INFECTION PREVENTION & CONTROL

ANNUAL REPORT
April 2014 – March 2015

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Provincial Health Services Authority Infection Prevention & Control (IPAC)
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Executive Summary

The PHSA Infection Prevention and Control (IPAC) Program had several achievements during the 2014-2015 Fiscal Year. This annual report highlights these achievements and describes the program’s challenges and future plans.

Highlights:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2013-14 Rate</th>
<th>2014-15 Rate</th>
<th>Rate change compared to last year</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSA Overall HH Compliance</td>
<td>88%</td>
<td>90%</td>
<td>Improved</td>
</tr>
<tr>
<td>PHSA HA – CDI Rate</td>
<td>5.7 per 10,000 inpatient days</td>
<td>6.9 per 10,000 inpatient days</td>
<td>Rate Increased*</td>
</tr>
<tr>
<td>PHSA HA – MRSA Rate</td>
<td>1.0 per 10,000 inpatient days</td>
<td>2.3 per 10,000 inpatient days</td>
<td>Rate Increased*</td>
</tr>
<tr>
<td>PHSA HA – VRE Rate</td>
<td>1.3 per 10,000 inpatient days</td>
<td>0.5 per 10,000 inpatient days</td>
<td>Rate Decreased*</td>
</tr>
<tr>
<td>CRBSI Rate in PICU</td>
<td>1.7 per 1,000 catheter days</td>
<td>0.6 per 1,000 catheter days</td>
<td>Rate Decreased*</td>
</tr>
<tr>
<td>CRBSI Rate in NICU</td>
<td>4.2 per 1,000 catheter days</td>
<td>2.4 per 1,000 catheter days</td>
<td>Rate Decreased*</td>
</tr>
<tr>
<td>CRBSI Rate at BC Cancer Agency Vancouver Center</td>
<td>1.7 per 1,000 catheter days</td>
<td>1.6 per 10,000 inpatient days</td>
<td>Rate Decreased*</td>
</tr>
</tbody>
</table>

*NOTE. None of the above rate changes are statistically significant.

Disease Outbreak:
No outbreaks were declared at PHSA facilities.
1. PHSA IPAC Program

At PHSA, the safety of patients, staff and visitors is of ultimate importance. To meet this commitment, in 2006, a PHSA-wide Infection Prevention and Control (IPAC) service was formed, reporting to the PHSA VP of Quality and Safety on all matters concerning infection prevention and control. IPAC is working collaboratively with other health authorities, Provincial Infection Control Network of B.C. (PICNet), and regional and national public health services in supporting best practice in infection prevention and control.

Our people:
The IPAC program consists of medical microbiologists, infectious disease physicians, infection control practitioners, an epidemiologist, a construction specialist and an infection prevention and reprocessing practice manager. The team collaborates with physicians, nurses and other clinical staff as well as environmental health officers, medical health officers, public health nurses and occupational health nurses and physicians.

Our mission:
IPAC is an essential component of patients’ safety and quality of care. Our goal is to ensure the protection of patients, staff and visitors from preventable infections and to achieve that prevention in a timely and cost-effective manner.

Our services:
The program delivers comprehensive infection prevention and control services to its stakeholders in a constructive and collaborative manner through education, surveillance, consultation, outbreak investigation, research and the development of policies and procedures.

Education
The program provides education to staff, patients and visitors about best practices for infection prevention and control. The program is constantly assessing, developing and revising strategies to ensure that the learning outcome is optimal.

Surveillance
To reduce the risk of transmission of infectious diseases in the hospital, IPAC conducts surveillance during daily ward rounds and/or by checking microbiology laboratory significant findings.

The IPAC team uses the surveillance data to:
- Monitor incidence and trends of specific infectious diseases identified at PHSA facilities.
- Detect infectious cases in a timely manner to implement appropriate control measures.
- Detect clusters of infectious disease and manage outbreaks.
- Evaluate interventional strategies.
Meet provincial and national quality and safety indicator reporting obligations.

**Outbreak management**
The program is responsible, in collaboration with public health, for investigating clusters of infectious diseases cases and declaring outbreaks at any PHSA agency as appropriate. Standardized control measures are promptly implemented when an outbreak is declared.

**Sterilization and reprocessing practices**
The program ensures that PHSA agencies deliver a safe, standardized medical device reprocessing practices. This is achieved through working closely with sterilization and reprocessing departments across PHSA. IPAC is responsible for:
- Providing advice based on best available evidence and Canadian/provincial standards.
- Providing the education, training, and competency assessment of reprocessing staff.
- Developing ongoing quality assurance planning, risk assessment and remediation based on Best Practice Guidelines.
- Conducting ongoing monitoring and halting activities known to be inconsistent with best practices (e.g., reprocessing of "in-house" manufactured devices).
- Submitting the audit reports and other required materials to the Ministry of Health on an ongoing basis.

**Construction consultation**
The IPAC program is actively involved in infection prevention and control issues relating to all construction and renovation projects within PHSA to ensure that Canadian/provincial standards are considered and adhered to. The Lower Mainland Facilities Management Infection Control Committee (LMFMICC) has a representative from the IPAC program. One among many construction projects -- the building of the new Teck Acute Care Centre on the Oak St. site -- has consumed a full 1.5 FTE of infection control practitioners (ICP) work time. This commitment on the part of the IPAC service will continue until 2018.

**Our facilities:**
The IPAC team provides infection prevention and control services to the following PHSA agencies and clinics:

- BC Center for Disease Control – Vancouver
- BC Center for Disease Control – New Westminster
- BC Children’s Hospital
- Sunny Hill Health Center for Children
- BC Women’s Hospital
- BC Mental Health – Children
- BC Mental Health – Forensic
- BC Cancer Agency – Vancouver Center
- BC Cancer Agency – Abbotsford
- BC Cancer Agency – Fraser Valley
- BC Cancer Agency – Victoria
- BC Cancer Agency – Prince George
- BC Cancer Agency – Kelowna
Patients first
Excellence through knowledge

Results matter

Best value
Open to possibilities
2. Hand Hygiene Program

The PHSA Hand Hygiene (HH) program was developed based on the concepts and materials recommended by the World Health Organization’s Global "Clean Care is Safer Care". These are similar to the HH component of “Safer Health Care Now,” a program of the Canadian Patient Safety Institute.

A comprehensive HH program – Stop the Spread – was initiated in 2008 and is now implemented in all PHSA agencies.

Over the last few years, the IPAC team has been busy evaluating and improving our HH program. Education sessions regularly occur throughout the entire organization and are well received by various audiences.

Major HH activities at PHSA facilities 2014-15 include:

- Regular HH audits across all PHSA sites.
- Update of electronic HH auditing system.
- A celebration of World HH Day in May at all sites - using stickers, posters, banners, roving carts, prizes and games.
- A celebration of National Infection Control Week in October which included innovative HH education and activities, e.g. competitions and prizes for staff.
- Change of HH products was approved across the site and the change will occur in 2015-16.
- Regular in-services and orientation.
- Regular updates of the BCCH Intranet HH team site.
- An annual review of alcohol based hand rub dispensers (spot check).
There are a total of 49 units/services at PHSA that are audited quarterly or semi-annually for HH compliance by trained auditors. The HH auditors observe a sample of staff working at all sites within PHSA. The results are posted in public spaces on each unit. Staff included in the audit: nurses, physicians, clinical support services and others (e.g. housekeeping staff).

Achievements:
- The PHSA overall HH compliance has continually increased from 50% in 2008/09 to 90% in 2014/15, which surpassed the provincial HH performance target of 80% HH compliance set for all acute-care facilities in BC. (Figure 1).
- A sustained improvement in HH compliance was seen across all PHSA agencies (Table 1).
- An overall improvement in compliance observed in all healthcare provider groups, including physicians (Figure 2).

**Figure 1: The trend of PHSA overall HH compliance**

![PHSA Overall HH Compliance 2008/09 - 2014/15](image)

**Table 1: Institution specific overall HH compliance**

<table>
<thead>
<tr>
<th>Facility</th>
<th>2014/15 HH Compliance</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2014</td>
<td>2015</td>
<td>2014</td>
<td>2015</td>
</tr>
<tr>
<td></td>
<td>Apr - Jun</td>
<td>Jul -Sep</td>
<td>Oct -Dec</td>
<td>Jan - Mar</td>
</tr>
<tr>
<td>BCCH</td>
<td>86.5</td>
<td>88.9</td>
<td>92.8</td>
<td>92.9</td>
</tr>
<tr>
<td>Sunny Hill Health Center for Children</td>
<td>92.0</td>
<td>94.0</td>
<td>96.0</td>
<td>96.0</td>
</tr>
<tr>
<td>BCMHAS– BCCH Site</td>
<td>85.6</td>
<td>91.0</td>
<td>95.2</td>
<td>95.5</td>
</tr>
<tr>
<td>BCWH</td>
<td>90.6</td>
<td>86.0</td>
<td>90.0</td>
<td>88.9</td>
</tr>
<tr>
<td>BCCA</td>
<td>88.4</td>
<td>86.5</td>
<td>90.4</td>
<td>91.3</td>
</tr>
<tr>
<td>BCCDC</td>
<td>-</td>
<td>79.0</td>
<td>-</td>
<td>89.5</td>
</tr>
<tr>
<td>BCMHAS – Forensics</td>
<td>93.1</td>
<td>97.5</td>
<td>98.0</td>
<td>97.0</td>
</tr>
<tr>
<td><strong>PHSA overall</strong></td>
<td>89.4</td>
<td>89.0</td>
<td>93.7</td>
<td>93.0</td>
</tr>
</tbody>
</table>

*: No HH observation done for that period.
Figure 2: PHSA HH Compliance at Acute Care Facilities by Healthcare Provider (HCP)
3. Education

Education is an essential component of the IPAC program. IPAC delivers education sessions to all new employees during orientation and provides ongoing in-service and consultation to all PHSA staff. On a daily basis, the infection control practitioners (ICP) address patient-, procedure-, or unit-specific concerns through phone consultation, regular ward visits and ICP rounds.

The IPAC team is constantly developing, assessing and revising education material and strategies to meet the staff’s learning needs related to best practices of infection control. The Infection Prevention and Control Basic course, HH for Medical Staff, and the Provincial HH Module are available online for all PHSA staff through Learning Hub.

In summary, in 2014/15, the IPAC team delivered 130 hours of education sessions, reaching over two thousands staff (Table 2).

**Table 2: Education activities provided by IPAC.**

<table>
<thead>
<tr>
<th>Education Type</th>
<th>2013/14</th>
<th>2014/15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># attendees</td>
<td>Hours</td>
</tr>
<tr>
<td>Accreditation</td>
<td>108</td>
<td>8.5</td>
</tr>
<tr>
<td>Staff Orientation</td>
<td>712</td>
<td>27</td>
</tr>
<tr>
<td>General infection control</td>
<td>615</td>
<td>50</td>
</tr>
<tr>
<td>Transmission-based precautions/risk assessment</td>
<td>176</td>
<td>10.6</td>
</tr>
<tr>
<td>Reprocessing of Medical Devices</td>
<td>50</td>
<td>13</td>
</tr>
<tr>
<td>Antibiotic Resistant Organisms</td>
<td>47</td>
<td>4</td>
</tr>
<tr>
<td><em>Clostridium difficile</em></td>
<td>105</td>
<td>3.3</td>
</tr>
<tr>
<td>Hand Hygiene</td>
<td>410</td>
<td>24</td>
</tr>
<tr>
<td>Patient infection control education</td>
<td>12</td>
<td>1.3</td>
</tr>
<tr>
<td>Ebola</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chicken pox</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Reolysin Treatment Review</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Basic IC Response Training</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2235</strong></td>
<td><strong>142</strong></td>
</tr>
</tbody>
</table>

The IPAC executives also encourage the IPAC members’ self-led development and knowledge enhancement. The program has offered the team members various learning opportunities such as attending national/international infection control education conferences, educational days (i.e. PICNet, CHICA-BC), the Canadian Standards Association seminars, web teleclasses, Infectious Diseases/Medical Microbiology rounds and Oncology rounds. This ensures that all IPAC members remain up to date with current infection control best practices.

*Patients first*                      *Results matter*                      *Best value*  
*Excellence through knowledge*          *Open to possibilities*
4. Reprocessing Practices

The B.C. Ministry of Health (MOH) has instituted province wide audits of reprocessing practices of critical and semi-critical medical devices since 2007. This was implemented to improve patient safety through adoption of best practice guidelines for cleaning, disinfection and sterilization of medical devices in BC. The audits are mandatory and must be done annually, using an MOH generated audit tool. The Ministry monitors and provides feedback on health authority policy implementation and quality assurance planning through our annual submissions and semi-annual update telephone conferences.

Table 3: PHSA medical device reprocessing compliance results (2009-2014).

<table>
<thead>
<tr>
<th>Audit Section Description</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment &amp; purchase of medical devices &amp; reprocessing equipment</td>
<td>98%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Environmental requirement for reprocessing area</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>92%</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>Policies &amp; procedures</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Education &amp; training</td>
<td>55%</td>
<td>90%</td>
<td>99%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Occupational health &amp; safety</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>91%</td>
<td>97%</td>
<td>100%</td>
</tr>
<tr>
<td>Cleaning (decontamination) or reusable medical devices</td>
<td>79%</td>
<td>96%</td>
<td>99%</td>
<td>100%</td>
<td>100%</td>
<td>99%</td>
</tr>
<tr>
<td>Factors affecting product selection &amp; efficacy of liquid chemicals</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Disinfection of reusable devices</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>97%</td>
<td>100%</td>
<td>99%</td>
</tr>
<tr>
<td>Reprocessing endoscope devices</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Sterilization of reusable medical devices</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Storage &amp; use of reprocessed medical devices</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Quality assurance</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Single use medical devices</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Dental clinic (providing services to a health care facility)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>67%</td>
<td>67%</td>
<td>67%</td>
</tr>
</tbody>
</table>

Note: N/A indicates that this activity was not performed.
Major re-processing activities during 2014/15 include:

- Completion of the 7th MOH mandated reprocessing audit.
- Review of appropriate location for reprocessing of flexible scopes.
- Collaboration with the C&W Sterile Processing Department (SPD) and the OR suite to review quality and performance indicators.
- Implementation of an “Instrument Management System” in the C&W SPD. This system provides tray documentation tools, sterilizer record keeping management and SPD staff productivity monitoring capabilities.
- Dentistry clinic remains at 67% due to a minor issue with building design and will be rectified in 2015-16. This design issue represents one of 3 items on the audit tool, leading to a score of 67%.
- Completion of BCCA-VC SPD Renovation to develop a reprocessing environment to meet the latest BC Best Guidelines for Cleaning, Disinfection & Sterilization of Critical & Semi-Critical Medical Devices in Health Authorities, CSA standards and Accreditation Canada.
- Provision of clinical resources in support of teaching program [VCC Sterile Processing Technician Certificate program].
- Ongoing staff education across PHSA sites.
5. Surveillance

Healthcare-associated infections (HAIs) are associated with prolonged hospitalization, increased patient morbidity and mortality, and healthcare costs. PHSA routinely measures rates of *Clostridium difficile* infection (CDI), methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin resistant enterococci (VRE) and catheter-related blood stream infections in patients admitted to acute care facilities in PHSA (i.e. BCCH, BCWH and BCCA-VC). Our surveillance program enables IPAC to make informed decisions, implement effective policies and develop guidelines to address infection prevention issues. This section provides information on the incidence and trend of each measure over the last five years as well as pertinent action plans based on the findings.

5.1. *Clostridium difficile* Infection

*Clostridium difficile* is a spore-forming bacterium that is commonly found in the environment and can live in the intestines of healthy people. It may produce toxins and cause CDI. CDI can present as mild diarrhea, but occasionally progresses to a severe infection resulting in serious complications such as bowel perforation, toxic mega-colon, sepsis and even death. Risk factors for CDI include: prolonged hospitalization, inflammatory bowel disease, solid organ transplantation, gastric acid suppression, chemotherapy/immune-suppressants and the presence of a gastrostomy tube. Key to controlling CDI is the prompt recognition, testing, and treatment of patients with CDI.

In 2014/15, a total of 61 CDI cases were identified at PHSA facilities, 37 (61%) of which were classified as healthcare associated CDI (HA-CDI). Among those 37 cases, 28 cases were identified in BCCH, 8 cases in BCCA and one case in BCWH. The rate of HA-CDI at PHSA is driven by oncology patients (24/37). This patient population is at high risk for CDI due to frequent broad-spectrum antibiotic treatment and immune compromise. Given the complex nature of CDI development, it is possible that some patients carry the *C. difficile* organism in their intestines asymptomatically on admission but later develop infection as a result of antibiotic use. Hence some CDI cases, although they meet the surveillance definition of “HA-CDI” (see Appendix II), are not necessarily transmitted between patients in the hospital.

The following graphs present the overall PHSA HA-CDI rates and the facility specific rates identified over the last six of years.
In 2014/15, the overall PHSA HA–CDI rate increased to 6.9 cases per 10,000 inpatient days (95% CI: 5.0-9.5) from 5.4 cases per 10,000 inpatient days in 2013/14. The rate increase was due to an additional 7 HA-CDI cases being identified this year (30 HA-CDI cases identified last fiscal year and 37 cases identified during the current fiscal year). Except for the significant rate decrease observed in 2009/10, there has been no clear trend (both increase and decrease in rates) observed during last 6 years, due to the small number of cases identified each year.

Figure 4: Overall HA-CDI rate at PHSA acute care facilities

<table>
<thead>
<tr>
<th>Year</th>
<th>PHSA HA-CDI rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/10</td>
<td>7.9</td>
</tr>
<tr>
<td>2010/11</td>
<td>4.1</td>
</tr>
<tr>
<td>2011/12</td>
<td>6.5</td>
</tr>
<tr>
<td>2012/13</td>
<td>6.9</td>
</tr>
<tr>
<td>2013/14</td>
<td>5.4</td>
</tr>
<tr>
<td>2014/15</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Note: 1. Patients in psychiatric beds or less than one year of age were excluded in the calculation of rates.
2. Starting November 2011, PCR testing for CDI has been introduced at C&W. This more sensitive laboratory test may detect more CDI cases compared to the use of previous laboratory tests.

At the facility level, in 2014/15, there was only one HA-CDI case identified at BCWH. A slightly increased HA-CDI rate was observed at BCCH [11.5 per 10,000 inpatient days (95% CI: 8.0-16.7)]. An increased HA-CDI rate was also observed at BCCA [14.4 per 10,000 inpatient days (95% CI: 7.3-28.4)], although the changes in the rates at both BCCH and BCCA were not statistically significant.
In 2014/15, the following CDI prevention measures were implemented by PHSA IPAC through multidisciplinary collaborative work:

- Intensified hand hygiene promotion.
- Stringent environmental cleaning/disinfection.
- Timely implementation of infection control measures for suspect and confirmed CDI cases.
- Increased staff educations on hand hygiene and housekeeping standards.
- Adoption of a CDI “tool kit”, which has been developed by PICNet and is approved by the MOH.
- A BCCH multidisciplinary working group involving all key stakeholders has been meeting regularly and to address all identified issues.
5.2. Methicillin–Resistant *Staphylococcus aureus*

*Staphylococcus aureus* is a type of bacterium that is commonly found on the skin and in the nose of healthy people. At any given time, between 20 and 30 per cent of the general population carry *S. aureus* bacteria on their hands or in their nose, but are not ill. *S. aureus* bacteria that are resistant to the antibiotic methicillin are known as methicillin-resistant *Staphylococcus aureus* (MRSA). MRSA has the potential to cause infections for which treatment options are limited. If left untreated, MRSA infections may develop into serious, life-threatening complications such as infection of the bloodstream, bones and/or lungs (e.g., pneumonia).

MRSA is usually spread through direct physical contact or through contact with objects contaminated with infected body fluids. Bacteria on hands can spread to others if appropriate hand hygiene is not performed.

In 2014/15, a total of 63 new MRSA cases were identified among all patients admitted to PHSA facilities. Among those, 21 cases were classified as healthcare associated MRSA (HA-MRSA) [BCCH: 10/37 HA-MRSA; BCWH: 11/19 HA-MRSA]. Compared to the rates in previous 5 years, the overall PHSA HA-MRSA rate increased to 2.3 cases per 10,000 patient days (95% CI: 1.5-3.4) in 2014/2015; however this increase was not statically significant.

Figure 6: Overall HA-MRSA rate at PHSA acute care facilities
In 2014/15, no HA-MRSA cases were identified at BCCA. However, increased rates of HA-MRSA were observed at both BCCH and BCWH. These increased rates were not statically significant. The IPAC team initiated targeted actions on the units with high MRSA burden, which included implementation of MRSA screening compliance audits and reinforcement of good hand hygiene practices.

Figure 7: HA-MRSA rate by acute care facilities at PHSA
5.3. Vancomycin Resistant Enterococci (VRE)

Enterococci bacteria live in our intestines and on our skin, usually without causing problems. Vancomycin-resistant enterococci (VRE) refer to certain stains of enterococci that have developed resistance to vancomycin and other antibiotics, making them difficult to treat. A person can have VRE in their intestines without having symptoms of illness.

VRE, like many bacteria, can spread from patient to patient on the hands of healthcare workers and occasionally through contact with contaminated equipment or other surfaces (e.g. toilet seats, bedrails, door handles, soiled linens, stethoscopes, etc).

VRE infections occur most commonly in healthcare settings among patients with weakened immune systems. Those who have been previously treated with vancomycin or other antibiotics for long periods of time, have undergone surgical procedures, or have medical devices such as urinary catheters are at a higher risk of becoming infected with VRE.

In 2014/15, 18 new VRE cases were identified at PHSA facilities. Among those, 5 (28%) were classified as HA-VRE (BCWH: 2 cases; BCCH: 2 cases and BCCA: 1 case). The overall PHSA HA-VRE rate decreased to 0.5 cases per 10,000 inpatient days (95% CI: 0.2-1.3) this year from 1.3 cases per 10,000 inpatient days (95% CI: 0.7-2.2) in 2013/14.

**Figure 8:** Overall HA-VRE rate at PHSA acute care facilities

![PHSA overall incidence rate of HA -VRE 2009/10 -2014/15](image)
A decreased HA-VRE rate was observed at both BCCA [1.8 per 10,000 inpatient days (95% CI: 0.1-10.2)] and BCWH [0.4 per 10,000 inpatient days (95% CI: 0.1-1.3)]. BCCH recorded an increased rate [0.6 per 10,000 inpatient days (95% CI: 0.2-2.3)]. Overall, HA-VRE rates are low at the three PHSA acute care facilities and have fluctuated normally over the years due to the small number of cases.

**Figure 9: HA-VRE rate by acute care facilities at PHSA**
5.4. Catheter-Related Blood Stream Infection (CRBSI)

Central venous catheters (CVC) are indispensable in modern-day medical practice, particularly in the care of patients with complex illnesses such as those cared for in oncology and intensive care units (ICUs). Although such catheters provide necessary vascular access, their use puts patients at risk for complications, including local site infection, catheter-related blood stream infection (CRBSI), septic thrombophlebitis, endocarditis, and other infections (e.g., lung abscess, brain abscess, osteomyelitis, and endophthalmitis).

PHSA agencies deliver highly specialized care in high risk areas such as oncology, neonatal and paediatric intensive care units. Many of the patients in these units have central venous catheters and therefore, conducting surveillance of CRBSI in this high risk group is a pivotal component of IPAC activities.

**BCCA - Vancouver Centre**

At BCCA, IPAC started its CRBSI surveillance among admitted patients in 2013. In 2014/15, 1,287 CVC days were recorded at BCCA. Two CRBSI cases were identified, corresponding to 1.55 cases per 1,000 line days. The figure below illustrates the CRBSI rates produced by the surveillance data in last two years.

**Figure 10: CRBSI rate at BC Cancer Vancouver Center**

<table>
<thead>
<tr>
<th>CRBSI Rates at BC Cancer Vancouver Center Inpatient Unit 2013/14-2014/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases per 1000 catheter days</td>
</tr>
<tr>
<td>2013/14</td>
</tr>
<tr>
<td>2014/15</td>
</tr>
<tr>
<td>CR-BSI Rate</td>
</tr>
<tr>
<td>1.7</td>
</tr>
<tr>
<td>1.6</td>
</tr>
</tbody>
</table>
**Paediatric intensive care unit at BCCH**

In 2014/15, only one CRBSI case was identified at the Paediatric Intensive Care Unit (PICU) at BCCH. The rate has decreased compared to the rate of last year, but this rate change is not statistically significant.

**Figure 11: CRBSI rate at PICU unit at BCCH**

![CRBSI rate at PICU unit at BCCH](chart1.png)

**Neonatal Intensive Care Unit at BCWH**

In 2014/15, a decreased CRBSI rate of 2.4 case/1000 catheter days was observed in the Neonatal Intensive Care Unit (NICU). Although the rate change is not statically significant, the actual case number decreased significantly from 26 cases last year to 13 cases this year.

**Figure 12: CRBSI rate at NICU unit at BCCH**

![CRBSI rate at NICU unit at BCCH](chart2.png)
5.5. Surgical Site Infections

Infection following surgery can lead to serious complications including prolonged hospitalization, increased patient anxiety and health care costs. Therefore, surgical site infection (SSI) surveillance has become a universal measure of quality in surgical programs.

**BCCH:** In July 2011, the Department of Surgery at BCCH joined the U.S.-based National Surgical Quality Improvement Program (NSQIP) and began conducting detailed pediatric SSI surveillance for selected surgical procedures, including post discharge follow-up.

Since then, the PHSA IPAC Service has been working closely with the department of surgery and the NSQIP team to explore new ways to support collection of SSI data on procedures not currently part of the NSQIP program (e.g. cardiac surgery).

**BCWH:** Over 2000 Caesarean sections (C-sections) are performed annually at BCWH. Over the past few years, the IPAC team has been working collaboratively with the Department of Obstetrics and Gynaecology and Providence Health Care (PHC) on developing standardized definitions, surveillance tools and SSI case finding methods for C-sections. In Feb 2014, a pilot project on C-section surveillance was launched and operated by the research team at BC Women’s Research Institute. This project includes two components: 1) developing and implementing an on-line patient post-discharge SSI follow-up and reporting portal; 2) implementing a physician survey on reporting SSI identified within 30 days following C-sections. This study has completed in September 2014 and results are to be used for guiding future development of a SSI surveillance system at PHSA facilities.

In 2014/15, 11 SSI cases were identified, including 5 organ space, 2 deep incisional and 4 superficial incisional infections.

**Figure 13. C-section SSI cases identified at BCWH in 2014/15.**

![Bar chart showing C-section SSI cases identified at BCWH in 2014/15.](chart.png)
6. Outbreak Management

Outbreaks are defined as a localized increase (e.g. in a unit, in a hospital) of the occurrence of an event (e.g. disease) over expected numbers. A small rise in events may be referred to as a “cluster”. Both “clusters” and “outbreaks” require prompt investigation and management. To identify an outbreak, baseline endemic rates must be available for comparison.

Outbreaks may occur for a number of reasons. For example, the introduction of and transmission of an infectious disease within the healthcare facility, lapses in infection control practices, or contaminated or defective products or devices. While outbreaks will continue to occur, many can be prevented or have reduced impact through intentional, knowledgeable and rapid management practices.

The primary safety goal of the IPAC program is to decrease the occurrence and duration of outbreaks in PHSA. Routine surveillance allows the team to detect clusters in a timely manner so that the appropriate interventions can be implemented swiftly to limit transmission. Once an outbreak is identified, the IPAC team facilitates immediate and concurrent involvement of all areas impacted by the outbreak.

A Risk-Based Model remains the central approach used by the IPAC team to detect and control outbreaks. Actions facilitated by the IPAC team to prevent or contain outbreaks include:

- Provision of staff education to reinforce the need for implementation of precautions based on symptoms rather than diagnosis. This decreases the time between exposure and transmission.
- Thorough review of each patient case.
- Focus on Emergency Departments as a high risk area.
- Prompt laboratory identification of the infectious agent.
- Placement of infected patients in a private room, where possible.
- Dedicated equipment for infected patients.
- Increased cleaning staff on units with an ongoing cluster or outbreak.
- Change of cleaning solutions and frequency of cleaning in the affected area.

In 2014/15, no outbreaks were declared in any PHSA facilities.
7. Projects and Initiatives

7.1 Protocols for Ebola Virus Disease

The Ebola outbreak in West Africa consumed many healthcare resources worldwide. IPAC resources in PHSA were redirected toward preparing for the possibility of a suspect or confirmed Ebola case starting in August 2014, and high alert levels consumed resources well into March of 2015.

Personal Protective Equipment (PPE) supplies were assessed, obtained and trialed in a cycle that took many months to complete. Best practice for donning and doffing of PPE was studied, practiced and taught until a provincial standard was established by the BC Ministry of Health-led Ebola Working Group. Staff members were trained and simulations were held on an ongoing basis as information changed and the outbreak continued.

Many lessons were learned as we prepared for an outbreak that is unlikely to reach our province. Communication, partnerships, preparedness, and infection control principles were exposed and explored. Hanging on to and embedding these lessons in daily practice are the valuable work of the year ahead.

The IPAC team members participated on many committees to provide expert guidance that informed the many documents on the BC Ministry Ebola page, found at: http://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-systemoffice-of-the-provincial-health-officer/current-health-topics/ebola

7.2 Infection Control Audits of Specialty Areas

In 2011, BCCH became the first pediatric agency in Canada to participate in the National Surgical Quality Improvement Program (NSQIP). In response to internal risk assessments and SSI outcome data, a series of quality improvement initiatives have implemented at BCCH since 2013.

In February 2014, the Infection Control Committee approved IPAC’s request to review the operating room (OR) in light of NSQIP reports of high SSI rates and areas for improvement identified by the visiting IP consultant. Standardized audit tools developed by Infection Prevention and Control Canada (IPAC Canada) were used to guide the review. IPAC followed best practice guidelines as outlined by the Association for Professionals in Infection Control and Epidemiology (APIC), the Operating Room Nurses Association of Canada (ORNAC), and the Association of Peri-Operative Registered Nurses (AORN).

Since this audit IPACS has audited BCW OR, BCW Neonatal Intensive Care Unit (NICU) and BCCA OR using the same standardized tools. These audits have resulted in improvements but have also informed future planning for these important high risk areas. This audit process is systematically being expanded throughout PHSA.
8. Future Directions

The IPAC team is undergoing significant changes to its human resources moving into the next fiscal year, with the arrival of a new Corporate Director, Dr. Jocelyn Srigley, and several new Infection Control Practitioners. As a result, the IPAC service will undergo review and improvement as new ideas are incorporated and existing team assets are strengthened.

The PHSA hand hygiene program is scheduled for a refresh in the next fiscal year with the help of students from Emily Carr University of Art & Design.

Infection Control is very involved, with the rest of the Children’s & Women’s campus, in supporting the design and construction of Teck Acute Care Centre. Re-defining how we work as a small group and in the context of the larger group in a new facility is part of the short term goals for this evolving team. The long term goals of IPACS include expanding our service as new clinics open and Sunny Hill Health Centre for Children moves on to the site.

In addition, the IPAC program has recognized the need to build a system for expanding the surveillance scope to address new HAI risks in a changing environment. IPAC regularly reviews the surveillance program’s goals and processes to ensure that the program meets the needs of the institutions in context of high data quality and system efficiency. Led by the IPAC executives and epidemiologist, the surveillance process is reviewed annually to ensure that the definitions are relevant and accurate, and the data collection process is balanced between being comprehensive and efficient.

Moving forward, the IPAC program is putting effort in developing a timely data feedback mechanism and improving its data communication with all stakeholders, especially the front-line staff. In addition, the IPAC program will continue to participate and support the Provincial Infection Control Network (PICNet) and the Canadian Nosocomial Infection Surveillance Program (CNISP) to provide evidence-based data that can be used to establish benchmarks, identify trends to develop provincial/national guidelines to help reduce the transmission of HAI.
Appendix A: Infection Prevention and Control Team

Georgene Miller  
Vice President  
Quality Safety and Outcome Improvement

Eva Thomas, MD  
IPAC Medical Director - outgoing  
Medical Microbiologist

Jocelyn Srigley, MD, MSc  
Corporate Director, PHSA, IPAC - incoming  
Medical Microbiologist

Simon Dobson, MD  
IPAC Associate Director - Acting  
Infectious Diseases Specialist

Ghada Al-Rawahi, MD  
BCCA Infection Control Officer  
Medical Microbiologist

Peter Tilley, MD  
Medical Microbiologist

David Goldfarb, MD  
Medical Microbiologist

Jun Chen Collet,  
IPAC Epidemiologist

Viola Tang, RN  
IPAC Reprocessing Manager

Stacie Buttar  
IPAC Administrative Assistant

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PHSA IPAC Coordinator

Louise Holmes, RN, CIC  
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Kelsi Laporte, RN, CIC  
Infection Control Practitioner, BCCH & BCW

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Infection Control Practitioner, BCCH & BCW

Thomas Hooker, RN  
Infection Control Practitioner, BCCH & BCW

Alison Chant, RN, CIC  
Infection Control Practitioner, BCCA

Kimberly Mallory, RN CIC  
Infection Control Practitioner, BCCA

Sheetal Kainth, RN  
Infection Control Practitioner, BCCA

Kristie Harding, RN  
Infection Control Practitioner, BCCA

Judy Tearoe, RN  
Infection Control Practitioner, BCCA

Brenda Ryder, RN  
Infection Control Practitioner, BCCA

Ron Morley, RPN, ADPN  
Infection Control Practitioner, Forensics

Sarah Wells  
IPAC Construction Specialist

Ornella Polovina  
HH Auditor, Student Co-op

Ericka Mulherin  
HH Auditor, Student Co-op

Ishmael Nunez  
HH Auditor, Student Co-op

Jayson Tan  
HH Auditor, Student Co-op
### Appendix B: The patient service profile at PHSA facilities in 2014/15

<table>
<thead>
<tr>
<th>Facility</th>
<th>Acute Care Beds</th>
<th>Annual Admissions</th>
<th>Annual Outpatient visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC Children’s Hospital</td>
<td>102</td>
<td>6,785</td>
<td>122,798</td>
</tr>
<tr>
<td>Sunny Hill Health Center for Children</td>
<td>14</td>
<td>150</td>
<td>11,051</td>
</tr>
<tr>
<td>BC Women’s Hospital</td>
<td>182</td>
<td>15,083</td>
<td>50,158</td>
</tr>
<tr>
<td>BC Mental Health – Children</td>
<td>40</td>
<td>472</td>
<td>16,560</td>
</tr>
<tr>
<td>BC Mental Health – Forensic</td>
<td>190</td>
<td>342</td>
<td>3,025</td>
</tr>
<tr>
<td>BC Cancer Agency (BCCA) - Vancouver Center*</td>
<td>26</td>
<td>645</td>
<td>124,487</td>
</tr>
<tr>
<td>BCCA – Abbotsford*</td>
<td>NA</td>
<td>NA</td>
<td>35,800</td>
</tr>
<tr>
<td>BCCA – Fraser Valley*</td>
<td>NA</td>
<td>NA</td>
<td>59,921</td>
</tr>
<tr>
<td>BCCA – Victoria*</td>
<td>NA</td>
<td>NA</td>
<td>64,317</td>
</tr>
<tr>
<td>BCCA – Prince George*</td>
<td>NA</td>
<td>NA</td>
<td>15,348</td>
</tr>
<tr>
<td>BCCA – Kelowna*</td>
<td>NA</td>
<td>NA</td>
<td>48,515</td>
</tr>
<tr>
<td>BC Center of Disease Control – TB Clinic</td>
<td>NA</td>
<td>NA</td>
<td>24,393</td>
</tr>
<tr>
<td>BC Center of Disease Control – STD Clinic</td>
<td>NA</td>
<td>NA</td>
<td>14,843</td>
</tr>
<tr>
<td><strong>PHSA Total</strong></td>
<td><strong>554</strong></td>
<td><strong>23,477</strong></td>
<td><strong>591,216</strong></td>
</tr>
</tbody>
</table>

N/A indicates that this activity is not applicable.

* The outpatient visits for BCCA are the sum of the Radiation therapy visits, Systemic therapy visits, and the Chemotherapy visits.

Source: Data provided by PHSA Performance Measurement and Reporting Group.
Appendix C: Definitions

**Colonization:** The presence, growth, and multiplication of an organism without observable clinical symptoms or immune reaction. The patient is asymptomatic.

**Infection:** Invasion by and multiplication of a microorganism in body tissue resulting in clinical manifestations of disease.

**VRE case:** Laboratory confirmation of vancomycin-resistant enterococci from specimens indicative of colonization or infection.

**MRSA case:** Laboratory confirmation of methicillin-resistant *Staphylococcus aureus* from specimens indicative of colonization or infection. This includes:

- Cases identified for the first time during their hospital admission to BCCH or BCW.
- Cases identified previously at outpatient clinics but currently the patients being admitted to BCCH or BCW with positive MRSA isolates.
- Cases identified in the emergency department that are admitted subsequently (during the same day).

This does **NOT** include:

- Cases identified in the emergency department but are not admitted.
- Cases identified in outpatient clinics or other outpatient cases.
- Case re-admitted with MRSA.

**Healthcare-Associated MRSA:** A MRSA case (as defined above) identified greater than 3 calendar days after admission to BCCH or BCW, **OR** a MRSA case identified 3 calendar days or less after admission to BCCH or BCW, but is related to a previous admission to BCCH or BCW within the last 12 months.

**CDI case:** Laboratory confirmation (positive toxin or culture with evidence of toxin production) of *Clostridium difficile* in an unformed stool specimen (does not include patients <1 year of age).

**Primary CDI Infection:** The first episode of CDI ever experienced **OR** a new episode of CDI which occurs more than 8 weeks after the previous toxin-positive assay.

**Continuation of the CDI infection:** The subsequent positive CDI lab result(s) obtained within two weeks following the primary CDI infection.

**Healthcare-Associated CDI:** A CDI case (including primary and relapse CDI cases) with symptom onset greater than 3 calendar days or more after admission to BCCH or BCW, **OR** a CDI case with symptom onset in the community or 3 calendar days or less after admission to BCCH or BCW, provided that symptom onset was less than 8 weeks after the last discharge from BCCH or BCW.

**Patient days:** Patient days are used as denominators in the calculation of rates to adjust for length of stay. It is calculated by the number of patients admitted at BCCH or BCW (counts are usually conducted at midnight) and multiplied by the number of days of hospitalization in a given time period.
**Catheter-related Bloodstream Infection (CR-BSI):**

Patient has one of the following:
- Non-tunneled CVC, coated or non-coated (e.g. pulmonary artery catheter)
- Tunneled infusion device (e.g. Hickman, Broviac, tunneled hemodialysis line)
- Peripherally inserted central catheter (PICC line)
- Implanted vascular access device (IVAD)

**AND one of the following criteria**
- A recognized pathogen cultured from one or more blood cultures and unrelated to an infection at another site.

**OR**
- At least one of:
  - Fever >38 degrees
  - Chills
  - Hypotension

**AND**
- Positive laboratory results unrelated to an infection at another site that include a common skin contaminant (e.g. diphtheroids, *Bacillus* spp., coagulase-negative staphylococci, viridians group streptococci, *Aerococcus* spp. and *Micrococcus* spp.) cultured from 2 or more blood cultures drawn on separate occasions within 48 hours of one another.

**OR**
- At least one of:
  - Fever >38 degrees
  - Chills
  - Hypotension

**AND**
- Positive laboratory results unrelated to an infection at another site that include a common skin contaminant (e.g. diphtheroids, *Bacillus* spp., coagulase-negative staphylococci, viridians group streptococci, *Aerococcus* spp. and *Micrococcus* spp.) cultured from 1 blood culture

**AND**
- The physician institutes antimicrobial therapy.

**Gastrointestinal outbreak:** Three or more cases of suspected gastroenteritis among patients, residents, or staff, that cannot be explained by admitting diagnoses or by non-infectious causes of symptoms (i.e. recent use of laxatives or stool softeners, chronic diarrhea, etc.), within a four-day period in the same unit or patient care area.

**Respiratory outbreak:** Two or more cases of influenza-like illness (fever, chills, headache, myalgia, sore throat, cough, nasal congestion, etc.) among patients, residents, or staff within a one-week period in the same unit or patient care area.