement in Hand Hygiene is one of Island Health's strategies for improving the patient experience and decreasing healthcare associated infections that can result in excess LOS, morbidity and mortality. Many of the germs causing infections are transferred by hands when health care workers (HCW) or visitors touch patients while providing assistance.

In the fall of 2013 a new innovative approach was initiated at Island Health in an acute care facility surgery ward to address the engagement of patients in their own HH and include the HCWs that attend to their care. Although formal observational HH audits occurred regularly with independent HH auditors, the need to include patients in their own HH education or seek their perception of their own HCWs HH had not been formally addressed. It is well known that volunteers contribute greatly to personalizing, humanizing and demystifying the hospital experience, so it was only fitting that Island Health would engage volunteers educated in proper HH by our own infection control practitioners to supplement the existing independent auditors work to engage patients in their own education on HH. In March 2015 Island Health's Infection Prevention and Control Department along with Volunteer Resources and Auxiliaries have been commended by Accreditation Canada for their Innovative Leading Practice *Volunteers and Patients as Hand Hygiene "Partners in Care.*

The PAO expansion project was launched on July 14, 2014. The participating units included the addition of VGH units 6A&B to run concurrently with 7A&B. Figure 1 shows the number of cards distributed and collected per week. Please note that starting from the week August 11-17 until the end of the project, the number of cards collected matched up to the number of cards distributed.

Figure 1: PAO Expansion - Data Collection

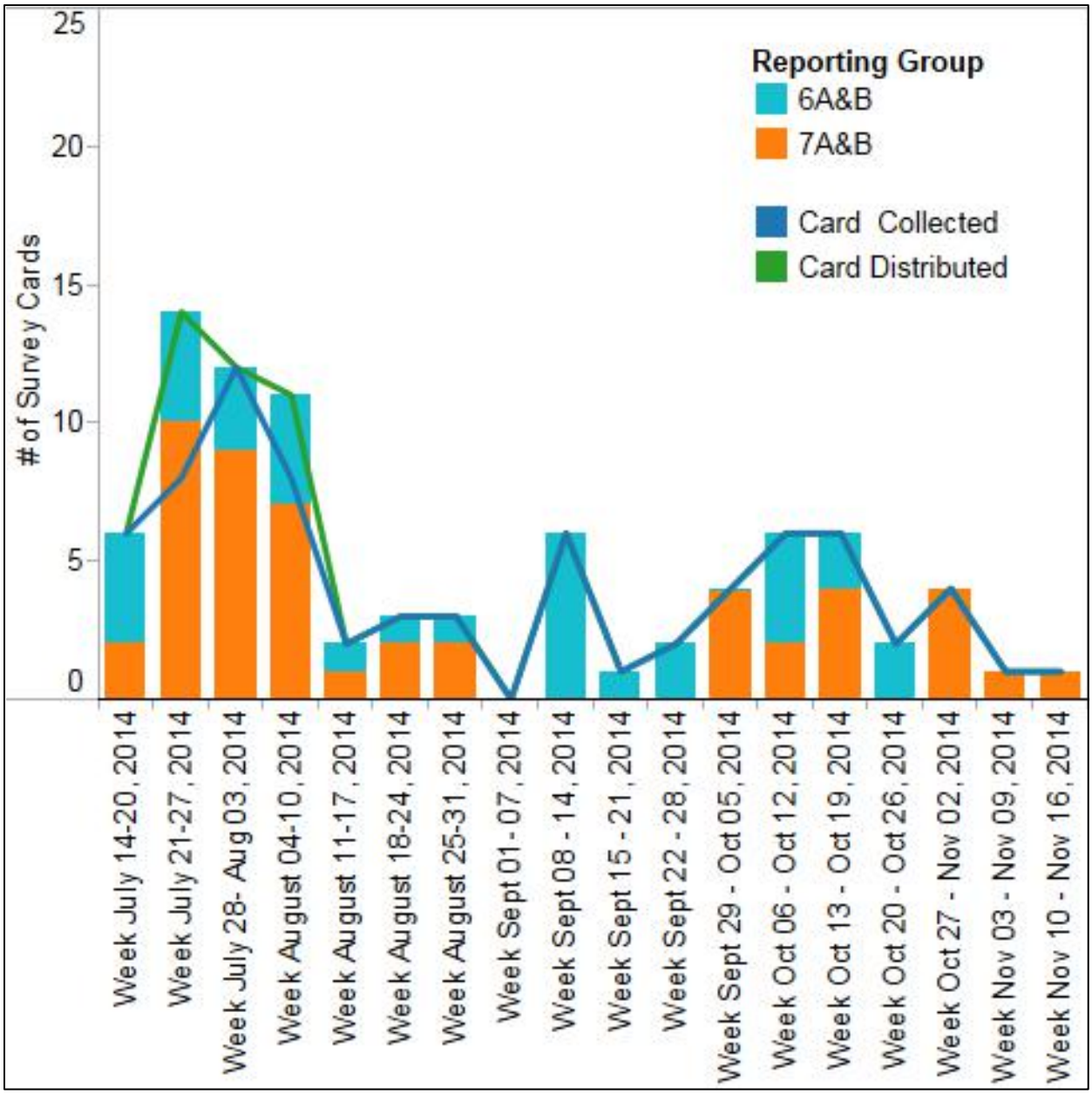


Figure 2 presents the results for expansion project data collection period between July 14, 2014 and November 16, 2014 (18 weeks). During the 18-week data collection period, a total of 84 survey cards were distributed to the participating units and the response rate was 89%.

Figure 2: PAO Expansion Project Response and Compliance Rates, July 14 & November 16, 2014

Project phases
Pilot 7A&B Expansion 6A&B 7A&B

PAO Expansion Project Response rates
(results compared to 7A&B Pilot)

Project phases	Card Distributed	Card Collected	Response rate	Card Distributed per Week
Pilot 7A&B	340	290	85.3%	17.9
Expansion 6A&B 7A&B	84	75	89.3%	4.7

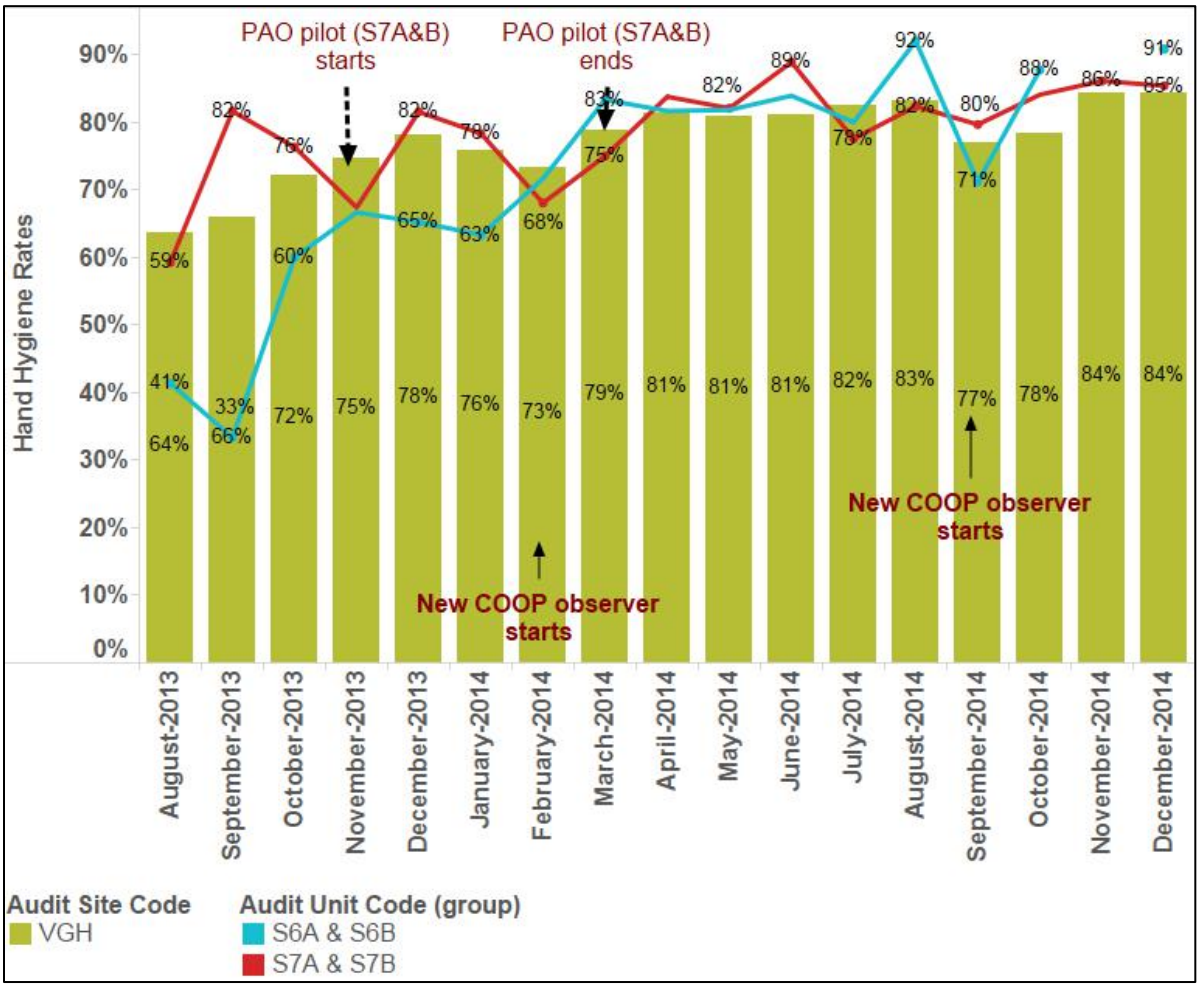
PAO Project Hand Hygiene Rates
(results compared to 7A&B Pilot)

Project phases	Comply	Answered "yes/no"	PAO HH Rate
Pilot 7A&B	583	611	95.4%
Expansion 6A&B 7A&B	106	108	98.1%

Figure 3 indicates the HH rates before and after the PAO project for VGH (Bar) and on the pilot units (lines). The HH rates at 7A&B and 6A&B showed an uptrend between August 2013 and December 2014 but this doesn't indicate causal relationship between PAO project and increased HH rates on the units because:

- The overall rates at VGH (including non-PAO units) were increasing for the same period of time
- The introduction of new coop observer seems playing more significant role in the change of the HH rates for the facility as well as on the unit

Figure 3: Hand Hygiene Rates at VGH and Unit S6A&B, S7A&B



Island Health has adopted and branded a new suite of hand hygiene products and dispensers (soap, alcohol based hand rub and lotion). These have been installed at VGH on unit 7A/7B as a pilot. Staff are testing a new environmentally friendly, scent-free soap product. These products are scheduled for Island Health wide rollout starting in the fall of 2014. Learning from these pilot activities will inform strategic spread throughout Island Health.

Support from Senior Leadership

Visible commitment from Senior Leadership to hand hygiene has been enabled through a multitude of initiatives including:

- Elevator wraps,
- Participation in the provincial "Clean Shots" photo campaign
- Patient/visitor interactions on World Clean Your Hands Day
- Standard suite of hand hygiene products
- Custom Island Health Hand Hygiene Dispensers
- Crede Software acquisition and implementation across Island Health and introduction of Quality Improvement Reports for Hand Hygiene, (Appendix F)
- New Refreshed Hand Hygiene Policy for Island Health.

Construction

IPAC staff participates on the multi-disciplinary Capital Planning, Design and Construction Committee for Island Health. IPAC references the most current and relevant Canadian Standards Association criteria to determine patient risks and risk mitigation with regards to patient safety.

Campbell River Hospital – New Build in Progress

Campbell River Hospital – Current State

In addition, IPAC collaborates with Facilities and Maintenance Operations to identify and manage infection control risks associated with construction, renovation and remediation projects within Island Health facilities. IPAC is currently engaged with a number of construction projects including: the relocation of CDH ICU for sprinkler installation, the design and planning for CDH MDRD and operating room renovation, LMGIH ED renovation, new VGH endoscopy unit and the RJH ICU renovation. Most recently North Island Hospitals Project has committed to work with dedicated IPAC staff to ensure best practices for infection control from the design phase through to the opening of the new facilities in Campbell River and Comox.

Revised Surgical Site Infection (SSI) Surveillance

When information is reported back to surgeons, SSI rates often decline. IPAC has been monitoring the incidence of selected SSIs and reporting results back to surgical programs for more than five years. During 2014-15 an extensive review of the IPAC SSI surveillance system was conducted. The existing case finding methodology and data collection tool were reviewed. Methods to flag patients who have undergone a surgery and who have had a re-encounter with an Island Health facility within the follow-up period were expanded. The revised approach facilitates more complete post discharge case finding.

The SSI surveillance protocol was revised and reference documents for ICPs who conduct the SSI surveillance were created. A new data collection tool and database was developed in Research Electronic Data Capture (REDCap) - a versatile secure data management tool used to support surveillance projects across Island Health. A number of education sessions were conducted with ICPs to introduce them to the new protocol and to the database.

Catheter Associated Urinary Tract Infections

Use of non-clinically indicated urinary catheters is a contributing factor to the incidence of HA UTIs. IPAC assisted in developing a urinary catheter policy and participated in the quality improvement workshops to support unit staff in reducing CAUTIs. The catheter policy is now in place and supported by procedures.

Central Venous Catheter Associated Bloodstream Infection (CVC-BSI) Surveillance

The use of medical instruments such as catheters increases the risk of developing a healthcare associated infection (HAI). As part of efforts to expand surveillance of device related HAIs, IPAC, in collaboration with ACS Heart Health, implemented a CVC-BSI surveillance program in three adult intensive care units. A surveillance protocol was developed, a database created in REDCap and training was provided to ICPs. The 2014-15 CVC rate was not available at time of publication.

Surveillance

Hospitalized patients are vulnerable to healthcare associated infection (HAIs) by direct or indirect contact with contaminated surfaces and lack of appropriate hand hygiene. The elderly, immunocompromised and individuals exposed to antibiotics or serious underlying disease are at increased risk of developing a HAI. Frequent admissions to hospital or prolonged LOS in hospital also increase the risk of HAI. IPAC surveillance provides a means to assess the ability of the health care system to minimize the risk of transmission of infection in healthcare settings through measures such as proper hand hygiene, environmental cleaning and the judicious use of antibiotics. The IPAC program carries out surveillance for a number of quality and patient safety indicators. This section of the report presents information on these indicators.

Hand Hygiene

Hand hygiene is a general term referring to any action of hand cleaning which removes visible soil and pathogens from the hands. Hand hygiene for patient care may be accomplished using an alcohol-based hand rub (ABHR) or soap and running water. The importance of proper hand hygiene in preventing the transmission of healthcare associated infections (HAIs) has been known for a long time. A number of studies have confirmed the critical role that contaminated hands of health care workers play in the transmission of healthcare associated pathogens. Since the 1980s a number of national and international guidelines have been produced that provide recommendations on hand hygiene practice in healthcare settings.[iv] Measuring healthcare providers' compliance with hand hygiene guidelines and reporting results back is an important element in efforts to change behavioural patterns and create an organizational climate that supports hand hygiene.

Methodology and Definitions

Island Health's hand hygiene policy asks all healthcare providers to perform hand hygiene at four moments of patient care: before and after touching a patient and/or touching any object that comes into contact with the patient, before an aseptic procedure, and after exposure to blood and/or body fluids. A sample of health care providers are directly observed in acute care and residential care facilities to determine whether they clean their hands at the correct moments using the proper technique. Data is collected using an audit tool adapted from the Canadian Patient Safety Institute. The number of hand cleaning *events* observed (i.e., when healthcare providers clean their hands), as well as the number of hand cleaning *opportunities* (i.e., when a healthcare provider *should* clean their hands) are recorded. These two measures are used to calculate the hand hygiene rate using the following formula:

$$\text{Percent compliant} = \frac{\text{number of hand hygiene events}}{\text{number of opportunities}} \times 100$$

Hand hygiene compliance is recorded by individuals who observe a sample of healthcare provider behaviour. Healthcare providers may change their behaviour if they know they are being observed. Moreover, different observers may record the same behaviour differently leading to variation in results.

Between March and May 2013, five dedicated hand hygiene observers (return to work employees) began work at five acute care facilities.[1] Prior to this change, all observations were conducted by front line staff - usually nurses - that carried out this activity as part of their assigned duties after patient care was completed. Observations at all other acute and residential care facilities continue to be conducted by front line staff. It was anticipated that the introduction of dedicated observers would lead to improved data integrity and increased inter-rater reliability because they received standardized training and observed and recorded a more representative sample of opportunities. Due to this change, comparisons of hand hygiene rates before and after quarter three 2012-13 should be made with caution Another change in methodology occurred during quarter four 2013-14 when a new team of dedicated observers consisting of co-op students began to conduct dedicated hand hygiene observations and more emphasis was placed on standardizing auditing practice to ensure high data quality.

Annual Targets and Benchmarks

Status	Improvement Higher rates indicate improvement	Provincial Performance Target 80%	Actual (2014-15) 82%

The overall rate in Island Health acute care facilities for fiscal year 2014-15 was 82%. Island Health exceeded the Provincial Target this year up from 76% for 2013-14. Beginning in 2011-12, Island Health along with all other health authorities in the province began to report hand hygiene compliance data to the Provincial Infection Control Network (PICNet). Hand hygiene compliance rates produced by PICNet are used as an external benchmark.[2]

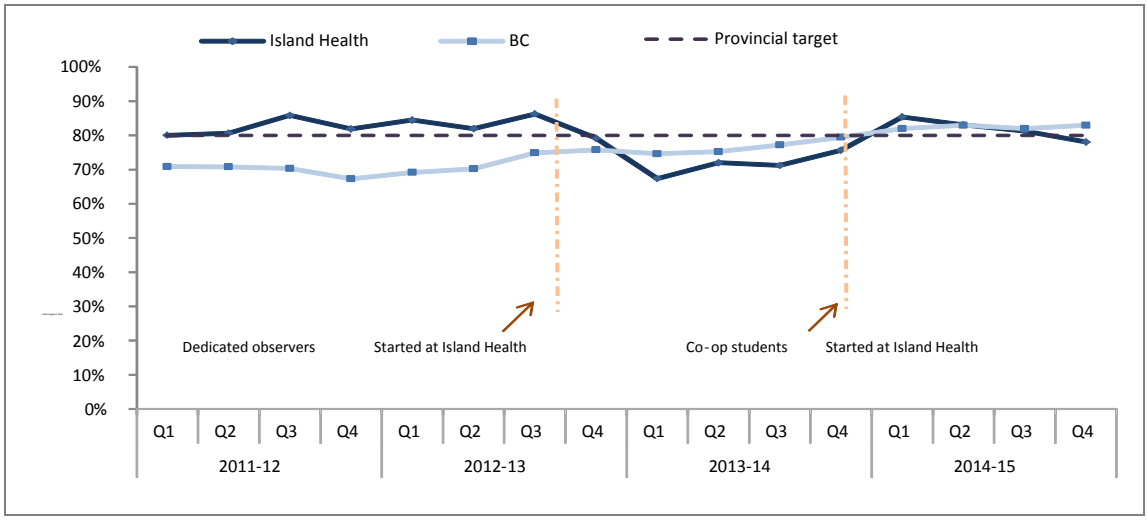
Results

Figure 4 provides the quarterly hand hygiene rates for acute care facilities at Island Health and the province as a whole. The overall 2014-15 rate at Island Health was 82%. The provincial rate was 83%. While the quarterly provincial hand hygiene rates remained steady at about 82% throughout 2014-15, rates at Island Health acute care facilities declined significantly from 85% in quarter one to 78% in quarter four.

The hand hygiene rate for the province increased steadily over the past four fiscal years. Meanwhile, reported rates at Island Health have fluctuated over the same time period. Along with possible sampling variation, the significant decrease in Island Health rates between quarter three 2012-13 and quarter one 2013-14 can be explained, at least in part, by the change in auditing methodology associated with the introduction of trained dedicated observers. In February 2014, with the introduction of the refreshed hand hygiene program dedicated observers were replaced with four co-operative university students and in August 2014 the second cohort of students began. The introduction of new dedicated observers on a periodic basis may, at least in part, account for the fluctuations in reported hand hygiene rates over the past two fiscal years.

[1] Dedicated observers were introduced at NRGH, RJH, SPH, VGH and WCGH.
[2] PICNet reports can be found at https://www.picnet.ca/surveillance/hand-hygiene/

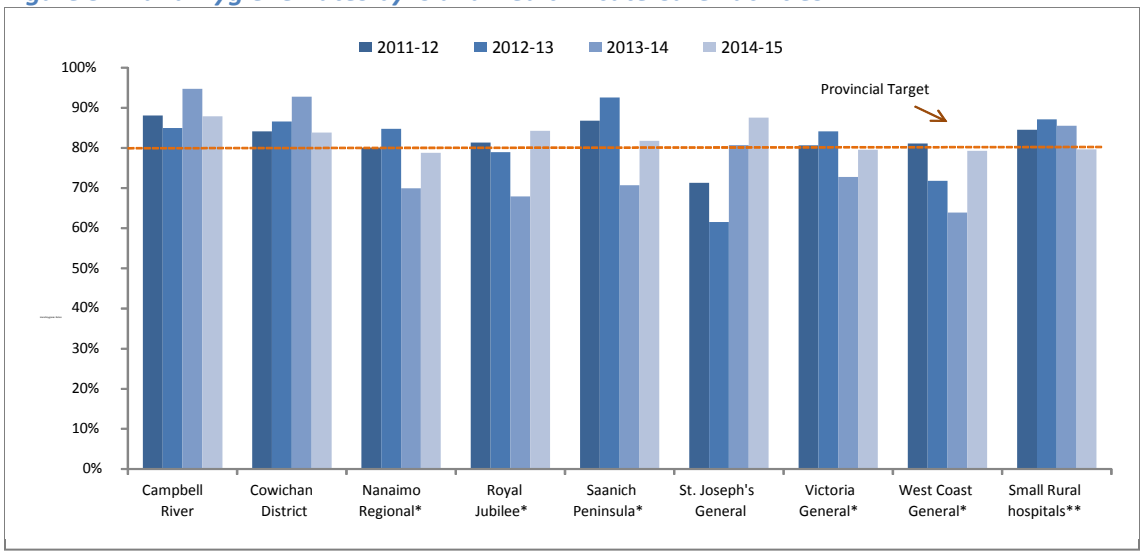
Figure 4: Hand Hygiene Rates at Island Health & BC Acute Care Facilities by Fiscal Quarter



Hand Hygiene Rates by Acute Care Facility and Healthcare Provider

Figure 5 shows hand hygiene rates at Island Health's acute care facilities for the past four fiscal years. Because of differences in the observation methods between facilities, comparisons should be interpreted with caution. Hand Hygiene rates increased significantly between 2013-14 and 2014-15 at all of the acute care facilities. (Appendix G – Table 1). It was noted that those acute care facilities with dedicated observers had lower rates in 2014-15. Meanwhile, facilities without dedicated observers reported higher rates, ranging from 74% to 88%. It is interesting to note that rates at CRH and CDH declined significantly between 2013-14 and 2014-15.

Figure 5: Hand Hygiene Rates by Island Health Acute Care Facilities

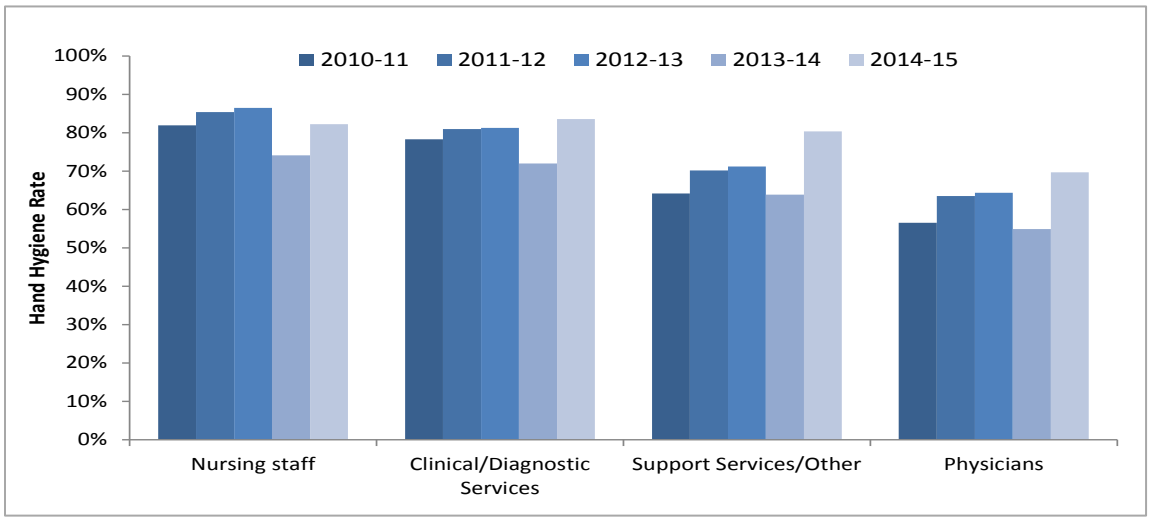


* Dedicated observers began auditing in 2013-14

** Includes Cormorant Island, Lady Minto, Port Hardy, Port McNeill and Tofino hospitals

Figure 6 provides hand hygiene rates by health care providers working at Island Health's acute care facilities. Clinical and diagnostic services includes physiotherapist, occupational therapist, dieticians, along with radiology and laboratory staff. Support services and other includes housekeeping, food services, and paid companions. Significant increases of hand hygiene rates for healthcare providers were noted in all groups Physicians (15%), Support Services/Other (16%), Clinical/Diagnostic Services (12%), and Nursing staff (8%) from 2013-14 to 2014-15.

Figure 6: Hand Hygiene Rates by Healthcare Provider Group, Island Health Acute Care Facilities



Actions Taken

A refreshed hand hygiene strategy was approved by the Island Health Board of Directors in October 2013 and the strategy was implemented during 2014-15. The focus of the hand hygiene program expanded to include: education (in-the-moment plus a new up-to-date, evidenced-based learning plan and hub); new products and branding; improved measurements to ensure high data quality; easy-to-use quality improvement reports for frontline staff; expansion into residential and ambulatory care areas and the development of a cost-effective and easy to deliver train-the-trainer program for health care providers who conduct hand hygiene observations.

The noted improvements in provider hand hygiene rates for 2014-15 is demonstrating that the following IPAC Initiatives continue to be successful to embed a commitment to hand hygiene into the culture of Island Health. This has been accomplished by IPAC:

- Encouraging the visibility of the hand hygiene through relationship building and verbal or written communication.
- Developing, testing and implementing a new and easy to use hand hygiene software program for efficient data collection with an emphasis on data quality.
- Designing custom quality improvement hand hygiene reports that are easily accessible and usable by health care providers to support quality improvement initiatives and hand hygiene best practices.

- Providing a comprehensive up-to-date and evidence-based learning plan that health care providers can access through two learning hubs
- Creating a train-the-trainer program that can be delivered in a cost-effective, outreach education method though an online 'e-module', which will be followed up by a face-to-face training session in a centralized locations convenient to different facilities across the Island.

What's Next

- Roll out of hand hygiene quality improvement reports to the site managers.
- Participating with Provincial Hand Hygiene Working Group to develop provincially standardized staff education.
- Work with the BC Patient Reported Experience Measures Steering Committee.
- Investigate the use of new technologies for hand hygiene auditing and technique.
- Expand the Patient as Observers to additional sites.

Clostridium difficile Infections (CDI)

Clostridium difficile is a spore-forming bacterium that can cause gastrointestinal illness. It is the most common causes of healthcare associated infectious diarrhea in Canada and a major cause of infectious gastroenteritis in acute care facilities.[v] The main symptom of CDI is diarrhea, which may be severe, accompanied by abdominal pain and fever. In some cases CDI can cause inflammation of the colon. In rare instances it can lead to very serious conditions such as toxic megacolon (enlargement of the colon) and require surgery such as colectomy. In extreme cases it can cause death. Patients who acquire CDI during their hospital admission generally stay longer than they would otherwise and sometimes experience poorer clinical outcomes.

C. difficile is not part of a person's normal colonic flora; hospitalized patients can ingest the organism if they touch contaminated surfaces or can also be spread on the contaminated hands of health care workers. If the patient has an intact lower-intestinal microbiome the good bacteria can normally fend off infection, however, if antibiotic treatment disrupts the colonic flora, resistant *C. difficile* can multiple quickly and release toxins to cause infectious gastroenteritis. Monitoring CDI trends provides a means to assess the ability of the health care system to minimize the risk of spreading infections though measures such as proper hand hygiene, environmental cleaning and the judicious use of antibiotics.

Methodology & Definitions

ICPs identify patients admitted to an Island Health acute care facility diagnosed with CDI using provincial and national surveillance protocols. A diagnosis of CDI applies to a person with an acute onset of diarrhea (three or more liquid stools within a 24 hour period) along with one or more of the following: a laboratory confirmation of positive *C. difficile* or culture with evidence of toxin production, diagnosis of typical pseudomembranous colitis, or diagnosis of toxic megacolon.

A CDI case is classified as "healthcare associated" when:

- The patient's symptoms occurred in the hospital more than 72 hours after admission; or
- Symptoms are seen in a patient that has been hospitalized or discharged within previous four weeks and patient is not a resident of a residential care facility.

See Appendix H for a more detailed discussion of the methodology and case definitions.

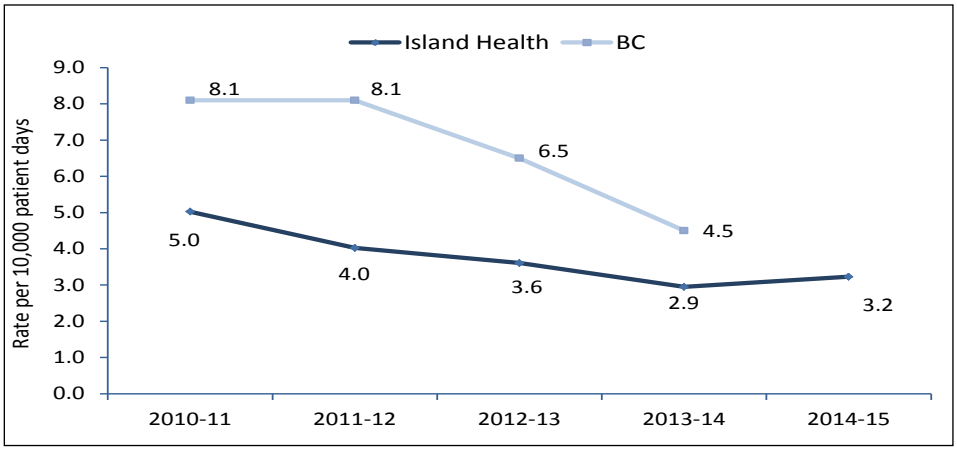
Annual targets and benchmarks

Island Health has established annual targets for the incidence of new healthcare associated CDI. The target for fiscal year 2014-15 was 3.0 cases per 10,000 patient days. The organization nearly achieved this goal, the overall rate was 3.2.

Status	**Improvement**	**Target**	**Actual** (2014-15)
	Lower rates indicate improvement	3.0 per 10,000 patient days	3.2 per 10,000 patient days

Comparisons between different health authorities should be interpreted with caution because of variations in laboratory testing for detection of *C. difficile* and different at-risk populations. The provincial rate is used by Island Health as a benchmark. Figure 7 shows that patients admitted to an Island Health acute care facility between 2010-11 and 2013-14 were less likely to acquire CDI than patients in the province as a whole.[3] The annual rate for Island Health acute care facilities steadily decreased between 2010-11 and 2013-14 from 5.0 to 2.9 per 10,000 patient days. The decline is statistically significant. The slight rate increase in 2014-15 to 3.2 per 10,000 patient days was not statistically significant.

Figure 7: Healthcare-Associated CDI Rates, Island Health and BC Acute Care Facilities



The 2014-15 provincial rate was not available at time of publication

Results

A total of 304 new and relapse cases of CDI were identified among patients in Island Health acute care facilities during fiscal year 2014-15.[4] Approximately 13% initially responded to therapy but experienced a relapse of symptoms after their initial diagnosis and treatment (Figure 8). The number of relapse

[3] Provincial CDI reports are available at the following website: http://www.picnetbc.ca/ the 2014-15 provincial rate was not available at time of publication.

[4] This does not include patients readmitted with on-going CDI symptoms. Please see Appendix H for methodology and definitions.

cases decreased during fiscal year 2014-15. Relapsing CDI is often more difficult to treat and contributes to significant morbidity and increased healthcare cost. It is associated with the following:

- virulent *C. difficile* strains;
- ineffective initial treatment; and
- failed immune response due to underlying medical conditions.[vi]

While we cannot rule out chance, the decline in relapse cases may be due to changes in any or a combination of these risk factors. The IPAC program reviews all new cases of CDI to ensure adherence to the CDI care plan and in collaboration with the antimicrobial stewardship pharmacists review the appropriate use of medications.

Figure 8: CDI Case Classification for Hospitalized CDI Patients

	2010-11		2011-12		2012-13		2013-14		2014-15	
	n	%	n	%	n	%	n	%	n	%
CDI cases	358	100	367	100	353	100	323	100	304	100
New Infection	303	84.7	310	84.5	301	85.3	259	80.2	264	86.8
Relapse	55	15.3	57	15.5	52	14.7	64	19.8	40	13.2
Where acquired - New Infections										
HA: reporting facility	230	75.9	196	63.2	178	59.1	146	56.4	162	61.4
HA: another facility	12	4.0	18	5.8	12	4.0	15	5.8	12	4.5
Community-associated	61	20.1	96	31.0	111	36.9	98	37.8	90	34.1

HA: Healthcare associated

A total of 264 new infections were identified among patients in Island Health acute care facilities during 2014-15. Sixty-one percent of the cases were likely acquired in the facility where the patient was diagnosed, another 5% likely acquired CDI during a previous admission in another acute or residential care facility. This means, 34% of all new infections identified among inpatients during 2014-15 were not admitted overnight to a healthcare facility in the four weeks prior to diagnosis.[5] It is important to note that some cases classified as community-associated had an encounter with the healthcare system in an emergency department or other outpatient clinic. Moreover, the epidemiology of CDI is continually changing. For example, some evidence suggests the virulent *C. difficile* NAP1 strain which is associated with healthcare associated CDI is becoming less prevalent while other less virulent strains that are not as closely linked to healthcare exposures are becoming more common. Island Health is collaborating with the BCCDC and the Public Health Agency of Canada to study these changes.

New *C. difficile* infections acquired in a healthcare facility represent cases where effective infection prevention and control measures will have the greatest impact. Figure 9 provides rates of healthcare

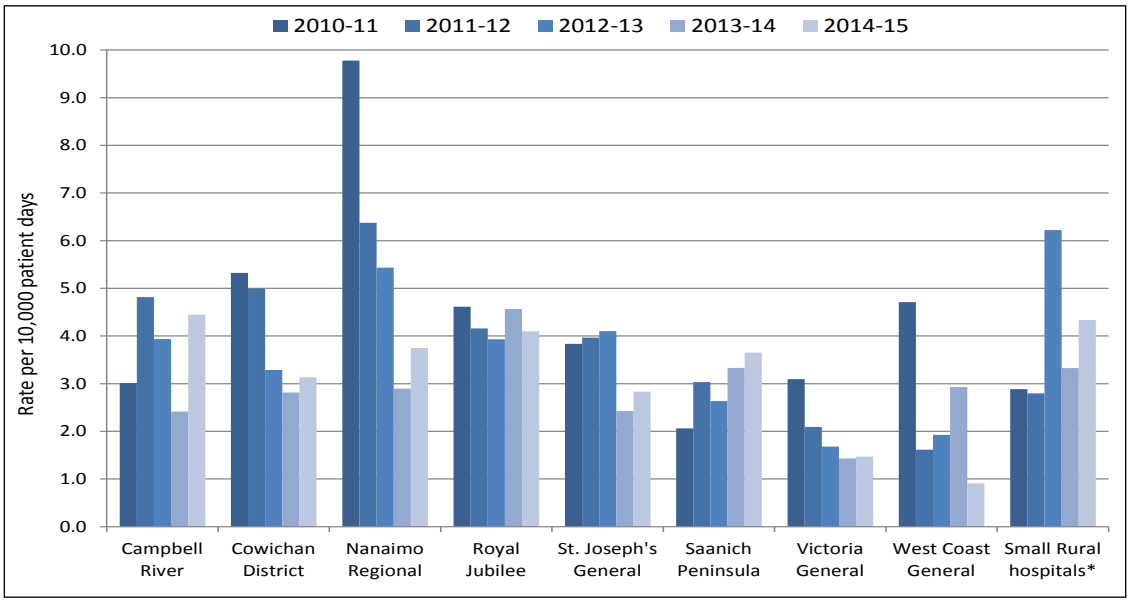
[5] An analysis of the 2010-11 cases showed that the statistically significant increase in community-associated CDI between 2010-11 and 2011-12 can only in part be explained by a change in the way healthcare associated CDI were defined during the latter fiscal year. During 2010-11 patients who had been inpatients in the previous eight weeks were classified as healthcare associated cases, in 2011-12 this look-back period was reduced to four weeks.

associated CDI by acute care facility for the fiscal years 2010-11 to 2014-15. (Appendix G – Table 2 to view the rates and 95% confidence intervals). The overall decline in the Island Health rates between 2010-11 and 2013-14 was the result of significant declines at NRGH and VGH and a slight decrease at CDH. Between 2013-14 and 2014-15 the rates at all facilities with the exception of WCGH increased slightly. None of the increases were statistically significant.[6]

The incidence rates of healthcare associated CDI also vary between acute care facilities. During 2014-15, rates tended to be higher at CRH (4.4), RJH (4.1), NRGH (3.7), SPH (3.7) and small rural hospitals (4.3). While rates tended to be lower at VGH (1.5) and WCGH (0.9). However, none of the differences were statistically significant.

Comparing rates between healthcare facilities is not recommended without first adjusting for differences in risk factors among the patient population. There are many factors along with infection prevention practices that can affect the incidence of healthcare associated CDI. The elderly, individuals with immune compromising conditions or serious underlying disease are at increased risk of developing CDI. People who have frequent admissions to hospital or have prolonged stays in hospital are also at increased risk.[vii] As a result, a hospital with a higher proportion of these types of patients may report higher rates of CDI than a hospital with different patient characteristics even though they both have equally effective control measures in place.

Figure 9: Healthcare Associated CDI Rates by Acute Care Facility



* Includes Cormorant Island, Lady Minto, Port Hardy, Port McNeill and Tofino Hospitals

[6] In smaller facilities relatively minor changes in the number of CDI cases can cause large changes in facility specific rates.

Actions Taken

IPAC is continuing to work with Island Health staff to improve early recognition of symptoms indicative of CDI and implement additional precautions quickly under a risk-based model. All new CDI cases are reviewed to ensure the CDI care plan is followed, and in collaboration with the antimicrobial stewardship pharmacists, appropriate medications are prescribed.

IPAC closely monitors the incidence and prevalence of CDI in all acute care and Island Health residential care facilities. Weekly CDI reports that compare the current number of CDI cases with historical baselines are sent to Senior Executive to facilitate communication. If the incidence of new healthcare associated CDI exceeds the expected baseline, the situation is reviewed by IPAC staff. An internal alert may be initiated if rates exceed 2 standard deviations above the target in order to rapidly initiate appropriate interventions to circumvent an outbreak. As part of the review, patient location and movements are evaluated using information technology to identify possible clustering within units and sources of transmission. Relevant stakeholders are contacted to review the increased incidence and plan the implementation of appropriate risk mitigation strategies, including enhanced environmental cleaning.

CDI spores are difficult to kill using neutral cleaners. As a result, sporicidal disinfectants are recommended for environmental cleaning in the room of any patient diagnosed with CDI. From September to December 2014, a bleach-based product was trialled in three Island Health acute care facilities. In January 2015, all Island Health acute and residential sites began using the sporicidal product.

What's Next

IPAC will:

- define "internal alert trigger points" for the number of CDI infections per unit or facility.
- create written procedures for the management of an internal alert.
- continue to investigate and implement new cleaning technologies such as UV light disinfection technology.
- work with IHealth to incorporate changes for improved communication to Housekeeping for cleaning procedures.
- develop, expand and deliver education for front line staff.

Methicillin-resistant *Staphylococcus aureus* (MRSA)

Staphylococcus aureus (S. aureus) is a bacterium common to the normal flora of humans. Some population studies estimate that one third of humans are asymptomatically colonized with S. *aureus.* It is also one of the most common causes of bacterial infections, including those acquired in healthcare facilities.[viii] MRSA is a strain of *S. aureus* resistant to various antimicrobial agents including methicillin. These organisms have increased steadily in Canadian hospitals over the past several decades and are now one of the predominant pathogens in healthcare associated infections. Because of antimicrobial resistance, MRSA infections are more difficult to treat and can

lead to adverse health outcomes for the patient, increased LOS and increased healthcare costs. Moreover, asymptomatic (colonized) patients and healthcare workers who carry MRSA organisms on their skin serve as reservoirs for further transmission as they move through and across healthcare facilities. Once acquired, MRSA colonization can last a long time and as a result individuals colonized with MRSA are at increased risk for developing a MRSA infection.

Monitoring the incidence of MRSA in healthcare facilities is needed to develop effective prevention programs and measure the impact of these organisms. In general, MRSA is transmitted person-to-person. Studies show that when healthcare providers follow well established guidelines such as proper hand hygiene and contact precautions, MRSA infections can largely be prevented. Moreover, programs that successfully prevent MRSA transmission are likely to prevent the spread of other pathogens transmitted from patient-to patient. The incidence of healthcare associated MRSA is a good indicator of the ability to contain transmission of important pathogens in healthcare facilities.[ix]

Methodology & Definitions

ICPs identify patients admitted to an Island Health acute care facility diagnosed with MRSA using provincial and national surveillance protocols. A patient is included in case counts if there is a laboratory confirmation of antimicrobial resistant S. *aureus*, the patient must be admitted to an acute care facility, and the patient was identified for the first time at the time of hospital admission or during their hospitalization. For epidemiologic purposes MRSA is classified by where the organism was likely acquired; healthcare facility versus the community. Given the prevalence of MRSA in the community some misclassification may occur, especially if patients are not screened on admission. Please see Appendix H for a more detailed discussion of methodology and definitions.

Annual targets and benchmarks

Island Health has established annual targets for the incidence of new healthcare associated MRSA. The target for fiscal year 2014-15 was 2.0 cases per 10,000 patient days. This goal was nearly achieved with an overall rate of 2.4 per 10,000 patient days.

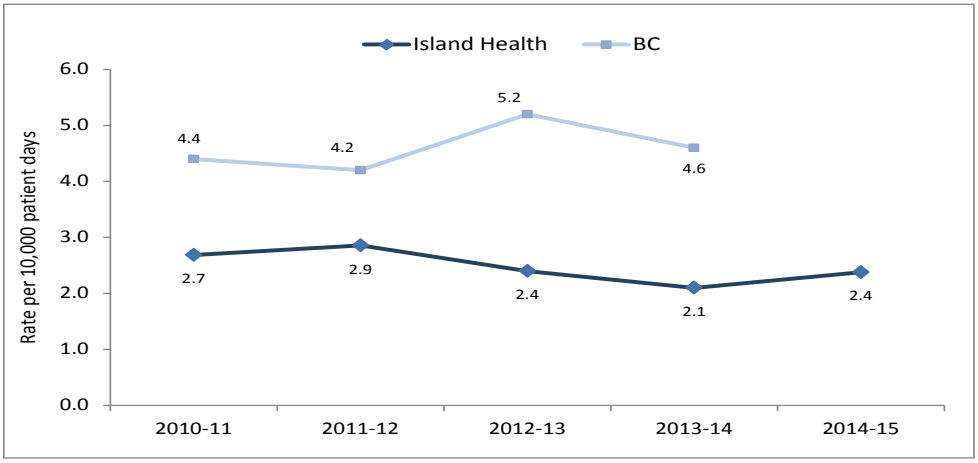
Status	**Improvement**	**Target**	**Actual** (2014-15)
	Lower rates indicate improvement	2.0 per 10,000 patient days	2.4 per 10,000 patient days

While comparisons between different health authorities need to be made with caution because of variations in screening practices, case classification, and different at-risk populations, the provincial rate is used by Island Health as a benchmark. Figure 10 shows that patients admitted to an Island Health acute care facility between 2010-11 and 2013-14 were less likely to acquire MRSA during their hospital admission than patients in the province as a whole.[7]

[7] Provincial MRSA reports are available at the following website: http://www.picnetbc.ca/ the 2014-15 provincial rate was not available at time of publication.

The incidence of hospital-acquired MRSA declined slowly but significantly at Island Health acute care facilities between 2011-12 and 2013-14 from 2.9 to 2.1 per 10,000 patient days. An insignificant rate increase occurred in 2014-15 to 2.4 per 10,000 patient days

Figure 10: Healthcare Associated MRSA Incidence Rates, Island Health and BC Acute Care Facilities



Results

Between April 1, 2014 and March 31, 2015, 300 patients admitted to an Island Health acute care facility were newly diagnosed with MRSA – an increase of approximately 20% compared to the previous two fiscal years. Approximately 42% of the patients likely acquired the MRSA organism while they were admitted to the facility. The diagnosis was made either during the admission when they tested positive or during an admission at that facility in the previous twelve months. Another 15% likely acquired the organism during a previous encounter with another healthcare facility and 43% did not have traditional healthcare exposures and were classified as community-associated. This distribution was similar in each of the previous three fiscal years.

In the past 10 to 15 years MRSA has emerged as a cause of infections among individuals who did not have any of the traditional healthcare exposures. As the healthcare system shifts more treatment to the outpatient arena, and the epidemiology and risk factors of MRSA evolve, it is becoming more difficult to accurately classify MRSA as strictly healthcare associated or community-associated.[x] This is especially true if the patient had a previous healthcare exposure more than six months prior to diagnosis. During 2014-15, 68% of the nosocomial cases presented in Figure 11 were classified as such based on a previous encounter with the reporting facility. The average difference between admission and previous encounter was 2.7 months; the standard deviation was 2.9 months.

Patients had clinical manifestations of an infection in 32% of the healthcare associated cases, which means 68% were asymptomatic carriers. Infections of the skin or soft tissue were the most common type of infection reported, followed by respiratory and UTIs. Distinguishing between colonization and infection at times can be difficult if positive cultures are obtained from non-sterile sites (such as sputum

urine or wounds) because clinical signs and symptoms must be interpreted. Bloodstream infections which can have severe outcomes were reported for about 3% of all infected incident cases.

Figure 11: Selected Characteristics of MRSA Incident Cases

	2011-12		2012-13		2013-14		2014-15	
	n	%	n	%	n	%	n	%
MRSA cases	320	100	254	100	242	100	300	100
Where MRSA was acquired								
HA: reporting facility	146	45.6	126	49.6	111	45.9	127	42.3
HA: another facility	58	18.1	45	17.7	30	12.4	45	15.0
Community-associated	116	36.3	83	32.7	101	41.7	128	42.7
HA: reporting facility	146	100	126	100	111	100	127	100
Colonization	92	63.0	56	44.4	55	49.5	87	68.5
Infection	54	37.0	70	55.6	56	50.5	40	31.5
Type of Infection								
Skin/soft tissue	20	37.0	29	41.4	20	35.7	19	47.5
Respiratory	21	38.9	18	25.7	13	23.2	12	30.0
Urinary tract	10	18.5	18	25.7	12	21.4	9	22.5
Surgical site	4	7.4	3	4.3	3	5.4	2	5.0
Bloodstream	5	9.3	5	7.1	5	8.9	1	2.5
Other	5	9.3	8	11.4	6	10.7	3	7.5

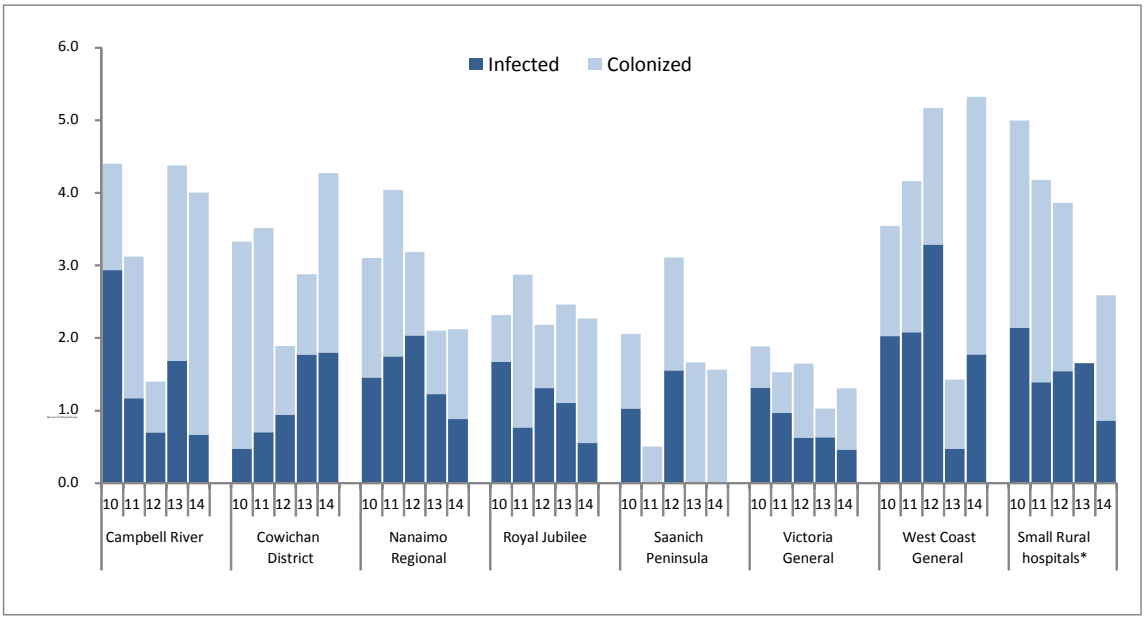
HA: Healthcare associated

Figure 12 provides incidence rates of healthcare associated MRSA by acute care facility for the fiscal years 2010-11 to 2014-15. (Appendix G – Table 3) to view the rates and 95% confidence intervals). Rates tend to vary between facilities and over time within most facilities. Rates declined significantly at NRGH from 2011-12 to 2013-14 (4.0 to 2.1). There was also a general but non-significant downward trend at VGH and at small rural hospitals during this time period. Meanwhile, rates at CDH increased each year between 2012-13 and 2014-15 (from 1.9 to 4.3).[8]

During 2014-15, approximately 32% of all incident cases of MRSA were infections, a decrease from 51% reported during 2013-14. The proportion of new MRSA cases categorized as infections varied between acute care facilities in 2014-15 from a low of zero percent at SPH to a high of 42% at CDH and NRGH.

[8] In smaller facilities relatively minor changes in the number of CDI cases can cause large changes in facility specific rates.

Figure 12: Healthcare Associated MRSA Incidence Rates by Acute Care Facility



Actions Taken

Currently all patients admitted to Island Health acute care facilities are screened for MRSA risk factors. Those considered to be at risk are tested for the organism to detect colonization even if there is no evidence of infection. If the patient tests positive she/he is immediately placed on additional precautions to reduce the risk of transmission within the facility. To improve the efficiency and completeness of this active surveillance screening, the ARO screening form and the Infection Precaution Assessment form were merged. A protocol utilizing health informatics was developed to evaluate whether all eligible patients are administered the ARO screening form and whether those classified at risk are swabbed for MRSA in a timely manner. Preliminary results are being validated and if the approach is reliable the process metric will be reported on a regular basis.

Island Health has also developed mechanisms to rapidly communicate positive MRSA results from the laboratory to clinical areas in order to quickly initiate precautions on newly identified MRSA patients. Hand hygiene is also an important component of prevention efforts and Island Health has developed a comprehensive Hand Hygiene Strategy.

What's Next

IPAC will:

- continue to work with the Surgical Quality Council to reinforce the use of decolonization therapy such as chlorhexidine bathing and nasal Mupirocin for high-risk patients prior to surgery to reduce the risk of subsequent SSIs in patients colonized with MRSA.
- evaluate the compliance of the targeted ARO Screening on Admission Form.
- develop an education plan for front line staff on utilizing appropriate precautions for MRSA.
- continue to consult with Patient Placement Coordinators regarding appropriate bed placements.

- investigate facilities with increased incidence and provide recommendations.

Carbapenemase-Producing Organisms

Antimicrobial resistance is a global public health concern. The loss of effective antimicrobials is reducing our ability to protect individuals from infectious diseases, with profound impacts on our healthcare system. CPO refers to bacteria that have acquired genes that make them resistant to broad spectrum antibiotics including carbapenem. When resistance to carbapenems occurs, there are often few alternative treatments available. CPO is endemic in various regions of the world, but it is increasing showing up in Canadian hospitals. To minimize the risk of spreading CPO in healthcare facilities it is critical to monitor the clinical incidence of these organisms and evaluate evidence of intra-facility transmission.

Methodology & Definitions

Since July 18, 2014, all laboratory isolates recovered from patient specimens that are suspected of harbouring a carbapenemase gene are submitted to British Columbia Centre for Disease Control Microbiology Reference Laboratory (BCPHMRL) for confirmatory testing.[9] If an isolate from a patient in an acute care facility is identified with a carbapenemase gene for the first time or with a new carbapenemase gene, it is considered to be a new case of CPO, and is reported to the Provincial Infection Control Network (PICNet). For more information about the provincial CPO surveillance program, please visit the PICNet website at www.picnet.ca.

Annual Targets and Benchmarks

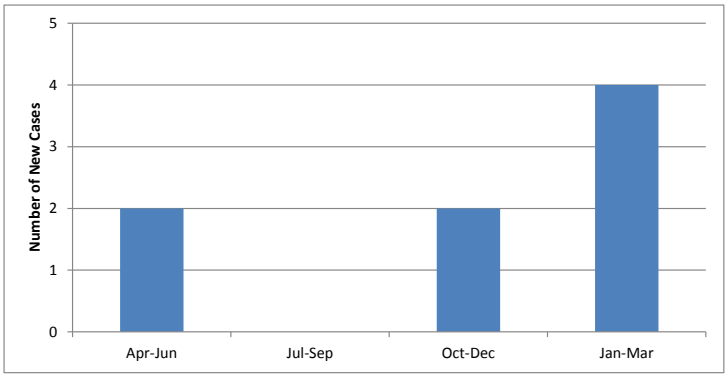
CPO is an emerging pathogen in many healthcare facilities in Island Health. To date, there has been no evidence of CPO transmission in an Island Health acute care facility. Therefore no annual targets have been set by the province. All health authorities in British Columbia report incidence of CPO to PICNet. Estimates reported by PICNet will be used as benchmarks in future reporting.

Results

A total of eight new cases (Figure 13) of CPO were identified among patients admitted to an Island Health acute care facility during fiscal year 2014-15. One half of the cases were reported during the last three months of the fiscal year (January – March). Five patients did report a healthcare exposure outside of Canada in the previous 12 months while no specific risk factors were identified for the remaining three cases. NDM-1 was the most common carbapenemase gene identified (five of the eight cases). The other three patients harbored three other CPO genes - OXA 48, OXA 24/51 and VIM.

[9] Prior to the start of the provincial CPO surveillance in July 2014, the isolates suspected of CPO were submitted voluntarily to BCPHMRL for confirmatory testing. Island Health did participate in this program.

Figure 13: Number of CPO cases in Island Health Acute Care Facilities, 2014-15



Actions Taken

CPO usually spread person-to-person through contact with infected or colonized people, or via contaminated surfaces or medical equipment. All patients admitted to an Island Health acute care facility are screened for known CPO risk factors and those who met certain pre-specified criteria are tested for CPO colonization. Patients who are considered to be at risk for CPO are placed on additional precautions on admission until laboratory tests indicate a negative result. If a previously unrecognized CPO patient is identified all contact of the patient are screened and tested to identify possible transmission. A system is in place to identify patients with a history of CPO (colonization or infection) so they can be placed on additional precautions on admission. Proper hand hygiene among healthcare providers is critical to prevent the transmission of any antimicrobial resistant organism including CPO. Antimicrobial stewardship is another important measure in the prevention of ARO.

What's Next

IPAC will:

- work with Patient Placement Coordinators to clarify the standard recommendations for IPAC priorities for single room placement.
- re-evaluate criteria for screening CPO on admission to acute care facilities one year post implementation.
- develop and implement a CPO Procedure.
- develop, expand and deliver education for front line staff.

Influenza

Acute respiratory infection is a frequent cause of hospital admission, and healthcare associated clusters of these diseases sometimes occur. Influenza is the predominant cause of acute respiratory viral infections among hospitalized patients and continues to be an important cause of morbidity and mortality, particularly among the elderly and patients with serious chronic conditions. Sudden increases in the number of patients admitted to an acute care facility because of acute respiratory infection places stress on the healthcare system. Moreover, increased prevalence of the virus within facilities amplifies the risk of transmission for all patients. Strategies to prevent the transmission of influenza in healthcare facilities must be multifaceted including both vaccination

and effective infection control measures. Monitoring the prevalence of influenza in acute care facilities is needed to inform control measures and plan the provision of healthcare services.

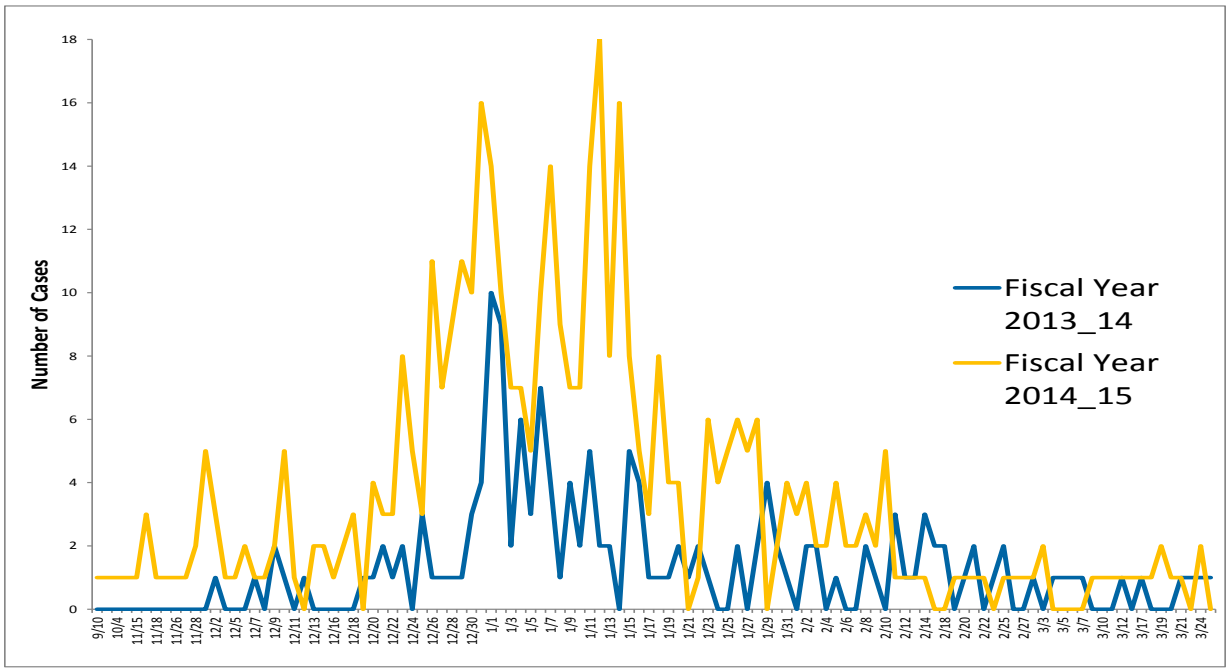
Methodology & Definitions

The number of influenza cases presented in this report is based on laboratory confirmation of influenza virus. Healthcare providers are encouraged to screen patients admitted to hospital who exhibit symptoms suggestive for influenza. However, screening practices may vary between healthcare providers and between acute care facilities. As a result, the number of laboratory confirmed cases reported may reflect screening practices along with the prevalence of the illness in each facility. The incidence rates presented in this report may be an underestimate of the actual incidence of influenza among hospital patients.

Results

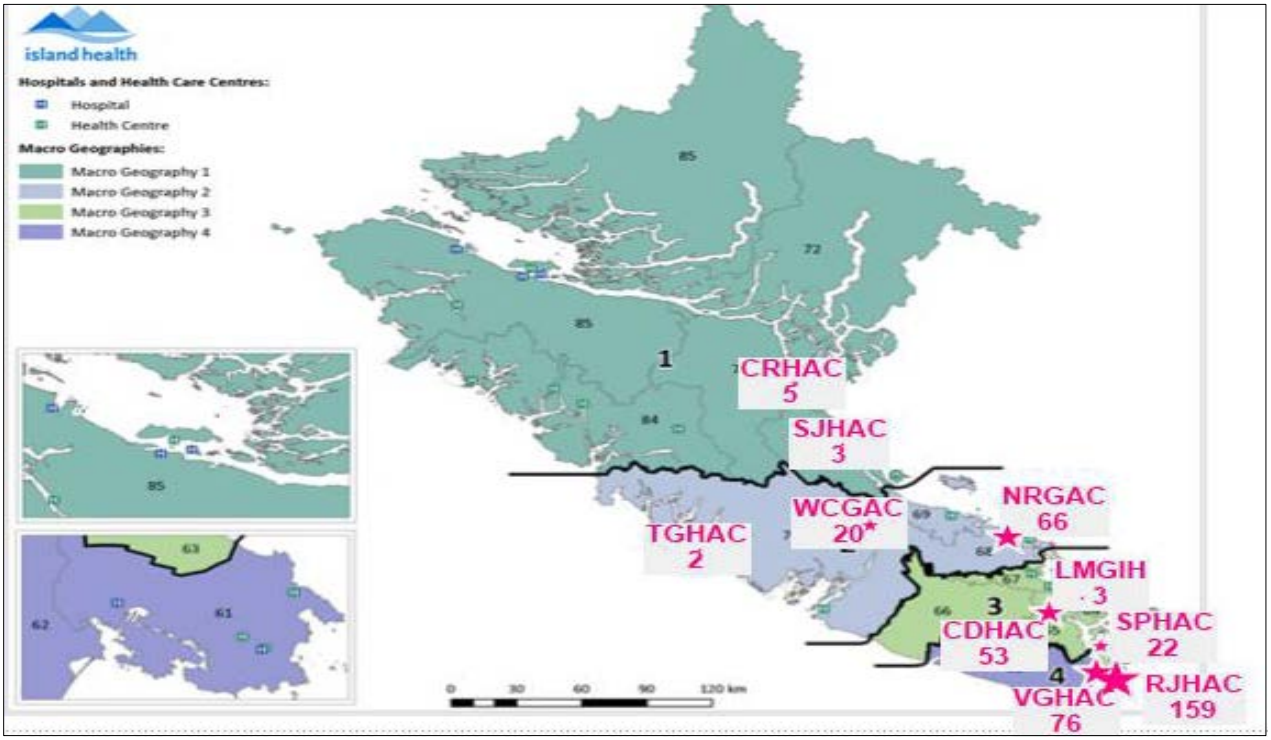
Due to antigenic drift resulting in a vaccine mismatch for the circulating dominant strain of influenza a higher than usual volume of influenza related admissions to Island Health acute care facilities and multiple outbreaks in residential care facilities occurred during the 2014-15 influenza season. Between September 2014 and March 2015, 409 patients admitted to an Island Health acute care facility were diagnosed with laboratory confirmed influenza. During the same period the previous year 151 cases were reported (Figure 14). The overwhelming majority of individuals needing in-patient acute care came from the community. About 91% of influenza admissions were from the community, the rest (9%) were transferred from residential care facility.

Figure 14: Laboratory Confirmed Influenza Patients Admitted to Island Health Acute Care Facilities - 2013-14 and 2014-15



Three influenza outbreaks were declared in acute care facilities between December 2014 and March 2015 (see Outbreak Management). All outbreaks were declared in facilities located in Victoria (Macro Geography 4). While most of the patients (57%) who tested positive for influenza were admitted to Island Health's two largest acute care facilities - RJH and VGH – the burden was similar in all facilities south of Macro Geography 1 (Figure 15).

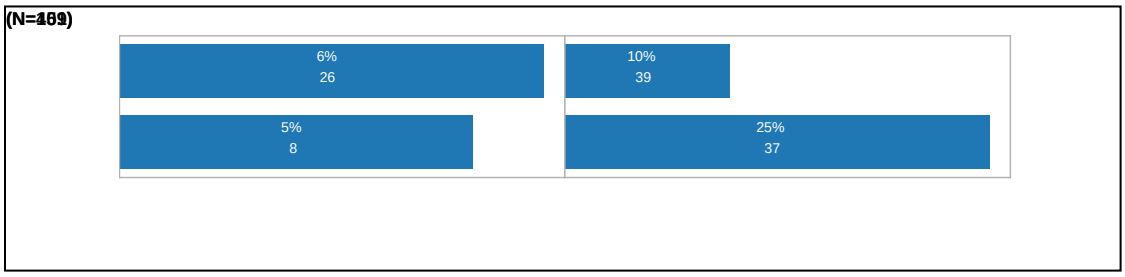
Figure 15: Number of Influenza Admissions by Island Health Acute Care Facility



Influenza A (H3N2) was the predominant virus circulating in the community and has most severely affected the elderly. The median age of hospitalized patients with laboratory confirmed influenza was 80 years, compared to 53 years in 2013-14 when the predominant virus was H1N1. Last year, influenza was more likely to impact relatively young individuals and cause serious complications that required admission to ICU. During the 2013-14 influenza season 25% (37/151) of all hospitalized influenza patients were admitted to ICU at some point during their say, compared to 10% (39/409) in 2014-15.

The vast majority of individuals hospitalized with influenza do recover. This year, 26 of the 409 (6%) hospitalized influenza patients died while they were admitted patients (Figure 16). A similar mortality rate (5%) was reported in 2013-14 when 8 of the 151 patients died (5%). It is important to point out that this represents all-cause mortality and the death may not be directly attributable to influenza.

Figure 16: Deaths and ICU Admissions for Patient Admitted with Influenza



What's Next

IPAC will:

- participate and support Access and Transitions in the development of a Seasonal Capacity Plan.
- continue collaborating with Public Health, OH&S and BCCDC.
- continue to be an active member of the Influenza Steering Committee.
- update the outbreak algorithms for ILI and confirmed influenza for acute and residential/congregate living facilities.
- reassess and update the Seasonal Influenza Point of Care Risk Assessment algorithm for patients with Acute Respiratory Illness or Distress.
- continue to support Senior Executive with real-time influenza reporting.

Surgical Site Infections

Despite advances in operative techniques and use of prophylactic antibiotics, SSIs continue to be a major source of morbidity for patients who undergo operative procedures. Patients who develop an SSI have a 60% chance of admission to ICU, are five times more likely to be readmitted to hospital, and twice as likely to die.[xi] As a consequence of the significant morbidity, mortality, and cost of SSIs, prevention is part of major quality improvement initiatives. Moreover, studies have shown that reporting information about SSIs resulting from clean procedures back to surgeons is an effective way to reduce the incidence of new infections.[xii]

Methodology & Definitions

SSI is defined as the development of an infection – often noted by the presence of purulent drainage - at the site of surgery within a specified period of time following the procedure. The follow-up period varies according to the operative procedure; within 30 days for most surgeries, but up to 90 days if the procedure included an implant (e.g. coronary artery bypass grafts, joint replacement or pacemakers). Island Health carries out SSI surveillance on targeted cardiac and orthopaedic procedures with a 90 day follow-up period. Surveillance is performed using standard definitions for the identification and classification of SSIs published by the National Healthcare Safety Network (CDC/NHSN 2015). [xiii] See Appendix H for more information regarding methodology and case definitions.

Prior to 2012, surgeries under surveillance at Island Health were followed for one year after the procedure to determine whether an infection occurred. Changing the postsurgical follow-up period to three months facilitated timelier reporting of SSIs to stakeholders and put Island Health in line with changes made at Vancouver Coastal Health.[xiv] A review of all SSIs reported between fiscal years 2009 and 2011 revealed that 56% were identified within one month of surgery and 87% were identified within three months. Due to the 90 day follow-up period following the procedure date, the information presented in this report for fiscal year 2014-15 presents SSI rates recorded for procedures carried out between April 1 and December 31, 2014. For example, if a patient undergoes one of the surgeries under surveillance on December 31, 2014, they will be followed until March 31, 2015 to determine whether a SSI occurred.

Ascertainment of an SSI is limited to patients who are diagnosed during their hospital stay when the procedure was conducted or had a reencounter with an Island Health acute care facility following their discharge. Patients with less serious SSI treated in physician offices are not captured in the surveillance system. Nor are patients who travel to an Island Health facility for surgery from a community outside of Island Health's boundaries and subsequently treated for a SSI in their home community included.

Annual Targets and Benchmarks

CNISP publishes hip and knee arthroplasty SSI rates for participating Canadian hospitals. The most recent published information includes rates for procedures conducted during 2011 when seven hospitals reported a rate of 2.5 per 100 procedures.[10] The National Health Services Network (NHSN) in the United States publishes SSI rates for selected cardiac surgeries. Rates are currently available for procedures conducted during 2009. The NHSN (2009) benchmark for SSIs related to coronary artery bypass graft was 2.8 per 100 procedures and the benchmark for pacemakers was 0.4 per 100 procedures. Island Health's goal is to keep SSI rates below these benchmarks.

Total Joint Replacement Surgeries			
Status 	**Improvement** Lower rates indicate improvement	**Target** 2.5 per 100 procedures	**Actual** (2014-15) 1.2 per 100 procedures
Coronary Artery Bypass Graft Surgeries			
Status 	**Improvement** Lower rates indicate improvement	**Target** 2.8 per 100 procedures	**Actual** (2014-15) 5.0 per 100 procedures
Pacemaker Surgeries			
Status 	**Improvement** Lower rates indicate improvement	**Target** 0.4 per 100 procedures	**Actual** (2014-15) 1.2 per 100 procedures

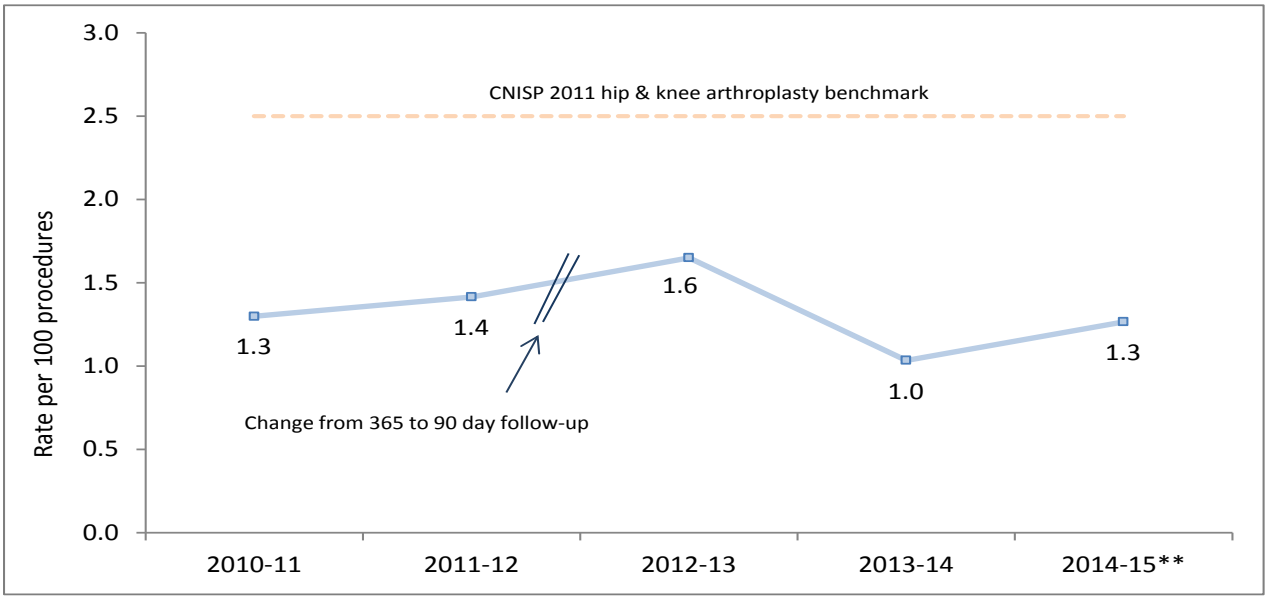
[10] The follow-up period for hospitals participating in the CNISP hip and knee arthroplasty SSI surveillance is one year.

Results

Orthopedic Procedures

Figure 17 provides the SSI rates following joint replacement surgeries between 2010-10 and the first three quarters of 2014-15. Rates were steady at around 1.5 per 100 procedures between fiscal years 2010-11 and 2012-13, dropped slightly to 1.0 in 2013-14 and increased again to 1.3 per 100 procedures in 2014-15. The overall Island Health rate was lower than the 2011 CNISP benchmark rate of 2.5.

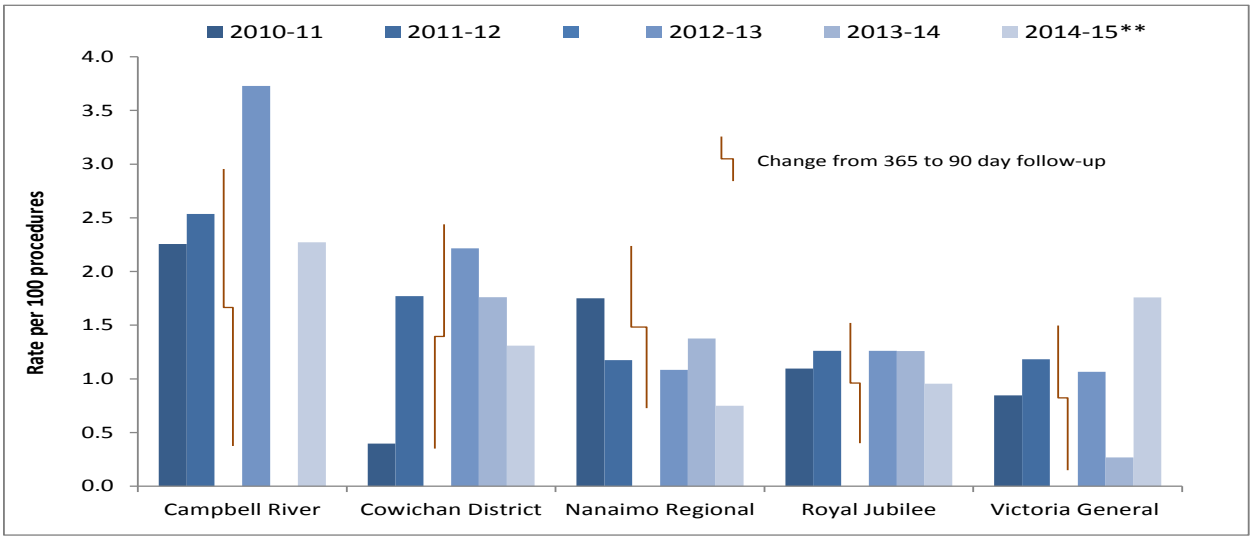
Figure 17: Surgical Site Infection Rates Following Total Arthroplasty Island Health*



* Total arthroplasty = Total Hip, Knee and Shoulder Surgeries
** April 1 – December 31, 2014

Total joint replacement surgeries are performed at five Island Health acute care facilities. While SSI rates following these procedures did vary somewhat between facilities, the differences were not significant. During 2014-15, rates were highest at CRH and VGH (2.3 and 1.8 per 100 respectively) (Figure 18). Comparing crude SSI rates between hospitals is not recommended without adjusting for patient risk factors associated with the incidence of SSIs. (Appendix G – Table 4 for rates and 95% confidence intervals)

Figure 18: Infection Rates Following Total Arthroplasty Surgery by Island Health Acute Care Facility*



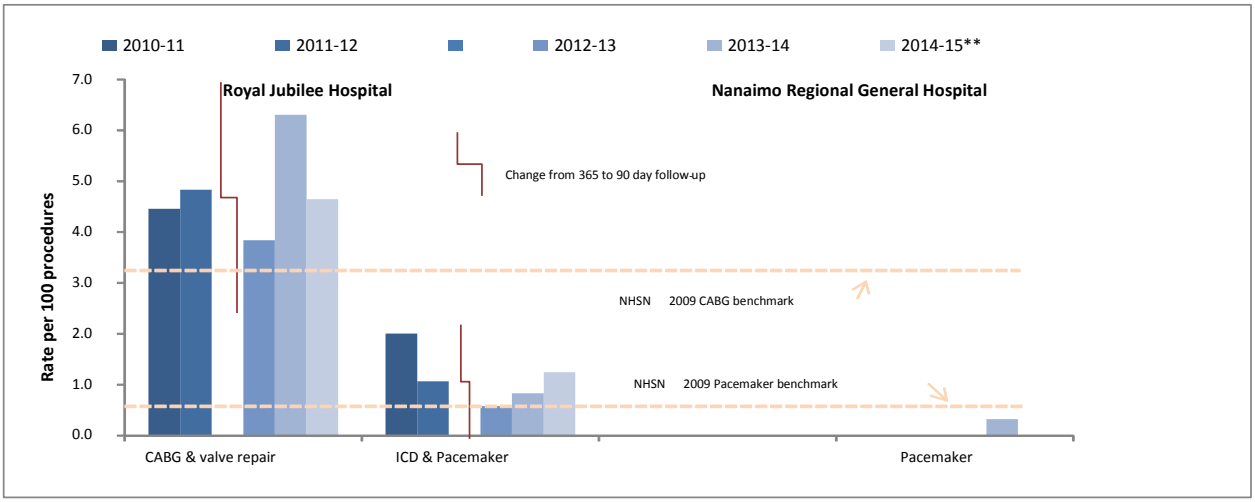
* Total arthroplasty = Total Hip, Knee and Shoulder Surgeries
** April 1 – December 31, 2014

Cardiac Procedures

CABGs are the most common type of cardiac surgery for adults. During this procedure, a healthy artery or vein from the body is connected, or grafted, to a blocked coronary artery. CABGs and surgeries to repair the heart's valves or septum are performed at the RJH. Procedures to insert manipulate or replace pacemakers or implantable cardioverter-defibrillators are performed at RJH and NRGH.

Figure 19 shows the SSI rate following a CABG and/or valve repair surgery performed at RJH decreased from 6.3 to 4.6 per 100 procedures between 2013-14 and 2014-15. The decrease was not statistically significant (Appendix G – Table 5). The infection rate following a procedure related to a pacemaker or implantable cardiac defibrillator has fluctuated between 0.6 and 1.2 per 100 procedures over the past three fiscal years. Surveillance of infections following pacemaker implants at NRGH was also carried out. Over the past five fiscal years, one case was reported.

Figure 19: Infection Rates Following Cardiac Surgery, Royal Jubilee Hospital and Nanaimo Regional General Hospital



** April 1 – December 31, 2014

Actions Taken

SSI rates are monitored and reported back to the organization on a regular basis to ensure actions can be taken if a cluster or increase incidence occurs. The IPAC SSI surveillance program was reviewed and revised to improve case ascertainment, data collection and data quality.

IPAC has worked closely with the Heart Health program in many areas of quality and patient safety including SSI surveillance, environmental audits, reprocessing audits, best practice guidelines for the Heart Catheter Lab for intra cardiac device implants. When an increase in SSI rates for cardiac surgery performed at RJH was noted in the fall of 2014, IPAC collaborated with the Heart Health Program to review the cases and identify possible risk factors.

What's Next

IPAC will:

- conduct environmental and routine practice audits for the OR and post-surgical units and provide best practice recommendations.
- review of pre-operative skin preparations and provide best practice recommendations.
- review wound care protocol.
- implement APIC Guide for the Prevention of Mediastinitis Surgical Site Infections Following Cardiac Surgery.
- implement enhanced surveillance and new data collection tool for SSI to provide more timely data and to improve quality and case finding sensitivity.

OUTBREAK MANAGEMENT

This section provides information about outbreaks declared at Island Health acute, residential care and affiliated residential care facilities. When comparing outbreaks from year to year, it is important to keep in mind that the number and type of outbreaks in healthcare facilities are influenced by changing prevalence of enteric and respiratory pathogens in the community. Norovirus is the most prominent cause of healthcare associated diarrhea not associated with antibiotics and the predominant cause of infectious gastroenteritis outbreaks. Influenza is the predominant cause of outbreaks due to acute respiratory viral infections. Outbreaks caused by respiratory viral pathogens do follow a marked seasonal pattern. Over the previous five fiscal years, 80% of all respiratory outbreaks occurred between December and March. A similar but less pronounced seasonal clustering occurred for enteric outbreaks; 65% occurred during these four months.

Figure 20 provides information about the number and type of outbreaks declared in each of the past five fiscal years. During 2014-15, a total of 72 outbreaks were declared (seven in Island Health acute care, 20 in Island Health residential care and 45 in affiliated residential care facilities). This represents an increase from the previous year when 50 outbreaks were declared. A sharp increase in the number of influenza outbreaks occurred in 2014-15, caused in large part by a vaccine mismatch for the circulating dominant strain of influenza. This is a dramatic change from the previous year when 90% of all outbreaks were caused by gastroenteritis.

Twenty influenza and influenza-like-illness outbreaks were declared in Island Health owned and operated residential and acute care facilities between September 2014 and March 2015, compared to one outbreak during the same period the previous year. Meanwhile, 29 influenza and influenza-like-illness outbreaks were declared in affiliated residential care facilities in 2014-15 compared to four in 2013-14. Efforts to manage and contain the outbreaks in residential care were successful and this minimized transfers to acute care facilities. Approximately 9% of influenza related admissions to acute care facilities were transferred from a residential care facility, the vast majority (91%) were admitted from the community.

Figure 20: Outbreaks at Island Health Acute, Residential Care and Affiliated Facilities

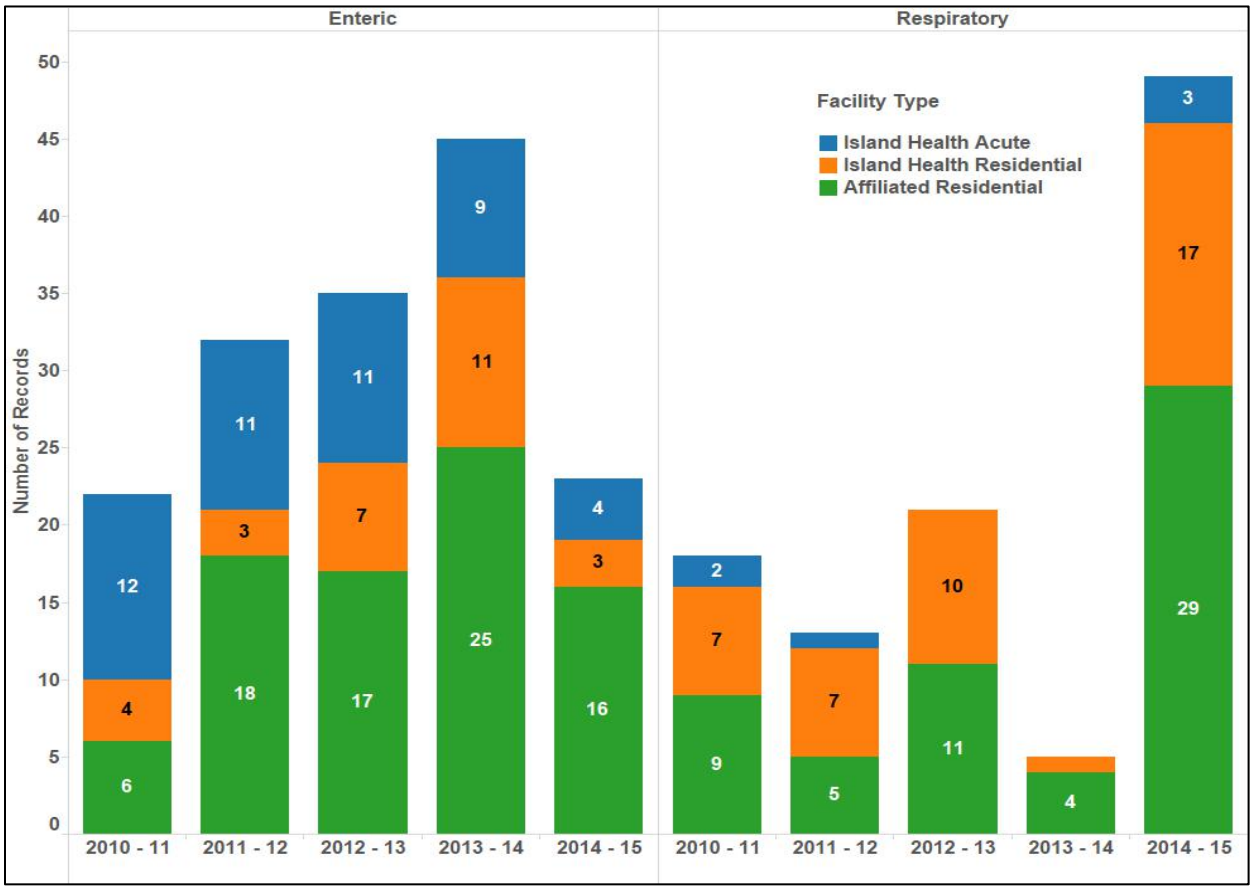
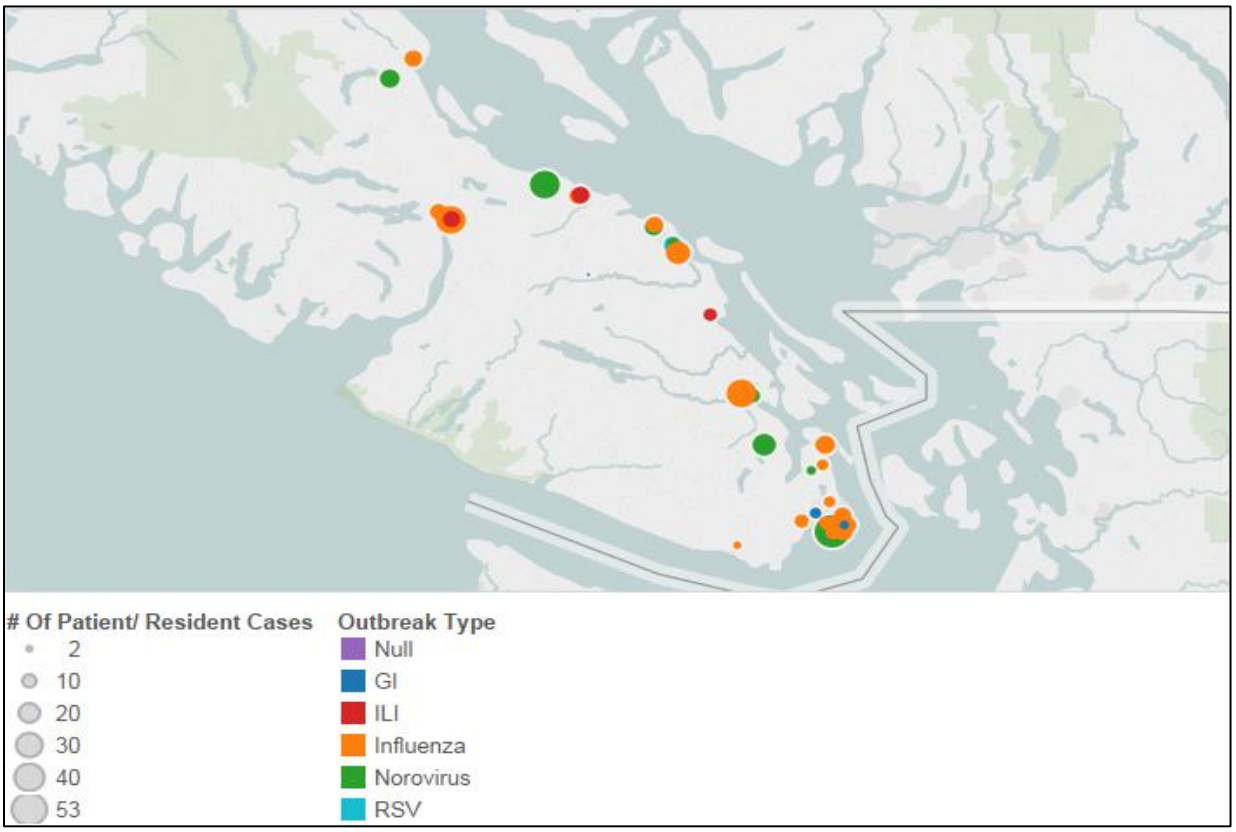


Figure 21 shows most of the 72 outbreaks (63%) were declared in facilities located in the more populous southern section of Vancouver Island (Macro Geography 3 and 4). Meanwhile, 29% occurred in facilities in the central section of the Island (Macro Geography 2) and the remaining 8% in the less populated north (Macro Geography 1).

Figure 21: Outbreaks at Island Health and Affiliated Facilities Fiscal Year 2014-15



While the endemic level of viruses in the community may increase the risk of outbreaks in healthcare facilities, the presence of effective infection control measures to rapidly detect transmission and initiate appropriate interventions can reduce the severity of an outbreak, both in terms of the number of people affected and duration.

Figure 22 provides the average duration and average number of patients affected by type of outbreak for Island Health acute care sites along with Island Health and affiliated residential care facilities. The average duration of outbreaks in all facilities was 12.5 days in 2014-15. This was similar to the average duration in the preceding four years when outbreaks lasted on average between 11.5 and 13.1 days. On average 16.1 patients/residents were affected by each outbreak in 2014-15. However, the number of patients/residents affected varied substantially between outbreaks from a low of four to a high of 53 patients.

The average duration of outbreaks in Island Health acute care facilities was 9.0 days in 2014-15, down from 9.7 during the previous fiscal year. The average duration of outbreaks also declined between 2013-14 and 2014-15 at affiliated residential care sites from 15.3 to 12.2 days. However, the average duration did increase at Island Health residential care facilities from 10.5 days in 2013-14 to 14.3 days in 2014-15.

Figure 22: Characteristics of Outbreaks at Island Health and Affiliated Facilities

	Island Health										Affiliated				
	Acute Care					Residential Care					Residential Care				
	2010-11	2011-12	2012-13	2013-14	2014-15	2010-11	2011-12	2012-13	2013-14	2014-15	2010-11	2011-12	2012-13	2013-14	2014-15
All Outbreaks															
average duration (days)	11.6	9.5	10.1	9.7	9.0	14.5	10.7	12.4	10.5	14.3	12.5	15.4	11.5	15.3	12.2
average # of patients	9.3	8.5	7.2	8.8	6.6	25.2	15.0	10.8	14.8	14.1	27.7	22.5	14.6	28.2	12.5
Enteric															
average duration (days)	11.7	9.0	10.1	9.7	7.3	18.0	8.7	15.0	11.9	16.0	18.8	15.6	12.1	14.8	10.9
average # of patients	10.3	7.8	7.2	8.8	5.8	31.8	18.7	13.3	16.5	22.3	52.0	23.7	16.9	28.9	14.3
Respiratory															
average duration (days)	11.0	15.0	-	-	11.3	12.4	11.6	10.5	5.0*	13.9	8.2	14.8	10.7	18.3	12.9
average # of patients	3.5	16.0	-	-	7.7	21.4	13.4	9.1	6.0	12.6	11.4	16.8	11.0	23.5	11.7

*Please note the reported duration for one respiratory outbreak in Island Health residential care facilities in 2013-14 was revised after the 2013-14 annual report was published. As a result, the average duration reported in this report (5.0 days) differs from the estimate of 2.0 published in the 2013-14 annual report.

Actions Taken

To facilitate early detection and intervention, IPAC emphasizes the application of a risk-based approach to monitor symptoms, rather than the diagnosis of specific organisms. When an outbreak is declared, the Outbreak Management Structure toolkit is implemented to help manage the situation and facilitate the immediate and concurrent involvement of all relevant departments. The toolkit ensures that issues are identified, actions assigned and interventions implemented in an expedient manner.

For affiliated sites, outbreak management rests with Island Health's Public Health Communicable Disease Program. A collaborative committee comprised of IPAC and public health officials has been established to develop common surveillance protocols and communication procedures.

Moving Forward

Enhance Data Quality for IPAC Reporting

It is important for the IPAC program to monitor data quality and thus ensure that the collected data is meaningful to meet the objectives of local, provincial and national surveillance systems. The planned initiatives include:

- Produce data quality reports on IPAC surveillance data for the purpose of identifying potential data quality problems so that efforts can be made to improve data quality at the contributor and local level.
- Improve awareness of importance of data quality within the IPAC program via ongoing data quality auditing and education.
- In collaboration with executive leaders IPAC will investigate new ways of presenting data to help with quality and safety initiatives across Island Health. The use of new interactive mapping with GIS will also be investigated.
- The IPAC program will aim to accustom stakeholders to incrementally embed data and insights into everyday decision making. Our approach is to engage managers to be a part of a quality and safety improvement process that gives them simple ways to use relevant data versus "one-size fits all" to build knowledge and awareness among staff and stakeholders through a data to action plan.

Evaluation of New Technology and Products for Environmental Cleaning and Disinfection

- IPAC in collaboration with support services will evaluate alternative technologies such as UV disinfection to decrease organism bio burden within facilities.
- The increased use of technology and portable medical devices presents an increased risk for the transmission of microorganisms in clinical settings. IPAC continues to collaborate with Information Management & Information Technology (IMIT) to develop policy, procedures and guidelines for cleaning of medical devices and equipment within clinical settings.

Cerner IHealth Infection Control Lighthouse Module

The Lighthouse module will enable more robust data collection and timely interventions for patients requiring precautions. The ICPs will also be able to chart electronically for better communication with the units. IPAC will collaborate in the implementation of the updated version of Cerner's Infection Control solution. The solution will include enhanced surveillance capabilities to identify patients at risk for healthcare associated infections in a timely manner. The solution provides infection control practitioners with an active work list of patients at risk for a healthcare associated and antimicrobial resistant infections, and clinical dashboard with a comprehensive view of patient specific clinical data to minimize patient risk of such infections.

- Work with Cerner team to implement the Infection Control solution.

- Implement a change management strategy to facilitate adoption of the new solution by ICPs.
- Develop strategy and collect baseline data to evaluate the impact/benefits of the Cerner Infection Control solution.

Clinical Governance Structure

- ICPs and IPAC consultants will play a significant role in the new governance structure by local ICPs participating in local quality councils or as quality and safety representatives on program quality councils across Island health.
- The IPAC on-line Reference Guide will be updated to include the new standard suite of templates for document controlled policies and procedures.

APPENDIX A – DONNING (PUTTING ON) OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

PUTTING ON

Personal Protective Equipment (PPE) when Caring for a Patient with Suspected, Probable or Confirmed Ebola Virus Disease

island health

1 Prepare to Put on PPE

- Trained observer is present to observe that all steps are completed correctly
- Remove all jewelry, including ID Tags, pagers, etc.
- Put on hospital scrubs (disposable if possible)
- Tie back hair, if long
- Perform hand hygiene with ABHR or soap and water

2 Put on Foot/Leg Coverings (Booties)

- Put on leg coverings (booties)
- Perform hand hygiene with ABHR or soap and water

3 Put on Hat

- Put on hat, ensuring ears and hair are fully covered

4 Put on Mask

OR

Fluid-Resistant Mask

- Put fluid-resistant mask over nose, mouth and chin to fit snugly
- Place elastic loops behind ears
- Adjust flexible nose piece to fit securely

N95 Mask

- N95 mask to be used for aerosol-generating procedures
- Put respirator over nose, mouth and chin
- Secure on head with top elastic, followed by bottom elastic
- Perform a seal check to ensure that respirator collapses on inhale and does not leak on exhale

5 Put on Hood

- Take ends of opposite ties and cross over to cover the front of your neck
- Tie at the back of the neck over the hood
- Trained observer to ensure front and back of neck are fully covered

6 Put on Inner Gloves

- Put on nitrile extended-cuff gloves, making sure they are not too tight

7 Put on Gown

- Put on fluid-impermeable gown
- Secure ties/Velcro™ at the neck and waist
- Trained observer to ensure back is fully covered

8 Put on Face Shield

- Put on the face shield to protect eyes, nose and mouth

9 Put on Outer Gloves

- Put on nitrile extended-cuff gloves
- Pull over the cuff of the gown

10 Complete Sign-in/Sign-out Sheet

- Trained observer completes the *Extraordinary Precautions Sign-in/Sign-out Sheet* to confirm that all steps were completed correctly

APPENDIX B – DOFFING (TAKING OFF) OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

TAKING OFF

island health

Personal Protective Equipment (PPE) when Caring for a Patient with Suspected, Probable or Confirmed Ebola Virus Disease

1 Before Exiting the Patient Room

- Decontaminate outer gloves using PerCept™ wipes
- Dispose of PerCept™ wipes inside the patient room into Biohazardous waste
- Use new PerCept™ wipe to open door from patient room to anteroom
- Enter the anteroom, discard PerCept™ wipe into Biohazardous waste

2 Remove Foot/Leg Coverings (Booties) You may need to be seated to do this

- With your gloves still on, grasp each side of bootie and gently pull down to just below the bottom of the gown
- Roll down bootie inside out, to create large cuff of boot
- Repeat, rolling down to ankle
- Lift heel to clear bootie from underneath
- Lift toes to gently pull bootie away from foot
- Discard bootie in Biohazardous waste
- Repeat steps to remove second bootie
- Decontaminate outer gloves using PerCept™ wipes
- Discard PerCept™ wipe in Biohazardous waste

3 Remove Outer Gloves

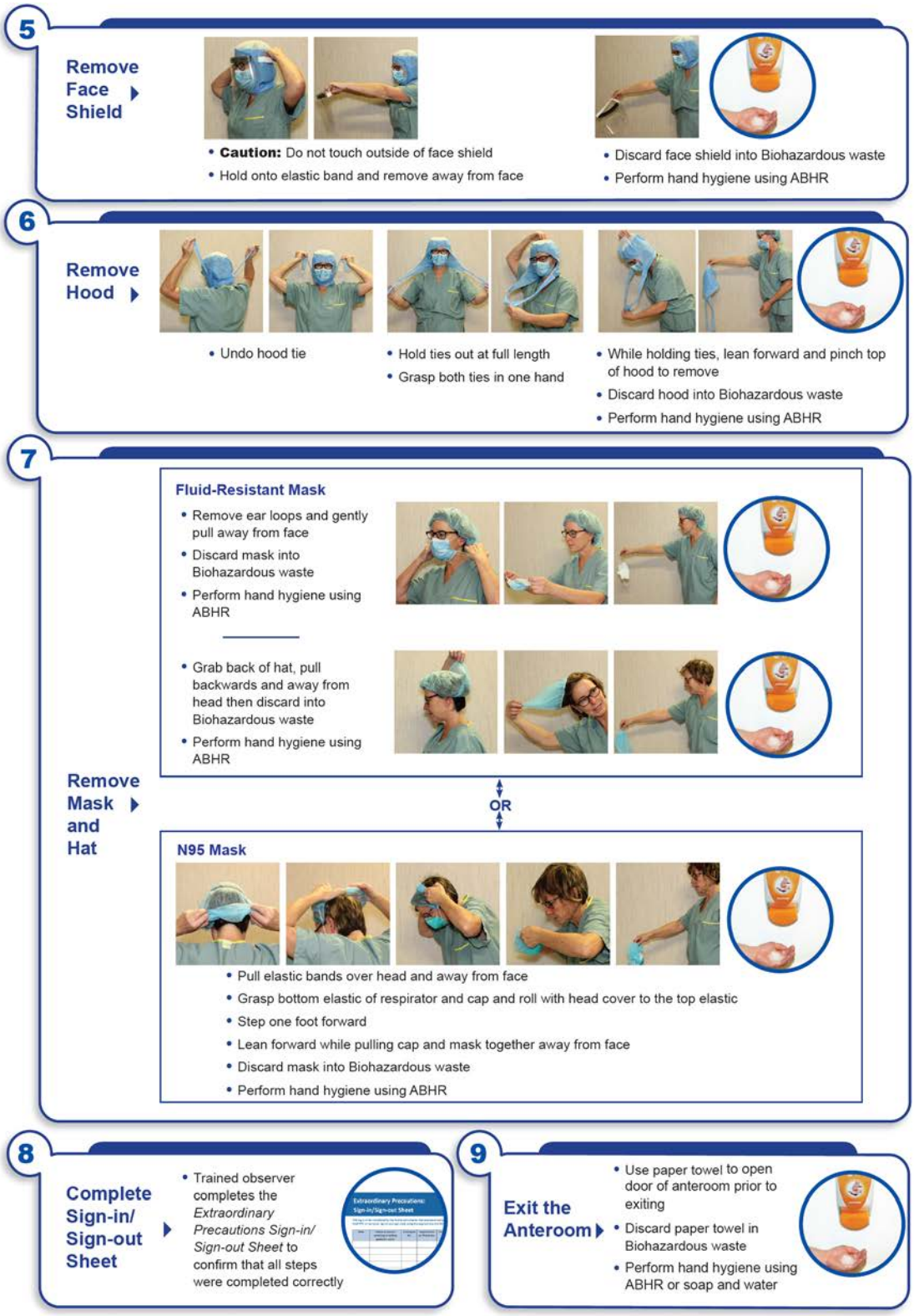
- Remove outer glove of the first hand by pinching glove just above palm area
- Peel glove away from hand and turn the glove inside-out
- Keep removed glove in the opposite hand
- Do not discard glove yet
- Remove outer glove of second hand by inserting index finger under top of glove
- Pull outer glove away and slowly peel it down, over top of the already removed glove
- Discard both gloves into Biohazardous waste
- Decontaminate inner gloves using PerCept™ wipes
- Discard PerCept™ wipes in Biohazardous waste

4 Remove Gown and Inner Gloves

- Pinch gown at shoulders and gently pull away from the body to loosen back Velcro™ closure or unfasten ties
- Untie side tie of gown
- Slowly pull gown away from neck and shoulders, touching only the outside of the gown
- With one hand grasp cuff and glove of opposite hand and pull hand into sleeve
- With the hand inside the sleeve, grasp glove and cuff of other sleeve and pull hand inside so both hands are now tucked inside their sleeves
- Lean forward rolling the gown off the arms, turning it inside out, as the gown is now contaminated
- The inner gloves are tucked into the gown as you remove it
- Gently roll gown into a loose bundle and discard into Biohazardous waste
- Perform hand hygiene using ABHR

Proceed to Step 5...

APPENDIX B (CONTINUED)



APPENDIX C: ARO SCREENING QUESTIONNAIRE FOR ACUTE CARE

Antibiotic Resistant Organisms (ARO)
Screening Questionnaire for
Acute Care Admission

Addressograph

Existing ARO Alerts

Does the patient have an existing MRSA disease alert? If YES place on Contact Precautions AND Initiate Infection Precaution Order (Isolation)	◯ Yes	◯ No	
Does the patient have an existing CPO (Carbapenemase) disease alert? If YES, must have a private room and be placed on Contact Precautions AND Initiate Infection Precaution Order (Isolation)	◯ Yes	◯ No	
Does the patient have an existing ARO disease alert and a new/worsening cough? If YES, place on Droplet Precautions AND Initiate Infection Precaution Order (Isolation)	◯ Yes	◯ No	◯ Unknown

ARO Screening Questions

MRSA

If YES to any of the questions below – collect lab samples for MRSA (see specimen collection for MRSA below)

In the past 12 months, has the patient been an inpatient in ANY hospital for greater than 48 hours? Includes inter-hospital transfers	◯ Yes	◯ No	◯ Unknown
Is the patient currently residing in a residential care facility?	◯ Yes	◯ No	◯ Unknown
In the past 12 months has the patient received dialysis or chemotherapy?	◯ Yes	◯ No	◯ Unknown
In the past 12 months has the patient or a member of their household had an abscess or boil?	◯ Yes	◯ No	◯ Unknown
In the past 12 months has the patient or a member of their household been advised that they have a bacteria resistant to antibiotics, such as MRSA?	◯ Yes	◯ No	◯ Unknown
In the past 12 months has the patient used street drugs other than marijuana?	◯ Yes	◯ No	◯ Unknown
In the past 12 months has the patient spent time in a correctional facility?	◯ Yes	◯ No	◯ Unknown
In the past 12 months has the patient lived on the street or in a shelter?	◯ Yes	◯ No	◯ Unknown

APPENDIX C (CONTINUED)

Carbapenemase (CPO)

If YES to any of the questions below – collect lab samples for CPO (see specimen collection for CPO below)
AND
Place patient on Precautions and Initiate Infection Precaution Order (Isolation)

In the past 12 months, has the patient had an overnight stay in a hospital off Vancouver Island/Gulf Islands?	◯ Yes	◯ No	◯ Unknown
In the past 12 months, has the patient received haemodialysis in a facility off Vancouver Island/Gulf Islands?	◯ Yes	◯ No	◯ Unknown
In the past 12 months, has the patient had a surgical or medical procedure outside of Vancouver Island/Gulf Islands?	◯ Yes	◯ No	◯ Unknown

If you answered "Unknown" to any of the above questions, state the reason and modify when known

◯ Unconscious ◯ Unknown household history ◯ Other
◯ Cognitively impaired ◯ Refused/uncooperative

Signature:_____ ***Unit:***_____ ***Date:***_____ ***Time:***_____

Lab Sample Collection

If YES to any of the above questions, collect appropriate lab specimens

MRSA

- Select routine culturette swab
- Collect separate swabs for each site

☐ Nares
☐ Groin
☐ Open Wound(s)

NARES: Use a firm circular/twisting motion
Swab just inside rim of nose
Use one swab for both sides

GROIN: Swab the crease at the junction of the torso with the legs on either side of the pubic area

OPEN WOUND(S): If evidence of infection, in addition to surveillance swabs, appropriate clinical samples should be obtained

CPO

- Select routine culturette swab
- Collect rectal swab
- Collect samples from other sites if applicable
- Request CPO testing on Requisition
- Initiate contact precautions
- Initiate droplet precautions if new/worsening cough
- Priority for private room until results obtained

☐ Rectal swab
☐ Urine (if indwelling catheter)
☐ Sputum (if coughing)
☐ Ostomy/Colostomy
☐ Open wound(s)

RECTAL SWAB: Ensure stained with feces

URINE: C&S Container

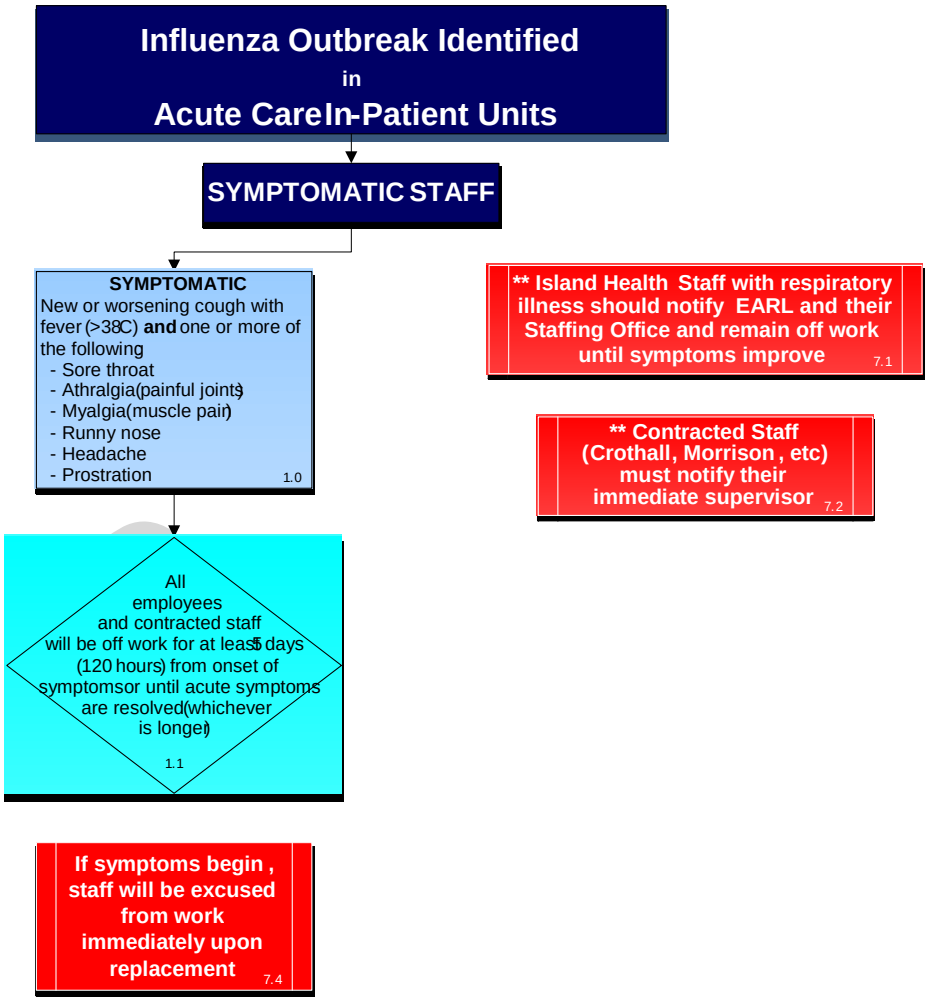
SPUTUM: C&S Container

OSTOMY/COLOSTOMY: Ensure stained with feces

OPEN WOUND(S): If evidence of infection, in addition to surveillance swabs, appropriate clinical samples should be obtained

Signature:_____ ***Unit:***_____ ***Date:***_____ ***Time:***_____

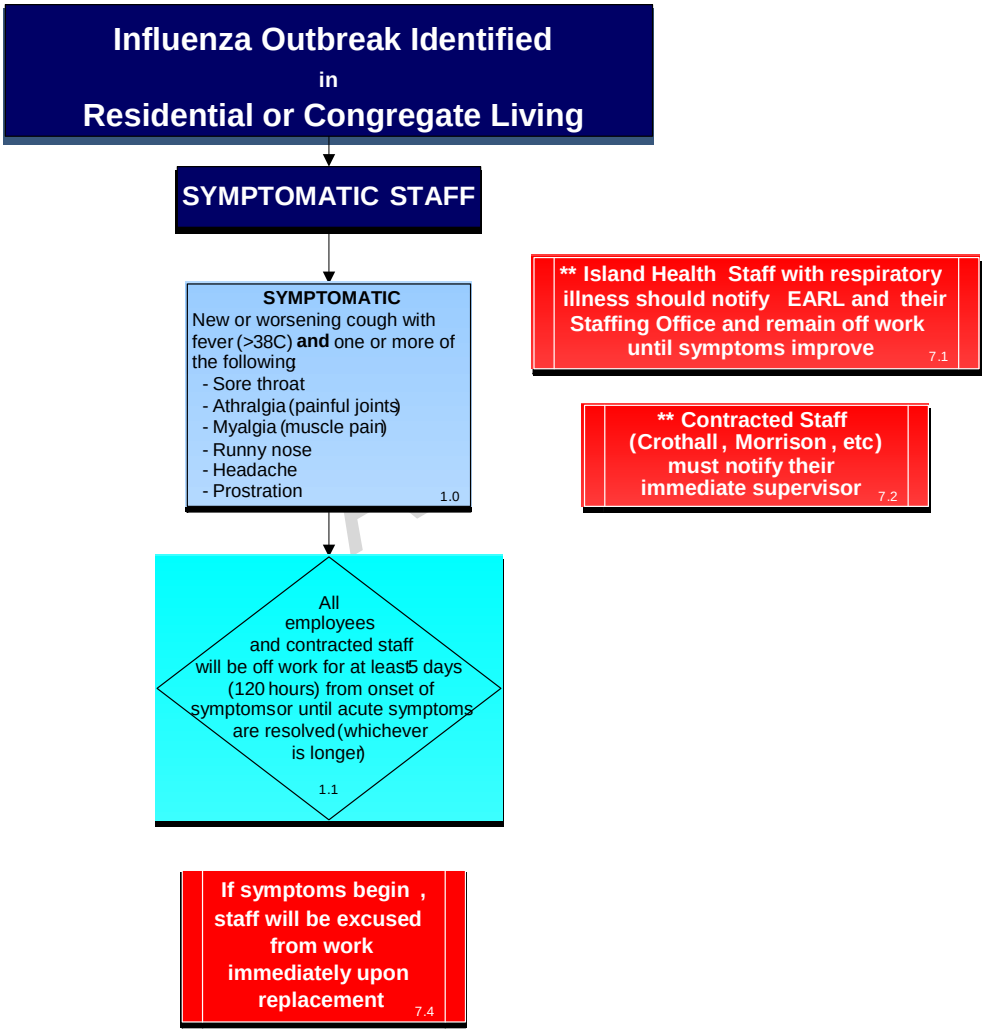
APPENDIX D: ALGORITHM FOR INFLUENZA OUTBREAK IN ACUTE CARE PATIENT UNITS



For those staff members whose job takes them occasionally to multiple areas (physiotherapy, occupational therapy, laboratory, FMO, etc), you should start your rounds in a non-outbreak area whenever possible and be vigilant in monitoring for symptoms. **The outbreak area should be your last stop**

***PLEASE NOTE**: an Influenza outbreak identified in any acute facility will **only** be declared over by an IP AC staff member*

APPENDIX E: ALGORITHM FOR INFLUENZA OUTBREAK IN RESIDENTIAL CARE PATIENT UNITS



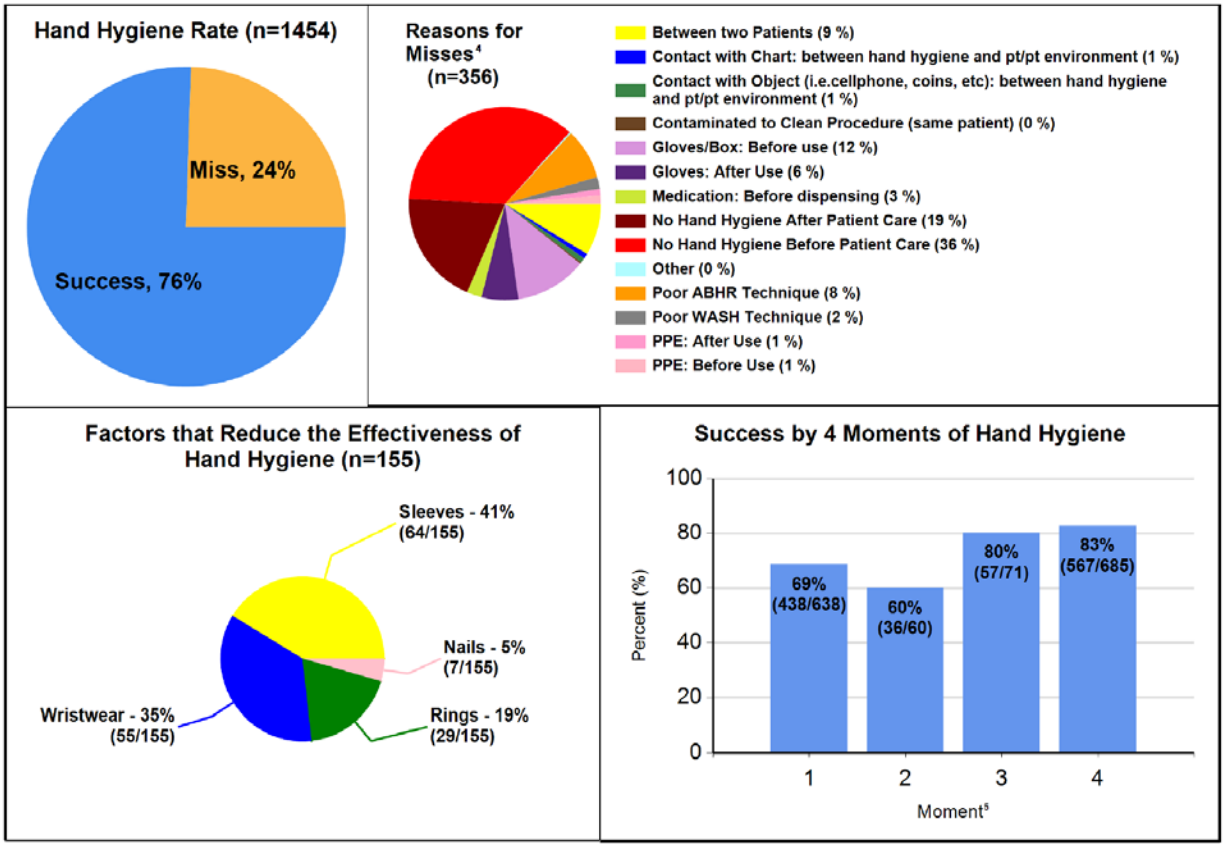
For those staff members whose job takes them occasionally to multiple areas (physiotherapy, occupational therapy, laboratory, FMO, etc), you should start your rounds in a non-outbreak area whenever possible and be vigilant in monitoring for symptoms. **The outbreak area should be your last stop**

PLEASE NOTE *: an Influenza outbreak identified in any acute facility will* ***only*** *be declared over by an IP AC staff member / CD Nurse in conjunction with the MHO*

APPENDIX F: SAMPLE CREDE QUALITY IMPROVEMENT REPORT FOR HAND HYGIENE

Hand Hygiene
Quality Improvement Report

Site[1]: Royal Jubilee Hospital
Unit[2]: All
Health Care Provider Group: Clinical Support Services, Diagnostic Services, Nurse, Other, Physician, Support Services
Health Care Provider[3]: All
Reporting Period: 1/1/2015 - 3/31/2015



[3] Health Care Provider:
Nurse, Physician, Physiotherapist, Occupational Therapist, Housekeeping, Lab, Respiratory Therapist, Speech Therapist, Porter, Dietician, ECG, Medical Imaging, Pharmacist, Psychologist, Social Worker, Volunteer, Paramedic, Security, Food Services, Other, Renal Technician, Cardiovascular Technologist, Cardiac Sonographer

[5] Moment:
1 - Before Pt/Environment Contact
2 - Before Aseptic Procedure
3 - After Blood/Body Fluid Exposure
4 - After Pt/Environment Contact

APPENDIX F (CONTINUED)

island health

Hand Hygiene
Quality Improvement Report

Reasons for Misses	Definition
Between two patients	Missed hand hygiene when leaving one patient's environment and entering another patient's environment
Contact with Chart: between hand hygiene and pt/pt environment	Missed hand hygiene before/after contact with a chart
Contaminated to Clean Procedure (same patient)	Moving from a "dirty" procedure to a "clean" procedure on the same patient without performing hand hygiene
Gloves/Box: Before Use	Not performing hand hygiene before removing gloves from a glove box and/or putting on gloves
Gloves: After Use	Not performing hand hygiene after removing gloves
Medication: Before Dispensing	Missed hand hygiene before providing medication to a patient
No Hand Hygiene	No hand hygiene was performed
Other	A special case in which none of the other reasons for misses is applicable but it is more complex than a simple miss
Poor ABHR Technique	Hand hygiene was performed with ABHR but with poor technique
Poor WASH Technique	Hand hygiene was performed with soap and water but with poor technique
PPE: After Use	Missed hand hygiene after use of PPE
PPE: Before Use	Missed hand hygiene before the use of PPE

[1] Site(s): Royal Jubilee Hospital

[2] Unit(s): 1NW, 1SW, 2NE, 2NW, 2SE, 2SW, 3NE, 3NW, 3SE, 3SW, 4NE, 4NW, 4SE, 4SW, 6NE, 6NW, 6SE, 6SW, 7NE, 7NW, 7SE, 7SW, 8NE, 8NW, 8SE, 8SW, Ambulatory Dialysis Service (RJH), Cardiac Rehab Program (RJH), Cath & EP Lab, CCU (RJH), CSS (RJH), CVU (RJH), Echo Lab, EDS (RJH), ER (RJH), ER-B (RJH), ER-C (RJH), ICU (RJH), Lab Outpatient (RJH), Medical Imaging (RJH), Ophthalmology Medical Clinic (RJH), Ophthalmology Surgical Clinic, Pacemaker Clinic (RJH), Pain Clinic (RJH), PARR (RJH), RP-3, SDC (RJH), Surgical Suture Clinic

APPENDIX G - TABLES

Table 1: Hand Hygiene Rates, British Columbia & Island Health by Acute Care Facilities & Healthcare Providers

	..... 2011-12		..... 2012-13		..... 2013-14*		..... 2014-15*	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
British Columbia	70%	(69 - 70)	73%	(73 - 73)	77%	(77 - 77)	83%	(83 - 83)
Island Health	82%	(81 - 82)	83%	(82 - 83)	72%	(71 - 72)	82%	(81 - 82)
Island Health acute care facilities								
Campbell River	88%	(87 - 89)	85%	(84 - 86)	95%	(93 - 96)	88%	(86 - 90)
Cowichan District	84%	(81 - 88)	87%	(84 - 89)	93%	(92 - 94)	84%	(82 - 86)
Nanaimo Regional*	79%	(77 - 81)	85%	(83 - 86)	70%	(69 - 71)	79%	(78 - 80)
Royal Jubilee*	81%	(79 - 84)	79%	(77 - 81)	68%	(67 - 69)	84%	(83 - 85)
Saanich Peninsula*	87%	(85 - 89)	93%	(90 - 95)	71%	(68 - 73)	82%	(80 - 84)
St. Joseph's General	71%	(69 - 74)	62%	(60 - 63)	81%	(77 - 85)	88%	(85 - 91)
Victoria General*	81%	(79 - 82)	84%	(83 - 85)	73%	(72 - 74)	80%	(78 - 80)
West Coast General*	81%	(79 - 83)	72%	(70 - 73)	64%	(62 - 66)	79%	(77 - 82)
Small rural hospitals**	85%	(84 - 86)	87%	(86 - 88)	86%	(83 - 88)	80%	(76 - 84)
Health Care Providers								
Clinical/diagnostic serv	81%	(80 - 82)	81%	(80 - 82)	72%	(71 - 73)	84%	(82 - 85)
Nursing staff	85%	(85 - 86)	86%	(86 - 87)	74%	(74 - 75)	82%	(82 - 83)
Physicians	63%	(62 - 65)	64%	(62 - 66)	55%	(53 - 57)	70%	(67 - 72)
Support services/other	70%	(68 - 72)	71%	(69 - 73)	64%	(62 - 66)	80%	(79 - 82)

*Dedicated observers began auditing in 2013-14

**Includes Cormorant Island, Lady Minto, Port Hardy, Port McNeill and Tofino hospitals

Table 2: Healthcare-Associated CDI Rates[1] British Columbia & Island Health by Acute Care Facility

	..... 2010-11		..... 2011-12		..... 2012-13		..... 2013-14		..... 2014-15	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
British Columbia	8.1	(7.8-8.4)	8.1	(7.8-8.4)	6.5	(6.2-6.8)	4.5	(4.3-4.8)	N.A.	
Island Health	5.0	(4.4 - 5.7)	4.0	(3.5 - 4.6)	3.6	(3.1 - 4.2)	2.9	(2.5 - 3.5)	3.2	(2.8 - 3.8)
Island Health acute care facilities										
Campbell River	3.0	(1.5 - 6.0)	4.8	(2.7 - 8.5)	3.9	(2.2-7.1)	2.4	(1.2-5.1)	4.4	(2.6 - 7.7)
Cowichan District	5.3	(3.4 - 8.3)	5.0	(3.1 - 7.9)	3.3	(1.9 - 5.8)	2.8	(1.6 - 5.1)	3.1	(1.8 - 5.5)
Nanaimo Regional	9.8	(7.9 - 12.1)	6.4	(5.0 - 8.2)	5.4	(4.2-7.1)	2.9	(2.0 - 4.2)	3.7	(2.7 - 5.2)
Royal Jubilee	4.6	(3.5 - 6.0)	4.2	(3.2 - 5.4)	3.9	(3 - 5.2)	4.6	(3.5 - 5.9)	4.1	(3.1 - 5.4)
St. Joseph's General	3.8	(2.2 - 6.8)	4.0	(2.3 - 6.8)	4.1	(2.4 - 6.9)	2.4	(1.2 - 4.8)	2.8	(1.5 - 5.3)
Saanich Peninsula	2.1	(0.8 - 5.5)	3.0	(1.4 - 6.8)	2.6	(1.1 - 6.3)	3.3	(1.5 - 7.4)	3.7	(1.7 - 7.7)
Victoria General	3.1	(2.2 - 4.4)	2.1	(1.4 - 3.1)	1.7	(1.1 - 2.6)	1.3	(0.8 - 2.2)	1.5	(0.9 - 2.4)
West Coast General	4.7	(2.5 - 9.1)	1.6	(0.5 - 5)	1.9	(0.7 - 5.1)	2.9	(1.3 - 6.5)	0.9	(0.2 - 3.6)
Small rural hospitals*	2.9	(1.1 - 7.7)	2.8	(1.1 - 7.5)	6.2	(3.1 - 12.4)	3.3	(1.2 - 8.9)	4.3	(1.8 - 10.4)

[1] Rate per 10,000 patient days
N.A. Not available
* Includes Cormorant Island, Lady Minto, Port Hardy, Port McNeill and Tofino hospitals

Table 3: Healthcare Associated MRSA rates[1], British Columbia & Island Health by Acute Care Facility

	..... 2010 - 11		..... 2011 - 12		..... 2012 - 13		..... 2013 - 14		..... 2014 - 15	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
British Columbia	4.4	(4.1 - 4.6)	4.2	(3.9 - 4.4)	5.1	(4.8 - 5.3)	4.6	(4.4 - 4.9)	N.A.	
Island Health	2.7	(2.3 - 3.2)	2.9	(2.4 - 3.4)	2.4	(2.0 - 2.8)	2.1	(1.7 - 2.5)	2.4	(2.0 - 2.8)
Island Health acute care facilities										
Campbell River	4.4	(2.5 - 7.8)	3.1	(1.6 - 6.2)	1.7	(0.7 - 4.2)	4.4	(2.5 - 7.5)	4.0	(2.5 - 7.5)
Cowichan District	3.3	(2 - 5.6)	3.5	(2.1 - 5.8)	1.9	(0.9 - 3.8)	2.9	(1.7 - 5.0)	4.3	(2.7 - 6.7)
Nanaimo Regional	3.1	(2.2 - 4.4)	4.0	(3 - 5.4)	3.2	(2.3 - 4.4)	2.1	(1.4 - 3.1)	2.1	(1.4 - 3.2)
Royal Jubilee	2.3	(1.7 - 3.2)	2.9	(2.1 - 3.9)	2.2	(1.6 - 3)	2.5	(1.8 - 3.4)	2.3	(1.6 - 3.1)
Saanich Peninsula	2.1	(0.8 - 5.5)	0.5	(0.1 - 3.6)	3.1	(1.4 - 6.9)	1.7	(0.5 - 5.2)	1.6	(0.5 - 4.9)
Victoria General	1.9	(1.3 - 2.8)	1.5	(1 - 2.4)	1.5	(1 - 2.3)	1.0	(0.6 - 1.8)	1.3	(0.8 - 2.1)
West Coast General	3.5	(1.7 - 7.4)	4.2	(2.1 - 8.3)	5.6	(3.2 - 9.9)	1.4	(0.5 - 4.4)	5.3	(3.0 - 9.4)
Small rural hospitals*	5.0	(2.4 - 10.5)	4.2	(1.9 - 9.3)	3.9	(1.6 - 9.3)	1.7	(0.4 - 6.6)	2.6	(0.8 - 8.0)

[1] Rate per 10,000 patient days

N.A. Not available

* Includes Cormorant Island, Lady Minto, Port Hardy, Port McNeill and Tofino hospitals

Table 4: Surgical Site Infection Rates[1] following Total Joint Replacement* by Acute Care Facility

	2010-11		2011-12		2012-13		2013-14		2014-15**	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Island Health	1.3	(0.9 - 1.9)	1.4	(1.0 - 2.0)	1.6	(1.2 - 2.3)	1.0	(0.5 - 1.3)	1.3	(0.8 - 1.9)
Acute Care Facilities										
Campbell River	2.3	(1 - 5)	2.5	(1.2 - 5.3)	3.4	(1.8 - 6.3)	0.0	-	2.3	(0.9 - 5.5)
Cowichan District	0.4	(0.1 - 2.8)	1.8	(0.8 - 3.9)	2.2	(1.1 - 4.6)	1.8	(0.7 - 4.2)	1.3	(0.5 - 4.1)
Nanaimo Regional	1.8	(0.9 - 3.3)	1.2	(0.6 - 2.5)	1.1	(0.5 - 2.3)	1.4	(0.7 - 2.8)	0.8	(0.2 - 2.3)
Royal Jubilee	1.1	(0.5 - 2.3)	1.1	(0.6 - 2.2)	1.5	(0.9 - 2.7)	1.3	(0.7 - 2.4)	1.0	(0.4 - 2.1)
Victoria General	0.8	(0.3 - 2.6)	1.2	(0.4 - 3.2)	1.1	(0.4 - 2.8)	0.3	(0 - 1.9)	1.8	(0.8 - 3.9)

[1] Rate per 100 surgical procedures * Total Hip, Knee and Shoulder Surgeries

** April 1 – December 31, 2014

Note: Surveillance after 2011-12 is based on 90 days follow-up period, surveillance before 2012-13 is based on 365 day follow-up period

Table 5: Surgical Site Infection Rates[1] following Selected Cardiac Surgeries* by Acute Care Facility

	2010-11		2011-12		2012-13		2013-14		2014-15**	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
CABG & valve repair	4.5	(3.2 - 6.2)	4.8	(3.5 - 6.6)	3.8	(2.7 - 5.5)	6.3	(4.7 - 8.5)	4.6	(3.1 - 6.9)
ICD & Pacemaker	2.0	(1.2 - 3.3)	1.1	(0.5 - 2.1)	0.6	(0.2 - 1.5)	0.8	(0.4 - 1.8)	1.2	(0.6 - 2.5)

[1] Rate per 100 surgical procedures * CABG, cardiac valve and pacemakers surgeries

*** April 1 – December 31, 2014

Note: Surveillance after 2011-12 is based on 90 days follow-up period, surveillance before 2012-13 is based on 365 day follow-up period

Appendix H: Methodology & Definitions

Clostridium difficile Infection (CDI)

CDI case identification and confirmation is completed by the ICPs using provincial standardized case definitions and protocols. Cases are identified from medical microbiology reports and chart reviews. ICPs enter relevant, clinical details into a dataset utilizing Cerner Infection Control Module Powerform. The population under surveillance includes:

- Patients admitted to an Island Health acute care facility who are **one year of age or older**.
- Residents of an Island Health owned and operated residential care facility.

CDI Case Definition

A patient/resident is counted as a CDI case if the following apply:

- Presence of diarrhea* without other known etiology** **AND** laboratory confirmation of positive toxin assay or positive PCR for *C. difficile*

  OR

- Fever WITH abdominal pain and/or ileus **AND** laboratory confirmation of positive toxin assay or positive PCR for *C. difficile*

  OR

- Diagnosis of typical pseudo-membranous colitis on sigmoidoscopy or colonoscopy; OR histological/pathological diagnosis of CDI with or without diarrhea

  OR

- diagnosed with toxic megacolon

  *Diarrhea is defined as 3 or more loose or liquid stools in a 24 hour period for at least one day without another etiology – new or unusual for the patient. Loose or liquid stool is defined as that which takes the shape of the container that holds it and will move back and forth if the container is set in motion. Or stool consistency according to Bristol Stool Scale Type 6 or 7.

  ** Other known etiology may include diarrhea caused by diagnostic tests, therapeutic regimen, or acute exacerbation of a gastrointestinal chronic condition.

Where was CDI most likely acquired?

A CDI case is classified as either healthcare associated (HA) or community-associated (CA) based on the symptom onset of CDI and the patient's healthcare encounter history in the last four weeks.

A CDI case is considered **"healthcare associated your facility"** if following criteria apply:

- A new CDI case (as defined above) with symptom onset greater than or equal to 72 hours after admission to the reporting acute care or residential care facility

  OR

- A new CDI case (as defined above) with symptom onset in the community or occurring less than 72 hours after admission to the reporting acute care or residential care facility, AND

  The patient was admitted to the reporting facility for a period of at least overnight (or greater than or equal to 24 hours) and discharged in the four weeks prior to symptom onset.

A CDI infection is considered **"healthcare associated another facility"** if following criteria apply:

- A new CDI case (as defined above) with symptom onset in the community or occurring less than 72 hours) after admission to the reporting facility

  AND

- The patient was admitted to another healthcare facility (including acute care and residential care) for a period of at least overnight (greater than or equal to 24 hours) and discharged in the four weeks prior to symptom onset.

A CDI infection is considered **"**Community Associated**"** if the following criteria apply:

- A CDI case (as defined above) with symptom onset in the community or occurring less than 72 hours after admission to an acute care or residential care facility where the CDI was identified, provided that the case had no encounter with a healthcare facility (including acute care and residential care) as an inpatient in the four weeks before onset of CDI.

Was the CDI a new infection or a relapse?

All CDI cases entered in the surveillance forms must be classified as new or relapse. The definitions of New and Relapse are given below:

New infection

- A patient with diagnosis of CDI as defined above with **NO** previous history of CDI

  OR

- A patient with diagnosis of CDI as defined above that has **NOT** had an episode of CDI in the **previous 8 weeks.**

Relapse

- Patient with diagnosis of CDI with recurrence between 2 and 8 weeks after a previous CDI episode**.** The two to eight weeks period should be calculated from the date of specimen collection or diagnosis by endoscopy or pathological specimen of the previous CDI case to the date of recurrence of the symptoms or date of specimen collection; whichever recorded date is the earliest.

A relapse is attributed to the source of the original infection (i.e. healthcare associated; your acute care facility, healthcare associated another facility, or community associated). A patient with a positive laboratory test and recurrence of diarrhea **less than 2 weeks from the previous episode** even if the symptoms resolve is considered to be a continuation of the previous episode and not a relapse.

Calculation for Healthcare-Associated CDI Rate

Healthcare-associated CDI rate equals the number of new CDI cases classified as healthcare associated your facility in a specified time period divided by the total number of patient days (patients one year of age or older) for the same time period multiplied by 10,000.

Methicillin-resistant Staphylococcus aureus (MRSA)

CDI case identification and confirmation is completed by the ICPs using provincial standardized case definitions and protocols. Cases are identified from medical microbiology reports and chart reviews. ICPs enter relevant, clinical details into a dataset utilizing Cerner Infection Control Module Powerform. The population under surveillance includes:

- Patients admitted to an Island Health acute care facility.
- Residents of an Island Health owned and operated residential care facility.

MRSA Case Definition

A patient/resident is counted as a MRSA case if the following apply:

- Laboratory identification of MRSA: isolation of *Staphylococcus aureus* cultured from any specimen that tests resistant to oxacillin by standard susceptibility testing methods; or by a positive result for penicillin binding protein 2a (PBP2a); or molecular testing for mecA. May also include positive results of specimens tested by other validated polymerase chain reaction (PCR) tests for MRSA.
- A newly identified case of MRSA either infection or colonization at the time of hospital/residential care admission or identified during hospitalization/residential care.
- Patient must be admitted to an Island Health acute care or residential care facility.

INCLUDES:

- MRSA cases identified for the first time among the inpatients at the time of admission or during their hospitalization/ stay in residential care in the reporting facility
- MRSA cases newly identified among the patients in the emergency department who were then admitted to the reporting facility
- MRSA cases newly identified as inpatients in an acute care facility, who have been documented previously with positive MRSA by outpatient clinics (including ambulatory care), or any residential care facility
- Previously identified cases diagnosed with a different strain. This means the person was exposed again to MRSA and acquired another strain from another source.

EXCLUDES:

- MRSA patients previously identified by your acute care facility or Island Health residential care facilities
- MRSA patients identified in the emergency department or outpatient clinics who were not admitted to your acute care facility
- Patients transferred from another acute care facility with positive MRSA which was already documented by the transfer facility

Where was MRSA most likely acquired?

A MRSA case is classified as either healthcare associated (HCA) or community-associated (CA) based on the date the laboratory specimen was collected and the patient's healthcare encounter history in the last 12 months. The time from admission to the laboratory specimen was collected should begin at time the patient entered the emergency department for the admission in question rather than time admitted to the unit.

A MRSA case is considered **"healthcare associated your facility"** if it meets the following criteria:

- A new MRSA case (as defined above) with a specimen collection date greater than 48 hours after admission to your acute care or residential care facility

  OR

- A new MRSA case (as defined above) with a specimen collection date less than or equal to 48 hours after admission to your acute care or residential care facility

  AND one of the following:

  - The patient was admitted to your acute care facility for a period of at least overnight (or >=24 hours) within the **previous twelve months**,

    OR

  - Presence of indwelling catheters or other medical device at time of admission, which was inserted by your facility,

    OR

  - Documented history of weekly visits to an outpatient clinic (e.g., dialysis, oncology) in your facility for more than 4 weeks in the last twelve months

The last two criteria represent significant exposures in your healthcare facility. For example, if a patient was receiving dialysis once a week for more than four weeks and screens positive this would be considered a significant exposure. However, ICPs should use their best judgment. For example, if other MRSA cases were identified in the dialysis clinic at the same time, then a patient who had visited only twice might be classified as healthcare associated your facility. The presence of a medical device would apply if a patient went home with a catheter following day surgery, for example.

A MRSA case is considered **"healthcare associated another facility"** if it meets the following criteria:

- A new MRSA case (as defined above) with a specimen collection date less than or equal to 48 hours after admission to your acute care or residential care facility

  AND one of the following:

  - The patient was admitted to another healthcare facility for a period of at least overnight (or >=24 hours) within the **last twelve months**,

    OR

  - Presence of indwelling catheters or other medical device at time of admission, which was inserted at another healthcare facility,

    OR

  - Documented history of weekly visits to an outpatient clinic (e.g., dialysis, oncology) in another healthcare facility for more than 4 weeks in the last twelve months

A MRSA case is considered **"community-associated"** if it meets the following criteria:

- MRSA identified less than 48 hours after admission to acute or residential care facility

  AND ALL of the following:

  - No hospitalization in the 12 months prior to the sample collection date
  - Not a in a long-term care facility in the 12 months prior to the sample collection date
  - No weekly visits to an outpatient clinic (e.g., dialysis, oncology) in healthcare facilities in the 12 months prior to the sample collection date

- No indwelling catheter or medical device (e.g. foley catheter, IV line, tracheostomy, feeding tube)
- No other significant number of encounters with healthcare facility in previous 12 month

Is the patient colonized or infected?

- Colonization refers to the presence of MRSA on skin, on mucous membranes, in open wounds, or in excretions or secretions but are not causing adverse clinical signs or symptoms.
- Infection is defined as a patient with evidence of clinical signs and symptoms resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) in addition to a positive culture of MRSA. The presence of an infection is determined using the January 2014 CDC NHSN definitions/criteria for infections, and in accordance with the best judgment of the ICP. These criteria should be met at the time of the culture that yielded MRSA, or within 72 hours of the culture. The NHSN definitions/criteria can be accessed at URL: www.cdc.gov/**nhsn**/pdfs/pscmanual/17pscnosinfdef_current.pdf

Calculation for Healthcare-associated MRSA Rate

Healthcare-associated MRSA rate equals the number of newly identified MRSA cases classified as healthcare associated your facility in a specified time period divided by the total number of patient days for the same time period multiplied by 10,000.

Carbapenemase Producing Organisms

CPO case identification and confirmation is completed by Island Health medical microbiology laboratory and the BC Public Health Microbiology & Reference Laboratory. ICPs using provincial standardized case definitions and protocols enter relevant, clinical details into a dataset. The population under surveillance refers to the individuals who are monitored for CPO and who would be counted as a case in the CPO surveillance system if they met the case definition *(see below)*. The patient population under surveillance includes:

- Patients admitted to acute care facilities
- Haemodialysis patients visiting renal clinics

CPO Case Definition

A case of CPO is defined as a patient whose specimen isolate has been identified as harboring a carbapenemase gene.

- Either infection or colonization with CPO is included.
- The same genotype identified from different bacterial species in the same patient will be regarded as the same case of CPO.
- Different carbapenemase genes identified from the same specimen or subsequent specimens from the same patient are considered as new cases of CPO, regardless of the bacterial species.

Case identification and confirmation

Isolates from screening or clinical specimen with eligible Enterobacteriaceae and/or *Acinetobacter* and/or *Pseudomonas* spp. are first identified by the Island Health medical microbiology laboratory. Isolates suspected of harboring a CPO gene are sent to the BC Public Health Microbiology & Reference Laboratory (BCPHMRL) for molecular testing and genotyping analysis. For positive CPO isolates, BCPHMRL checks the laboratory database to determine whether it meets the definition for a newly identified case of CPO (either colonized or infected). A new case of CPO is recorded if any of the following apply:

- CPO cases identified for the first time among inpatients at the time of admission or during hospitalization in the acute care facility and haemodialysis patients identified for the first time while visiting a renal clinic
- A previously identified CPO colonized patient who subsequently develops a CPO infection within one year after testing positive as a colonized case
- A previously identified CPO patient (either colonized or infected) who subsequently tests positive with another CPO gene (either colonized or infected) regardless of the bacterial species
- CPO cases newly identified in the emergency department who was then admitted to an Island Health acute care facility
- CPO cases newly identified as inpatients in an acute care facility, who have been documented previously with positive CPO by outpatient clinics (including ambulatory care), or residential care facility.

Is the patient colonized or infected?

- Colonization is the presence of CPO on skin, on mucous membranes, in open wounds, or in excretions or secretions but are not causing adverse clinical signs or symptoms.

- Infection is defined as a patient with evidence of clinical signs and symptoms resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) in addition to a positive culture of CPO. Clinical evidence is derived from direct observation of the infection site (e.g., a wound), or review of information in the patient chart or other clinical records, or a physician or surgeon diagnosis of infection. The presence of an infection is determined using the January 2014 CDC NHSN definitions/criteria for infections, and in accordance with the best judgment of the ICP.

  (http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf)

Surgical Site Infections

IPAC's SSI surveillance program focuses on clean procedures that have a normally low risk of infection but can cause serious morbidity. Patients who had their last non-infected surgical procedure at an Island Health acute care facility are included in the surveillance. All patients having any of the procedures listed in Table 1 are monitored for signs of SSI. The denominator is the number of selected surgical procedures performed within the specified period. The numerator is the number of infections detected within 90 days post procedure. Patients who present with an infection at the time of the procedure at the facility are excluded as are any patients whose onset of infection is outside of the follow-up period.

Table 1 – Procedures under Surveillance

Orthopedics	**Cardiac**
• Total Hip arthroplasty, primary	• Coronary artery bypass graft (CABG)
• Total Hip arthroplasty, revision	• Cardiac valve surgery
• Total Knee arthroplasty, primary	• CABG & cardiac valves
• Total Knee arthroplasty, revision	• Pacemaker, primary
• Total Shoulder arthroplasty, primary	• Pacemaker, revision
• Total Shoulder arthroplasty, revision	
• Hip hemi-arthroplasty, primary	
• Hip hemi-arthroplasty, revision	
• Knee hemi-arthroplasty, primary	
• Knee hemi-arthroplasty, revision	

Definition of A SSI

The clinical evidence required to determine whether a case meets case definition for a SSI is obtained from direct observation, review of information on the patient's chart and other clinical records. A physician diagnosis of a SSI is acceptable criterion. Island Health uses the Centers for Disease Control National Healthcare Safety Network (NHSN) 2015 SSI criteria.

Finding SSI Cases

Case ascertainment of SSIs at Island Health consists of two processes. First, ICPs actively seek out infections by monitoring patient information on a daily basis. Second, data linkage is performed once a month to identify a list of "possible" SSI cases that is provided to ICPs for further investigation.

Active monitoring by ICPs

ICPs actively screen the following data sources on a regular basis for evidence of a SSI:

- ICPs review positive laboratory reports and note results that indicate a possible surgery related infection.
- ICPs monitor admission diagnosis and note patients with possible surgery related infections for follow-up.
- ICPs monitor patients who present to emergency departments with evidence of possible SSIs.
- ICPs monitor the surgical slate for procedures that are likely done because the patient has an SSI.

Data linkage

To augment the active patient-based monitoring conducted by ICPs described above data linkage is conducted to merge the procedures under surveillance with various re-encounters with Island Health facilities to flag possible cases that require further investigation by ICPs. This approach is described below:

- A list of all patients who had one of the surgical procedures under surveillance is extracted from the operation room booking system
- Each cohort is then merged with the following data sources extracted from Island Health's laboratory information system and data warehouse:
  a) laboratory positive sample analyzed at any Island Health medical laboratory within 90 days of the procedure
  b) patient visited any Island Health emergency department within 90 days of the procedure
  c) patient visited a designated Island Health ambulatory IV antibiotic treatment clinic within 90 days of the procedure
  d) patient was readmitted to any Island Health acute care facility within 90 days of the procedure
  e) patient had a subsequent surgical procedure suggestive of a possible post-operative infection within 90 days of the index procedure
- The ICP conducts a preliminary assessment to determine whether there is sufficient evidence indicating a SSI
- Further investigation of the patient's clinical information is then carried out by ICPs to determine whether the case should be classified as a SSI

Calculation for SSI rates

The procedure specific SSI equals the number of SSIs determined among patients who had undergone the procedure within the 90 day follow-up period for the specified time period divided by the total number of specific procedures performed at an Island Health acute care facility multiplied by 100.

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